SWIMMING UPSTREAM:

FURTHERING COLLABORATIVE CARE IN BLUE RIDGE HEALTH DISTRICT

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Table of Contents

Acknowledgements and Disclaimer

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Honor Pledge

On my honor as a student, I have not given nor received unauthorized aid on this assignment.

Executive Summary

A patient's health is driven by a variety of factors including their home, work, and community. This means that patients often require services provided outside of a traditional clinic to fully address their health needs. However, to ensure that patients receive all the support they need, healthcare providers need solid partnerships with the people and organizations that are providing these non-traditional healthcare services. *To promote effective upstream care, Blue Ridge Health District (BRHD) must facilitate collaboration, connection, and communication between governmental actors, health departments, clinics, and non-profits.*

BRHD is provisioned by the Virginia Department of Health to provide community health services to over 250,000 residents, but they maintain a specific focus on promoting health justice (VDH, n.d.). The district has spent the last 10 years working closely with local stakeholders to identify ongoing health injustices and develop potential upstream healthcare policies for the BRHD context. Now, BRHD needs a strategy to implement these policies, and effective collaboration is key. However, collaborative, upstream care is difficult to deliver because it is not something the free market naturally provides, and American healthcare reimbursement models encourage curative procedures over upstream care (Bufalino et al., 2020; Nichols & Taylor, 2018). Still, it is essential that BRHD work on this issue. Without upstream, collaborative care, residents will face higher rates of disease and worsened disease management. These costs are also disproportionately inflicted on marginalized communities making this issue relevant to BRHD's health justice mission (Covassin et al., 2018; White et al., 2013).

Many other communities have developed programming to encourage upstream, collaborative care. Research on these programs illustrates how communities can use new types of labor to facilitate collaboration, showcases the value of connecting clinics to one another, and details how to work towards an even more connected system where all sectors are seamlessly cooperating. Although most of this evidence is case-studies and early-stage programming, research indicates that almost any policy could work, but leaders need to ensure that stakeholders are invested in the program and have the resources to sustain it long-term.

Thus, this report considers three-policy alternatives. (1) Maintain the status quo and let present trends continue, (2) invest in community health workers (CHWs), and (3) invest in Unite Us, an innovative referral platform. These policy options were evaluated based on their cost to BRHD, effectiveness in improving collaboration, feasibility, sustainability, and equity in connection. Based on these criteria, investing in CHWs was the most sustainable and equitable way to facilitate collaboration without large increases in cost. CHWs are a powerful group able to bridge gaps in care provision by connecting patients to stakeholders and services that are typically inaccessible. With the proper support and monitoring, CHWs can address the collaboration issue in BRHD, ensuring that patients receive the services they need regardless of whether these services are provided by a physician or a non-traditional healthcare provider.

Introduction

Michael Johnson was released from prison in 2020 after completing a 5-year sentence at the Buckingham Correctional Center just an hour from Charlottesville. Upon his return home, he was faced with the immense task of reintegrating into society. However, Michael soon developed a sharp pain in his back and goes to the emergency room with his sister. There, he was told to keep pressure off his back, monitor his blood pressure, and then left to his own devices. Michael could not follow the doctor's orders. His record limited his employment opportunities, and his family could not afford fresh fruits and vegetables. However, if his physician had understood Michael's social and economic circumstances, he might have connected Michael to the Blue Ridge Food Bank and the Virginia employment commission. Michael's story, although fictional, represents the experiences of hundreds of Blue Ridge Health District (BRHD) residents. These patients are facing impossible choices every day and often their health takes a backseat.

Patients should not need to make these choices. Instead, they should be connected to the services that they need – even those which cannot be provided in an emergency room. This report will consider how patients can be connected to health-adjacent services even those provisioned outside of the clinic. This report will first understand the problem, then develop a series of potential, evidence-based policy solutions, and finally evaluate these solutions to produce a final policy recommendation for BRHD.

Problem Statement

An individual's health is defined by far more than their interactions with a physician, but is a function of their housing, food, work, community, and more. As the home to 5 health departments, 2 free clinics, and over 300 nonprofit partners, BRHD has the resources to address the fundamental social and economic structures that prevent an individual from reaching their full health potential. However, this type of care, also called upstream care, requires the successful collaboration between a multitude of stakeholders to ensure that patients can identify and access all the non-clinical services they need. Currently, BRHD's abundance of health-adjacent entities are struggling to effectively collaborate with one another as evidenced by inconsistent and incomplete stakeholder engagement. ***Thus, BRHD must facilitate collaboration, connection, and communication between governmental actors, health departments, clinics, and non-profits to promote effective upstream healthcare.***

Client Overview and Policy Landscape

BRHD is provisioned by the Virginia Department of Health (VDH) to provide community health and public health services to about 250,000 residents in the district (VDH, n.d.). BRHD utilizes a justice-oriented approach to community health. BRHD recognizes that marginalized communities are more likely to face worse social, economic, and environmental conditions to the detriment of their health. Thus, BRHD's mission focuses on working with community members

and organizational partners to address these health injustices for the betterment of all residents (VDH, n.d.). In pursuit of this mission, BRHD provides services with the support of both UVA Health and the Sentara Martha Jefferson Hospital as well as four Federally-Qualified Health Centers and two free clinics – Charlottesville Free Clinic and the Greene Care Clinic (VDH, n.d.). BRHD is also collaborates with expansive non-profit sector of an estimated 300-400 non-profits (R. Schmdit, personal communication, October 6, 2022).

Currently, BRHD is experiencing large shifts in the collaborative care space due to new grants and programming. The organization recently received a grant to hire a trainer for its community health workers (CHWs). This trainer will train, supervise, and support BRHD's team of 5 CHWs and other alike positions in the region. Additionally, Virginia has purchased a state-wide integrated health platform called Unite Us. BRHD currently uses the platform for internal case management (K.Goodman, personal communication, November 10, 2022). Both these programs as well as others demonstrate the growing political and financial backing to improve healthcare outcomes via collaborative care. BRDH is in a unique position where they do not need to convince others of need but rather must take advantage of the current opportunity as effectively as possible. Thus, rather than suggesting new policies, this report aims to understand the current issues with BRHD's collaborative care programs and identify opportunities for improved program implementation.

Background

The social determinants of health are the non-medical factors, including beliefs, social inequalities, behaviors, and risk exposure, that contribute to poor health outcomes (Bharmal et al., 2015). Their effects are validated by a rich literature connecting components like income, educational attainment, and race to health outcomes like life expectancy and maternal mortality (Braveman & Gottlieb, 2014). These measures are proxies associated with an increased likelihood of exposure to long-term social and economic stressors. For example, lower-income individuals are more likely to live in substandard housing, food deserts, and areas with higher rates of gun violence. These social, economic, and environmental structures often directly led to illness and disease, but also have long-run effects on the body through small-dose but prolonged exposure to stress (McEwen, 1998). Since the social determinants of health are inequitably imposed on certain communities, BRHD's justice mission obligates them to address these determinants via upstream care.

Upstream care aims to address the fundamental causes of disease by tackling inequalities in economic conditions, risk exposure, and social advantage. Upstream interventions have been shown to address the social determinants of health and, thereby, reduce health disparities (Williams et al., 2008). However, while healthcare providers play a key role in identifying a patient's social determinants of health, they are often unable to address these determinants. For example, a physician can identify that a patient's poor diet is contributing to their diabetes, but the physician might not have the tools or time to help the patient address the fundamental causes

of this poor diet. Instead, other entities like governmental bodies and local non-profits can fill the gap and help patients address these more fundamental social and economic stressors. Therefore, high-quality upstream care is inherently collaborative. Collaborative healthcare is provided by a team of providers – including both traditional healthcare providers and non-traditional healthcare providers like social workers and governmental actors (Worsham, 2022). All these individuals work together to address a patient's social determinants of health to hopefully improve the patients immediate and long-term health outcomes. Ultimately, BRHD cannot make progress on its mission without first implementing a successful collaborative care model.

This section first will describe BRHD's ongoing upstream care efforts, the reasons why BRHD has struggled to make progress on the issue of collaborative care, and why this work is important. Throughout this section, upstream care and collaborative care are treated as nearly synonymous.

Current Collaborative, Upstream Care Efforts

While BRHD has taken several steps in the aim of collaborative care, BRHD's main effort has been following the Mobilizing for Action through Planning and Partnerships (MAPP) process. Since 2007, BRHD has completed five rounds of MAPP. This framework, established by the Centers for Disease Control and Prevention and the National Association of City and County Health Officials, works to connect health organizations, coalitions, and community members so they can identify opportunities for health advancement (VDH, n.d.). The MAPP process was developed in 2001and is now a widely used framework among public health and community health organizations. It is unique in its emphasis on the role of stakeholders in addressing the social determinants of health. The MAPP process is still evolving, but it's a new and innovative way to think about health inequity and injustice. The process is a 6-step progression where local governments identify common values, assess the problem, identify strategic issues, formulate goals, and then take action (NACCHO, n.d.). BRHD recently finalized its goals and now working towards action.

While it appears that VDH mandated that all health districts in the state complete the MAPP process, BRHD seems to be the furthest along. Since joining the program, BRHD has published five MAPP2Health reports in 2008, 2012, 2016, 2019, and 2022 (VDH, n.d.). The 2012 report focuses on data analysis and data gaps, the 2016 report establishes four priority areas[1], the 2019 report creates subgoals in each priority area and identifies strategies and community partners for each subgoal, and finally, the 2022 report establishes specific focus areas and policy efforts for major subgoals (BRHD, 2012; BRHD, 2016; BRHD, 2019; BRHD, 2022). BRHD has already identified important community partners, established goals, formed coalitions, and much more while other areas in Virginia like Norfolk and Henrico remain in their

[1] Four priority areas: promote health eating and active living, address mental health and substance abuse, reduce health disparities, and improve access to care, and foster a healthy and connected community for all ages.

data analysis phases (Henrico County, 2017; Norfolk, 2015). The MAPP2Health plans have also manifested into real action via the establishment of coalitions addressing physical activity, food justice, mental health, community wellbeing, maternal health, and social health (BRHD, 2019). These coalitions were only established in 2019 and are therefore still in their infancy. Nevertheless, they have still raised awareness, developed educational materials and resource guides, and established community groups (VDH, n.d.).

Unfortunately, these coalitions and the other interventions described in the MAPP2Health reports fail to effectively engage all potential health-adjacent stakeholders. The coalitions are typically partnerships with small, local nonprofits but not providers while the policy interventions focus on traditional providers but not non-profits. Nearly all programming leaves out private actors. Research shows that the most effective upstream healthcare interventions are team-based with cooperation between physicians, nurses, social workers, and community health workers. These teams can work together to identify and improve the social determinants of a patient's health (CPSTF, 2021). For example, if patient comes into the clinic with a persistent cough that is linked to mold in their housing unit, a collaborative care team will not simply prescribe medication, but also connect the patient to legal aid to demand redress from their landlord. As already discussed, upstream care requires the input and effort of all stakeholders even those far removed from the traditional clinic. However, BRHD is not currently in regular communication with all actors who play a key role in creating a healthy community. While BRHD has made immense progress in identifying upstream policies for this community, BRHD now needs to identify strategies to implement these policies – and collaboration is key.

The Challenges with Collaborative, Upstream Care

BRHD recognizes the importance of upstream care, but there are several challenges with consistently implementing collaborative, upstream interventions. First, communities generally under-invest in preventative and upstream care despite the growing evidence base in support of this work. Research suggests that upstream interventions are public goods meaning that they can benefit people who do not directly pay for these services (Nichols & Taylor, 2018). Economic theory and evidence also show that public goods are inherently undersupplied by free market actors because suppliers cannot capture the full return of their investment. With upstream interventions, it's difficult to ensure a hospital or insurance company which provides preventative care reaps the full benefits of their investment as patients can easily switch providers (Nichols & Taylor, 2018). Collaborative interventions thus also face a free-rider problem where some members of the collaboration can make minimal investments in the intervention yet benefit from the investments and efforts of others on the team. This disincentivizes others from joining and investing in the team at all (Nichols & Taylor, 2018). Typically, a governmental body, like BRHD, will need to provide public goods in the face of this under provision.

Similarly, reimbursement systems in the US are not set up to incentivize upstream care. The US utilizes a fee-for-service model of reimbursement meaning that providers are compensated for care volume not their patients' outcomes. While the US has slowly been transitioning to a value-based reimbursement model, both payers and providers maintain a relatively short-term view of healthcare and patient outcomes (Levine et al., 2019). Current alternative payment models tend to focus on the management of acute events or procedures rather than preventing disease in the first place. Additionally, these alternative payment models are still uncommon with 64% of healthcare dollars still going to fee-for-service plans (Bufalino et al., 2020). This challenge is especially salient when pursuing collaborative, upstream care as it is extremely difficult to determine how the different entities that support a patient will be reimbursed. If a patient receives services from a physician, a social worker, and a nonprofit, only the physician will be reimbursed by an insurance company. The social worker and nonprofit require external funding, typically from philanthropic and governmental bodies, making it difficult to ensure that all care providers receive appropriate reimbursement for their services.

Finally, it is difficult to research and quantify the effects of collaborative, upstream care. Both upstream and collaborative care function within a complex series of interactions that play out over a long period of time, and therefore, are difficult to evaluate via randomized control trial (Bharmal et al., 2015). Because research funding prioritizes rigor and single diseases, researchers have a limited understanding of what upstream interventions work nor an ability to quantify their effects. These metrics are increasingly important to the healthcare system as all change is driven by quality and efficacy ratings. Collaborative, upstream care, both due to its complexity and longevity, cannot be evaluated against the same metrics as curative care (Levine et al., 2019). The evidence review included in this report describes and demonstrates these challenges in more depth.

Importance of Collaborative, Upstream Interventions

Even though collaborative, upstream care is difficult to provide, it is imperative that BRHD make progress on this issue. As discussed, effective upstream care is necessarily collaborative in nature, and an effective upstream intervention has the potential to prevent disease and more effectively manage existing disease. As described in Figure 1, the absence of effective upstream care leads to a variety of downstream consequences that ultimately impact social and economic wellbeing. The critical effects of ineffective upstream care include increased healthcare spending, increased burden on curative care systems, and unequal rates of disease among marginalized communities.

High health risk, for example elevated blood pressure or high body weight, is associated with increased health care expenditure. Figure 2 compares individuals of moderate and high risk individuals to low-risk individuals on a variety of risk factors including blood pressure, drug use, and stress. It shows that higher stress levels, cholesterol levels, body weight, and stress levels are

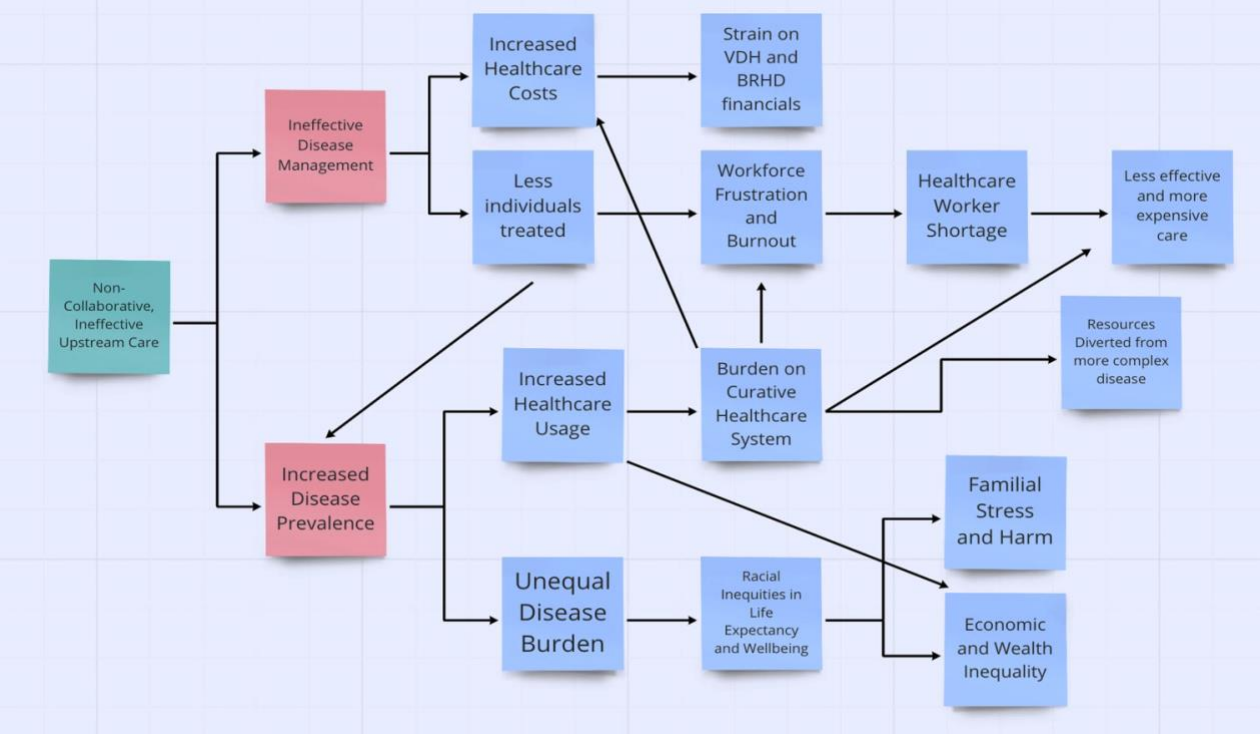


Figure 1: Consequences of Non-Collaborative, Ineffective Upstream Care

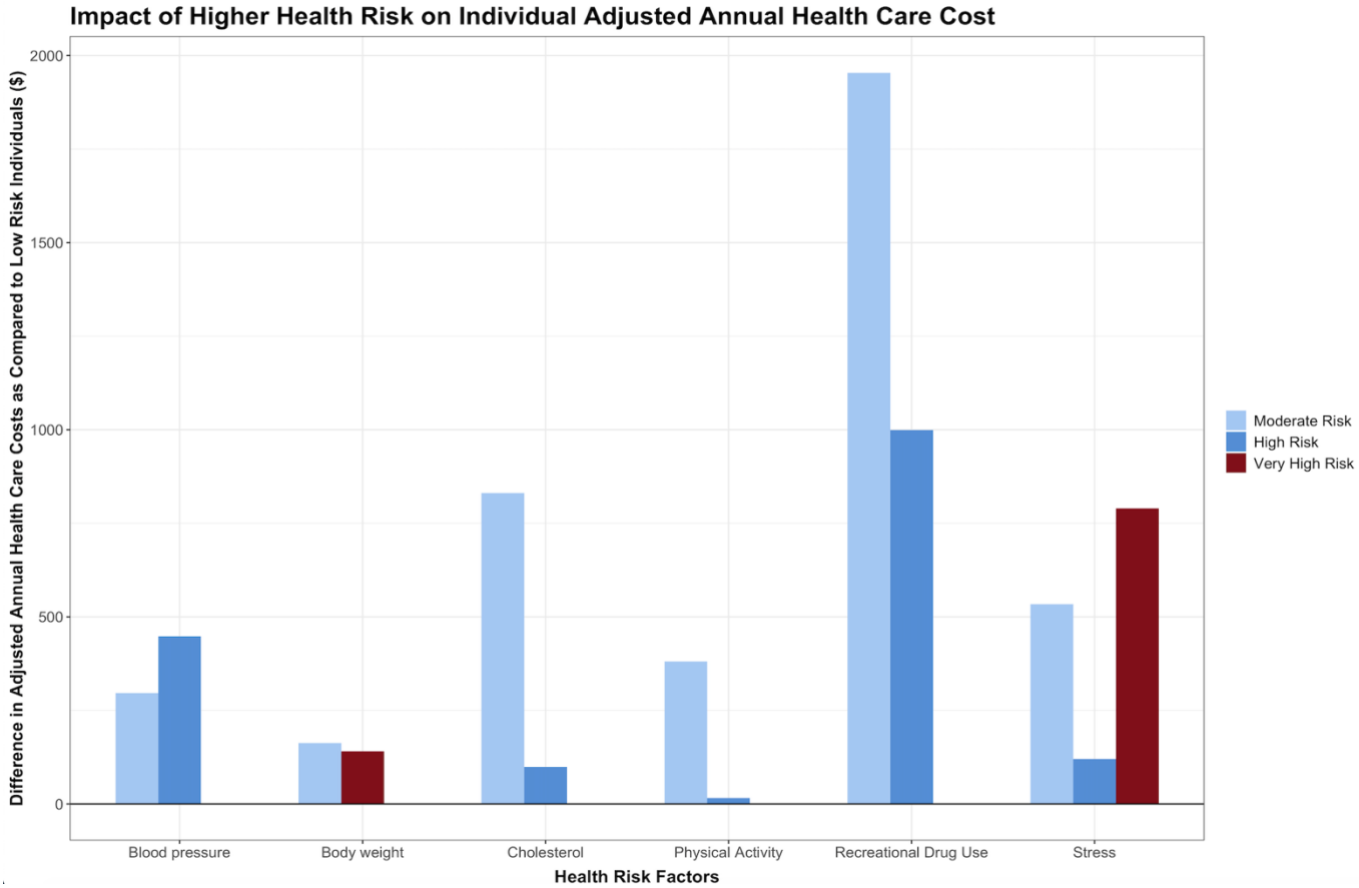


Figure 2: Impact of Increased Health Risk on Individual Adjusted Annual Health Care Costs (White et al., 2013)

associated with increased annual costs ranging from $150 to $2000 (White et al., 2013[2]). Even among those with chronic conditions, reducing one risk factor, like weight, smoking, and cholesterol, is associated with $129 in annual savings while each risk added is associated with $210 in increased annual spending (Nyce et al., 2012). Upstream interventions are effective in reducing these healthcare costs because they reduce or eliminate these risk factors. An evaluation of a collaborative, personalized care program, which provided patients with increased access to physicians and individualized healthcare resources, found a combined savings of $119.4 million (Klemes et al., 2012). Improved upstream care has the potential to yield huge savings improving the financial health of patients and BRHD. Currently, Virginia spends $10 billion on Medicaid patients, but data indicates that effective upstream care could potentially reduce Virginia's Medicaid spending by up to $20 million (KFF, 2020; Klemes et al., 2012).

These huge cost reductions are a function of reduced service utilization. Having a healthier population naturally leads to a population which needs fewer healthcare services. The same collaborative care strategy discussed above found enormous reductions in elective, non-elective, emergent, avoidable, and unavoidable hospital admissions. Compared to those who received traditional, fee-for-service care, in 2010, those who received personalized care were 62% less likely to be hospitalized, 49% less likely to have an avoidable hospital admission, and 63% less likely have an unavoidable hospital admission (Klemes et al., 2012). In BRHD, 3.5% of hospital admissions are entirely preventable, meaning they could have been addressed by a primary care physician. In some areas, like Green County, the rate of preventable hospital admissions climbs to about 5% (BRHD, 2022). These data do not include hospitalizations for critical conditions which may have been prevented from manifesting altogether with effective upstream care. Curative healthcare systems are currently burdened with both complex and preventable disease, so it is important implement strategies which can help mitigate this load. It will benefit patients who will see fewer healthcare costs and improved health outcomes, but also overworked physicians who will be able to reinvest their time and resources in more complex and unavoidable cases.

These increased costs are disproportionately imposed on Black patients and other marginalized communities including rural communities. Marginalized communities face disparities in access to health care, direct and indirect discrimination, neighborhoods without groceries or spaces to exercise, and environmental conditions all of which directly contribute to risk factors and poor health (Baldwin, 2003). Within BRHD specifically, a long, complex history has led to worsened living conditions and therefore worsened health outcomes for Black individuals. UVA medical students robbed Black graves for cadavers, professors led the eugenics

[2] White et al. analyzed the effects of three additional risk factors - tobacco use, alcohol use, and poor nutrition. These risk factors were associated with reduced costs, however, the researchers hypothesize that this relationship is primarily due to measurement issues and underutilization of healthcare services by certain groups. Thus, since the relationship between these risk factors and costs remains unclear, they were omitted from my discussion of the study and Figure 2.

movement and lobbied for the passage of the Eugenical Sterilization Act, white physicians denied care to Black individuals until the 1960s, and as recently as 1980, UVA health displaced Black residents for hospital expansion (BRHD, 2019). Racial covenants, redlining, and urban renewal limited residents' ability to buy homes in certain neighborhoods, access loans generally, and build stable communities (BRHD, 2019). This history is deeply intertwined with health.

The Black residents of Blue Ridge have experienced both historical and contemporary marginalization and are therefore at more risk to develop chronic disease. The unequal burden of chronic disease subsequently contributes to other health outcomes. For example, the unequal burden of cardiovascular disease is estimated to account for 30% of the gap in life expectancy between Black and white populations (Covassin et al., 2018). In BRHD, Black patients 45% more likely to be hospitalized for preventable issues as compared to white patients and were more than four times as likely as white patients to be admitted for hypertension and live births (BRHD, 2022). These disparities even starker for Black individuals who live in rural areas. Black patients in Nelson and Louisa County are 3 percentage points more likely to hospitalized for preventable diseases as compared to 1 percentage point in other areas of Blue Ridge (BRHD, 2022). Again, these preventable diseases have the potential to be addressed or alleviated with effective upstream care. Instead, Black individuals are currently burdened with diseases that condemn them to die younger and with less to leave their families. In an unforgiving cycle, disparities in health both result from and cause economic inequality – Black residents are left digging themselves out of a hole which just gets deeper and deeper.

Review of Existing Evidence

BRHD must pursue collaborative care programming to achieve truly effective upstream care, however, it is unclear what types of partnerships are most effective and what makes these partnerships effective. This review of the literature sheds some light on what BRHD is doing right and the policy solutions necessary to help BRHD improve. While BRHD will not be able to implement all the programming discussed in this review, this is a useful section for two reasons. First, this evidence was essential in creating the policy alternatives recommended in later sections. Second, this review is a resource that BRHD can return to in the future if they want to further expand their programming.

The evidence can be divided into three tiers of healthcare evolution. Reimagining the provider considers how we can use new types of labor to facilitate collaboration, reimagining the clinic considers how physician offices and clinics should cooperate, and reimagining the system considers how to connect a variety of sectors across BRHD. Across all three tiers, these studies are primarily policy proposals, early-stage programming, and case studies. As a result, these proposals are not accompanied with long-term, rigorous outcomes evaluation nor implementation evaluation. Still, the existing literature is quite valuable finding that while almost

all proposed programs could work, the program that will work best depends on its buy-in from stakeholders, funding structures, and sustainability.

Reimagining the Provider

Community Health Workers (CHWs)

Community health workers play an increasingly important role in healthcare delivery as connectors between healthcare consumers, especially groups who have traditionally lacked access to adequate care, and providers (Gibbons and Tyson, 2007). CHWs can address health at all levels via services like welfare-enrollment assistance, prescription refills, counseling, home visits, and health education (Peretz et al., 2020). There is strong evidence that CHWs are a cost-effective means of reducing the prevalence and burden of chronic disease. A meta-analysis of 26 randomized-control-trial (RCT) studies targeting cardiovascular disease found that 62% of CHW interventions saw reduced disease risk (Kim et al., 2016). CHWs have also been shown to improve blood pressure management through diet and medication adherence interventions (Brownstein et al., 2007; Gibbons & Tyus, 2007; Kim et al., 2016; Scott et al., 2018). Improved disease management then contributes to increased primary care usage, reduced emergency department usage, and reduced costs (Brownstein et al., 2007; Kim et al., 2016).

Despite evidence that CHWs are effective, inconsistent reporting on training, supervision, compensation, and workflow means that it is difficult to determine the factors which make CHWs effective. Still, a review of 112 articles from 2005-2007 found evidence that continuous training with a focus on both technical and social skills, frequent but high-quality on-site training and supervision, and CHW integration into practices and hospital systems are essential to CHW success (Scott et al., 2018). Effective reimbursement models are also vital, but most CHWs rely on federal and philanthropic grants. Minnesota was the first state to link CHW services to Medicaid reimbursement with the stipulation being that the CHW must be under the supervision of a physician (Kim et al., 2016). The use of RCTs means that we can be confident CHWs are effective, but we now need research focused on designing successful CHW programs.

Community Paramedicine

Recently, several programs have explored the use paramedics in providing care to underserved populations. Programs in Wisconsin, Georgia, California, and Texas have used EMTs to provide home visits, education, monitoring, and non-ED transports. These programs typically target individuals with chronic disease that have a history of high ED utilization and can be highly successful. For example, the program in Texas prevented 1,893 transports for 146 patients amounting to $800 million in savings (Iezzoni et al., 2016). A pre-post-design study conducted in South Carolina had paramedics execute a physician-designed care plan for patients with at least one chronic disease and a history of frequent ED usage. The researchers found a

significant decrease in blood pressure, ED visits, and inpatient visits with increased patient satisfaction, increased preventative care provided, and increased usage of community resources. This all amounted to an estimated return on investment of 20% (Bennett et al., 2018).

A more systematic review of 8 community paramedicine programs found similar results with all the studies describing decreased healthcare utilization and increased patient satisfaction. Among the 3 which described patient outcomes, they found reduced pain and improved blood pressure (Gregg et al., 2019). However, like the CHW literature, it is difficult to determine exactly what makes a community paramedicine intervention successful. An ethnographic study from rural Canada found that successful community paramedicine programs require community engagement, flexibility, interprofessional training, integration with the health system and social services, strong leadership, improved paramedic education, and clear treatment pathways distinct from just ED transport (O'Meara et al., 2016). Unfortunately, this study was conducted outside of the US, so it might be difficult to translate these findings to the American context. There remain major questions around who will be training these paramedics, how BRHD can successfully integrate them into the health ecosystem, reimbursement policies, and how to monitor EMTs to ensure patient safety.

Reimagining the Clinic

Coordinated Care

Unlike current models of care which involve detached providers not communicating with one another, coordinated care bridges that divide by creating a relationship between different providers, the patient, and their families to best meet a patient's needs (Bodenheimer, 2007). An effort in Tulsa, Oklahoma developed care coordination entities and a regional exchange for health information which connected primary care providers and specialists to treat patients with high-risk of mental illness. They found a reduction of $22 per patient per month in addition to improve treatment outcomes (Clancy & Duffy, 2013). Another program, targeting elderly individuals with chronic illness, developed mobile teams of providers to deliver services at the patient's home. A team comprised of a primary care provider, a social services staff, and office team all of whom coordinated services together. While this program saw improved patient satisfaction, the researchers were unable to provide cost estimates or outcome measures (DeJonge et al., 2009). Additionally, while these are both valuable case studies, it is difficult to draw a causal connection between the coordinated care program and their outcomes because coordinated care naturally involves a system-wide change.

While there are limited examples of coordinated care in action, these case studies still shed light on the essential components of a successful coordinated care program. The Tulsa program struggled with buy-in, especially from specialists who were only convinced to participate after seeing some preliminary success (Clancy & Duffy, 2013). Another review of 20

coordinated care studies emphasized the importance of multidisciplinary primary care teams, flexible service delivery systems, fund pooling, and collectivized information sharing (Ehrlich et al., 2009). Another study which interviewed and conducted focus groups with a cohort of 5 physicians found that coordinated care should start in the primary care office with the thoughtful integration of specialists. These physicians also emphasized the importance of clear communication and financially sustainable teams, but also pointed out the importance of involving the family in care (Stille et al., 2005). BRHD will have to consider barriers like disjointed electronic medical record systems, over-extended primary care facilities, and poor financing which can limit the potential of coordinated care (Bodenheimer, 2007).

Self-Management Trainings

Most healthcare occurs within the home when individuals or families are managing or preventing chronic disease. Self-management trainings facilitate and improve the at-home management of disease. A program implemented in 17 different states provided 6 peer-lead training sessions over 6 weeks to 1,170 participants. These trainings sessions aimed to cultivate the medical, social, and emotional skills to manage a participant's chronic disease. Evaluated via a pre-post design, it found reduced ER and hospitalization rates as well as net savings of $364 per participant. The researchers estimated national, annual savings of $3.3 billion if even 5% of adults with chronic are reached (Ahn et al., 2013). Two other training programs, one addressing diabetes and the other addressing dementia, also found improved outcomes, increased satisfaction, and behavior shifts. These programs were provided by community health workers for 12 weeks and 6-months respectively. The diabetes program included education sessions and weekly walking clubs while the dementia program included home visits and skills trainings to caregivers of dementia patients (Staten et al., 2004; Stevens et al., 2012). However, the intensity, facilitator, and programming that defines a successful self-management training remains unclear.

Reimagining the System

Community Partnerships

Cross-sector partnerships between providers, community groups, governmental bodies, and other stakeholders are a new frontier in healthcare provision (Towe et al., 2016). Less hands-on programs, like resource cards or resource maps, help patients identify and take-up community services they need, and can empower both the provider and patient (Clapp, 2022; Fiechtner et al., 2017). More involved community interventions like the Healthy Eating and Exercising to Reduce Diabetes program in Detroit included programming like walking clubs, cooking classes, and fruit and veggie markets. The intervention engaged a large array of community partners that were all involved in planning and implementing the different components of the program (Schulz et al., 2005). This program, and others like it, have found improved activity levels and increased healthy eating, but it remains unclear if these changes are able to translate into longer-term

outcomes like reduced blood pressure (Lundeen et al., 2017; Plumb et al., 2012; Schulz et al., 2005). In another program in Minnesota, patients received a home-visit, developed a plan of care with a nurse or CHW, and executed on the plan with the support of social workers, nurses, and physicians. This study was able to follow a cohort of 142 patients for 2.5 years, and researchers found reduced used of acute care services and a reduced cost of care. (Holland et al., 2019).

These cross-sector partnerships have huge potential because they target health inside the clinic but also in the home, community, and built environment. An action framework from the Robert Woods Foundation explains that successful cross-sector partnerships require a multitude and breadth of partners, investment in collaboration, and policies to support that collaboration (Towe et al., 2016). A review of 150 cross-sector programs identified the importance of productive formal and informal relationships, a skilled and dedicated workforce, institutional structures, and effective leadership (Watt et al., 2017). Another review of 16 articles found similar results while also emphasizing the importance of centering the patient and developing a shared vision of care (Winters et al., 2016). Of course, achieving these standards is difficult. It is exceedingly challenging to encourage active and sustained commitment from organizations which have other priorities and programming. Many cross-sector partnerships struggle to create momentum around these new practices and find adequate internal capacity for this new programming. For example, most social workers don't have the ability to take on an increased case load which makes it difficult to engage and retain the workforce necessary for success (Mosley, 2021).

BRHD should consider how to best encourage engagement from their stakeholders. Evidence on effective engagement recommends first securing buy-in from organizational and stakeholder leadership (Jarris, 2013; Spencer & Nuamah, 2021). Then, all stakeholders should work together to develop mutual trust and a shared vision. Throughout this process, the lead organization, BRHD in this case, should provide relevant information and data to secure further buy-in, provide resources like expertise and funding, and be open to learning from other stakeholders (Estacio et al., 2017; Jarris, 2013; Spencer & Nuamah, 2021). The key component of this process is that stakeholders are involved in the creation of the solution rather than having a solution imposed on them. Additionally, it is important that both BRHD and stakeholders ensure that staff have sufficient time to invest in the partnership (Spencer & Nuamah, 2021). Finally, researchers emphasize the importance of sustainable funding and ongoing monitoring and evaluation. Funding and staff changes can be extremely detrimental to a partnership, and evaluation is essential to ensure that everyone's efforts are recorded and acknowledged (Estacio et al., 2017).

Alternatives

The existing evidence on collaborative care indicates that nearly all programming has potential, so it is important to identify which programming can be implemented successfully

given BRHD's context. In conversations with BRHD, it became clear that some policies like community paramedicine were completely infeasible given current funding structures while other policies like self-management trainings and coordinated care were too narrow given the system-wide changes BRHD was interested in pursuing. Thus, I focus specifically on CHWs and community partnerships, however, the specifics of each policy alternative often borrow from other programs reviewed in the previous section. Ultimately, I suggest three policy alternatives: maintaining the status quo, investing in CHWs, and investing in the Unite Us platform.

Alternative 1: Maintaining the Status Quo

Currently, BRHD maintains an unfocused but comprehensive assortment of policies that aim to improve collaborative care in the region. BRHD employs 5 community health workers – one of whom is partially funded through Albemarle – and have plans to hire a CHW trainer. BRHD has also established coalitions of stakeholders to address issues like physical activity, food justice, mental health, and community well-being. These coalitions are still in their infancy having only been established in 2019, but they have produced some results. Finally, the group is planning to utilize an integrated health platform called Unite Us funded by the Virginia Department of Health (VDH). They plan to launch the platform internally to be used for case management before potentially extending it to the larger community. All these programs are grant funded with guaranteed funding only through 2024. Most of this funding comes from an influx of federal grantmaking during the COVID-19 pandemic – many of these grants focus specifically on rural areas. Additionally, BRHD has limited capacity for monitoring and evaluation meaning they have not been able to formally assess and amend their ongoing programming. Still, the literature indicates that all this programming is effective and will lead to improved community engagement and collaboration while maintaining flexibility in the face of funding fluctuations.

Alternative 2: Investing in Community Health Workers

BRHD could focus on improving the CHW program with an emphasis on supporting their existing team. To improve the CHW program, BRHD will first need to focus their CHW trainer on capacity-building activities. Capacity building involves the creation of appropriate infrastructure, resources, services, and staff necessary to implement a program. Successful capacity building will require that BRHD's trainer, ideally someone with previous experience as a CHW, offer mentorship and consultation, provide technical assistance, and conduct on-site supervision and training (DeCorby-Watson et al., 2018; Juckett et al., 2022). Next, BRHD will need to conduct outreach to local health systems to better integrate CHWs. Effective integration involves communication between CHWs and health systems, transparency about CHW recruitment, and education about the value of CHWs (Garfield & Kangovi, 2019; Payne et al., 2017). Since BRHD cannot force integration, they should work with leadership to establish shared goals, educate providers, and increase transparency around the CHW program. Finally,

BRHD should identify an alternative case management tool that they can fund independently and invest in the monitoring and evaluation of their CHWs (Scott et al., 2018).

Alternative 3: Investing in the Unite Us Platform

The VDH-funded Unite Us platform aims to streamline communication and referrals between different providers by centralizing their case management systems. Currently, BRHD plans to use Unite Us as an internal case management platform, but BRHD could instead dedicate time and resources to implementing the platform as an expanded referral platform. With this alternative, BRHD would work on quickly adding health systems, clinics, non-profits, and governmental agencies to the platform. The major challenge of this alternative will be convincing community partners and stakeholders that this platform is a worthwhile resource and investment of their time, thus BRHD should be thoughtful in how it engages these community partners. First, BRHD and community partners must establish a shared vision of what the Unite Us platform can do for residents. Then, to support the rollout of the platform, BRHD will need to dedicate resources to hiring a trainer who can implement the software and assist others with set-up. Finally, BRHD will need to invest in the monitoring and evaluation of the program to ensure that progress toward the original shared vision is recorded and recognized.

Criteria

BRHD's goal is to link community members to the services that they need, and they understand that to achieve this goal they need robust partnerships with the people and organizations that are providing these services. Additionally, as a small group funded primarily through grants, BRHD is working under constraints. I will use five criteria weighted equally– cost, effectiveness, sustainability, feasibility, and equity – to evaluate my three alternatives. I aim to identify the policy alternative that best balances BRHD's goals and constraints.

Cost

The cost criteria will evaluate the costs associated with each alternative over 5 years. Using budget information from BRHD, I quantified any increases or decreases in payroll, administrative, and IT costs associated with a particular alternative. Due to data constraints, figures only include costs specifically associated with collaborative care programming in BRHD. I account for inflation in my calculations using values from the CBO ranging from 2.1-3% between 2024-2029 (Swagel, 2023). I also use a 5% discount rate – this is the average discount rate across the range used by federal agencies (Zerbe Jr. et al., 2002). Then, I translate these budget changes into a 1-5 scale. 5 equates to a less than a 1% change in budget compared to the status quo, 4 is a 1-2% change in the budget, 3 is a 2-5% change in the budget, 2 is a 5-10% change in the budget, and 1 is more than a 10% change in the budget.

Effectiveness

The effectiveness criteria will be a measure of improved connection and collaboration. For all three alternatives, I used expert judgment to estimate the effect of each alternative on improved connection. I conducted structured interviews with 4 experts in BRHD who have substantial experience in their field (Zondervan-Zwijnenburg et al., 2017). Each of these experts rated the alternatives on a scale of 1-5, and I will use the average of these scores as a baseline score. However, expert judgment is fallible, so I remove 0.25 points if I felt there is a strong potential for bias. Then, I added points if either previous trends or the literature showed positive outcomes. Previous trends in stakeholder engagement were primarily relevant for the status quo. I quantified previous engagement by examining the number of unique entities that attended the MAPP2Health convenings and how attendance has changed over time (Goodman, 2020). Previous trends are not available for the other alternatives, so, instead, I used peer-reviewed literature to understand if the alternative is projected to have a positive effect on collaboration. I added 0 points to the expert evaluation if previous trends or literature is not promising, 0.5 points if they are somewhat promising, or 1 point if they are very promising.

Sustainability

Fluctuations in funding, staff, and policy can be extremely detrimental to a partnership's future, so BRHD will want to ensure sustainable funding for any alternative that they pursue. (Estacio et al., 2017). 3 sub-criteria were used to develop a final sustainability metric on a 1-5 scale. 1) The reliability of BRHD's current grants measured by the share likely to be renewed with less than 50% being low, 50-99% being medium, and 100% being high; 2) The number of additional grants would BRHD need to fund new programming with 0 being low, 1 being medium, and 2+ being high; and 3) The number of funding sources available for new grants with 2 or less being low, 3-4 being medium, and 4+ being high. All the data necessary for these sub-criteria was available online, in BRHD's budget, or via interviews with experienced staff members. Then, I quantified each sub-criteria's low, medium, and high rating to equal 1,3, or 5 points respectively. The average of these scores will be final sustainability score for each alternative, again on a scale of 1-5.

Feasibility

Any policy that BRHD pursues needs to be administratively feasible so that BRHD staff can implement, maintain, and monitor the program. 5 sub-criteria were used to develop a final feasibility metric on a 1-5 scale. 1) The number of organizations outside of BRHD that will need to be involved in implementing this alternative with 0-3 being a low number of partners, 3-6 being a medium number of partners, and 6+ being a high number of partners; 2) The autonomy with which these organizational partners will need to act on a low, medium, high scale; 3) The number of steps necessary to implement the alternative with less than 5 or less being low, 6-10

being medium, and more than 10 being high; 4) The number of these steps which are new with less than 30% being low, 30-60% being medium, and more than 60% being high; and 5) The length of time necessary to completely phase in the alternative with 2 years being low, 2-3 years being medium, and 3+years being high. Sub-criteria 3,4, and 5 were evaluated using a draft set of implementation steps and a draft implementation timeline that were approved by the BRHD team. Then, I quantified each sub-criteria's low, medium, and high rating to equal 5, 3, and 1 points respectively. Note that this point system is reversed with low equating to 5 because the low categorization for each sub-criteria is the normatively better outcome. Finally, the average of these scores will be final feasibility score for each alternative, again on a scale of 1-5.

Equity

Equity in connection is a key component of this analysis. An inequitable program will only reach stakeholders with the most resources, UVA Health for example, while failing to reach less established stakeholders like nonprofit groups and small clinics. Such a concern is relevant because while UVA health has fantastic resources for patients, so does the non-profit sector especially since there are non-profits in the region directly addressing food insecurity, housing needs, social disconnection, and much more. The collaborative care model aims to ensure that patients can access all the services they need including those that are provided at a localized and grassroots level. Three sub-criteria were used to develop a final equity metric on a 1-5 scale. 1) Whether the stakeholder will have to make low, medium, or high investments, staffing or monetary, in the implementation of an alternative; 2) Whether the stakeholder will have to make low, medium, or high investments in their use of the alternative; 3) Whether new organizations can easily start participating in the program, again on a low, medium, high scale. These sub-criteria helped indicate if the alternative is low-cost and easy to access. Then, like feasibility, I quantified each sub-criteria's low, medium, and high rating to equal 5, 3, and 1 respectively. Low equates to 5 points here because a low rating is the more equitable outcome. The average of these scores will be final equity score for each alternative, again on a scale of 1-5.

Evaluation

To determine which program BRHD should pursue, this section will evaluate the three alternatives already described. This section will first detail how each alternative was scored on the criteria listed above. Then, it will present a matrix summarizing the results of this detailed analysis. Finally, the section will present and justify a recommendation for which alternative BRHD should implement.

Alternative 1: Maintain the Status Quo

Cost: Under the status quo, given investment in both their current CHWs and a trainer, BRHD will spend $4,359,305 on collaborative care from 2024 through 2029. This value is measured in terms of present value with a discount rate of 5% while also accounting for inflation

until 2029. In calculating this cost, I assumed that funding for the 5 CHWs and CHW trainer would be available until 2029. Details for the cost calculations are provided in Appendix A. Since Alternative 1 results does not deviate in spending from the status quo budget, this alternative receives **5 cost rating.**

Effectiveness: Experts within BRHD have a high opinion of the collaborative care work that BRHD is already doing. On a scale of 1-5, they rate the effectiveness of BRHD's ongoing work an average of 4.5 – the base efficacy score. Quotes from these interviews are provided in Appendix B. While I was concerned with bias in these expert evaluations, I decided not to remove points as all experts had similarly positive things to say about BRHD's work. Appendix D provides more detail on these concerns ultimately finding that the results of my analysis are independent of evaluative bias. Additionally, figures 3 and 4 highlight BRHD's previous engagement trends. Figure 3 shows that about 90 individual organizations attended MAPP2Health meetings in 2022 with most only attending one meeting. Only Child Health Partnership and UVAHealth had a presence at all the meetings in 2022. Figure 4 shows that engagement with the MAPP2Health convenings was growing steadily overtime, but there was a sharp decline in 2022. This decline is likely attributable to the COVID-19 pandemic which over-extended health-adjacent organizations and prevented in-person meetings. Overall, BRHD maintains a high level of engagement, but only a few organizations consistently attend meetings, and BRHD has lost progress due to the pandemic. Therefore, the previous trends are somewhat promising. Thus, summing together the 4.5 points from expert evaluation and the 0.5 additional points from previous trends, Alternative 1 has a **5 effectiveness rating.**

Sustainability: Currently, BRHD's collaborative care services are funded by 5 grants that are set to expire between 2024 and 2026. 3 grants currently provide funding for the 5 CHWs and a public engagement manager. These 3 grants are funded at the Congressional level from provisions in the American Rescue Plan, and they are set to expire in 2024, 2025, and 2026 respectively. BRHD also has an additional grant from Health Resources and Services Administration (HRSA) for a CHW trainer until 2024. These 4 grants relating to CHWs are likely to be renewed – already HRSA has posted applications to extend the trainer grant until 2025. The last benefit BRHD relies on is the Unite Us grant from VDH which provides them access to the Unite Us platform free of charge. Former Governor Ralph Northam guaranteed funding for Unite Us until 2024, and it is likely that Governor Glenn Youngkin will let this funding expire (UniteUs, 2020). Overall, 4 out of 5 grants are likely to be renewed. If Unite Us funding were to expire, it is extremely unlikely that BRHD will be able find an alternative funding source, however, BRHD would simply let the software expire meaning it would need no new grants. If the other 4 grants were to expire, BRHD would want to replace that funding but there are only 3-4 alternative funding sources available. Thus, considering medium current reliability, 0 additional grants, and 3-4 alternative funding sources, each sub-criterion is rated 3, 5, and 3. Overall, Alternative 1 has a **3.67 sustainability rating.**

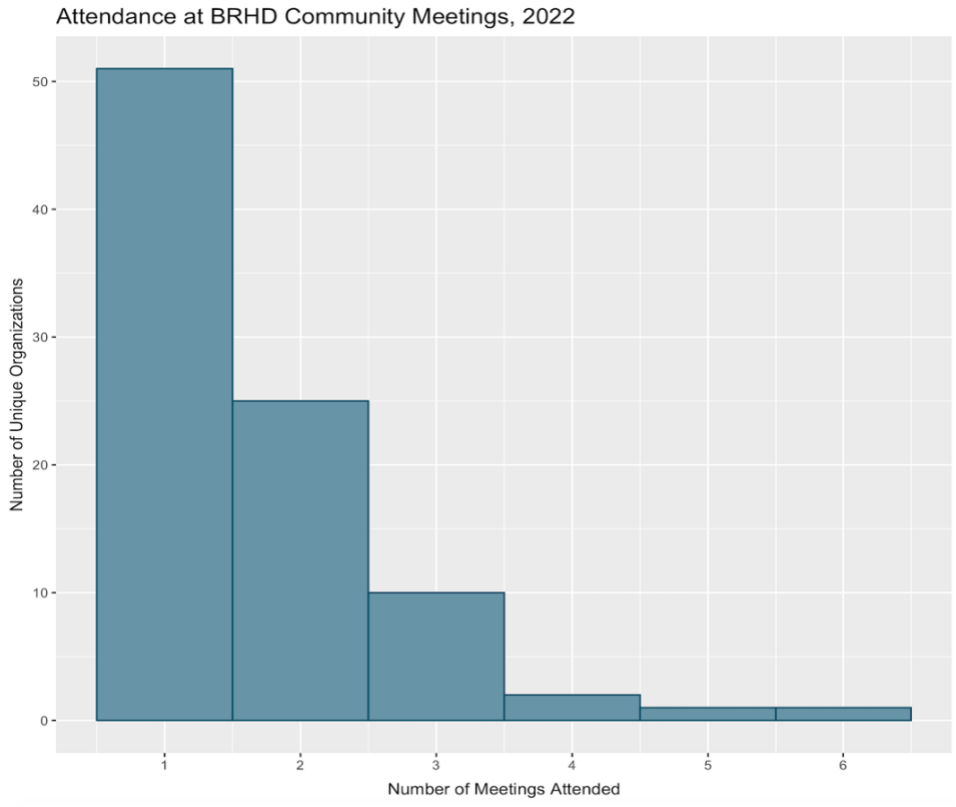


Figure 3: Attendance Frequency at BRHD Community Meetings in 2022 (J. Fleisher, personal communication, February 20, 2023)

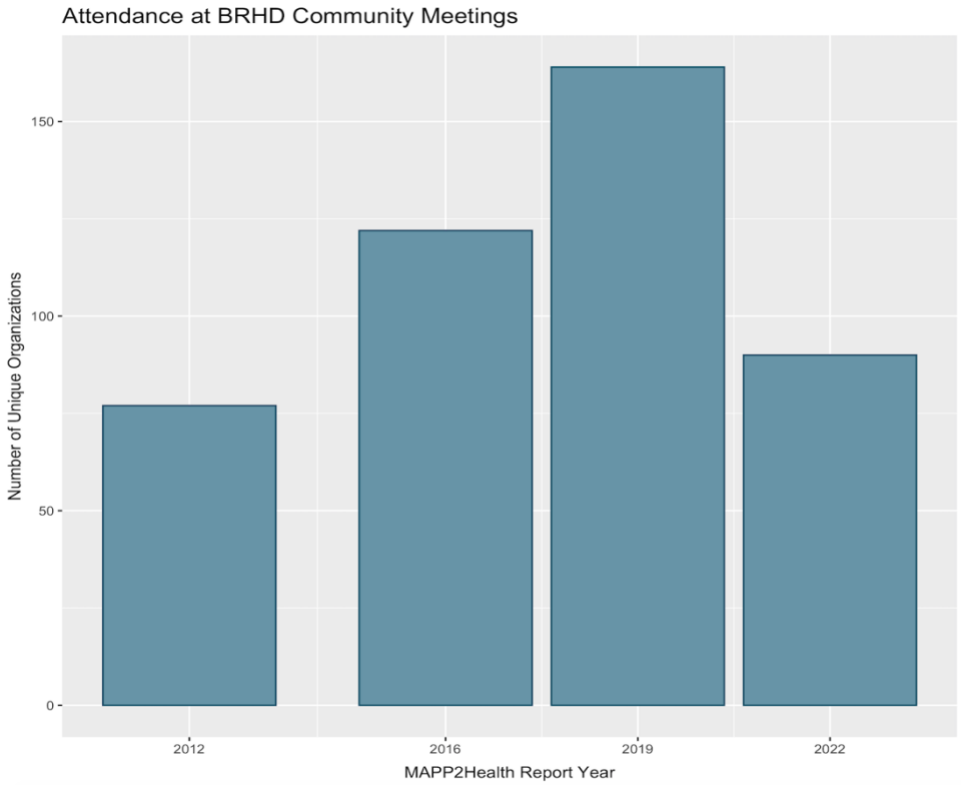


Figure 4: Attendance at BRHD Meetings, 2012 – 2022 (Blue Ridge Health District, 2012; Blue Ridge Health District, 2016; Blue Ridge Health District, 2019; J. Fleisher, personal communication, 2023)

Feasibility: Outside of BRHD, a few key partners, but more than 6, are being onboarded onto the Unite Us platform meaning high stakeholder involvement. While these stakeholders will onboard with assistance from BRHD, they will still need to learn and implement the platform requiring medium autonomy. To implement the status quo programming, BRHD must take 6 steps, 3 of which are new steps. These steps are detailed in Appendix C and include the hiring of a trainer and the internal implementation of Unite Us. The status quo implementation amounts to a low number of steps but a medium number of new steps. Finally, since these projects are already underway, I did not create a sample timeline for the status quo. However, BRHD expects to see returns from these efforts within a year meaning a low time investment. Considering all these sub-criteria, scored 1, 3, 5, 3, and 5 respectively, Alternative 1 has a **3.4 feasibility score.**

Equity: Since BRHD is only working with a few key stakeholders in the roll out of the Unite Us platform, BRHD has already created an inequitable collaborative environment. BRHD understands that stakeholders face high implementation and usage costs with regards to Unite Us, so they have limited access to key partners that BRHD has more confidence in. Alternatively, usage of CHWs is generally low-cost because interactions between external organizations and patients is entirely coordinated by the CHW. Therefore, implementation costs are high, but usage costs are medium. New organizations will need to learn the Unite Us platform and develop connections with the CHWs. Thus, it is difficult for less established organizations to start participating in Alternative's 1 programming. Considering these sub-criteria, which are scored 1, 3, and 1 respectively, Alternative 1 has a **1.6 equity rating.**

Alternative 2: Investing in CHWs

Cost: Given investment in stakeholder outreach and a new case management system to support the CHW team, Alternative 2 costs $4,419,673. Compared to the status quo, Alternative 2 imposes an additional $60,368 in costs or an additional 1.4% in spending. Again, costs are measured in present value with a discount rate of 5% while also accounting for inflation. I estimate that a new case management system would cost around $7,000 per year (Capterra, 2023). Finally, I rely on the assumption that BRHD would retain its CHWs and its CHW trainer in the status quo scenario. Therefore, the 1.4% growth in spending does not include retention costs. Details for the cost calculations are provided in Appendix A. Since Alternative 2 leads to a change in spending between 1-2% of the status quo budget, this alternative receives **4 cost rating.**

Effectiveness: Across four interviews, on a scale of 1 to 5, experts gave Alternative 2 a rating of 3.5, 2.5, 5, and 5 – a 4 average. The two 5 ratings came from a CHW supervisor and local partner that provides CHW services, so they likely have a strong bias in favor of CHWs generally. Quotes from these interviews are provided in Appendix B. Additionally, literature indicates that an effective CHW program can have a profound impact on linkages between patients and community resources. A review of 26 rural-focused CHW studies found that about

26% of these interventions emphasized linkages to community resources. CHW interventions that focused on community linkages saw improved health outcomes implying that CHWs were able to effectively link these patients to health-adjacent resources (Berini et al., 2022). However, there are several caveats with the literature. First, these programs are rarely evaluated via RCT. Second, most studies do not directly report the specifics of these community linkages. For example, the studies do not discuss how many resources patients were connected to via the CHW nor whether patients took advantage of these resources. Given these caveats, the literature is only somewhat promising. Thus, summing together the 4 points from expert evaluation, the 0.5 additional points from the literature, and the -0.25 due to high potential for bias in the expert evaluations, Alternative 2 has a **4.25 effectiveness rating.**

Sustainability: This alternative will primarily be funded by the 4 CHW grants BRHD already has access to. Again, 3 of these grants are funded at the Congressional level via the American Rescue Plan, and the last is funded by HRSA. All these grants should be renewed. For example, HRSA has already posted applications to extend funding for the CHW trainer position. Alternative 2 requires is one additional grant for a new, but lower cost, case management system. Since the estimated costs of this platform are substantially lower than the alternative Unite Us platform, BRHD has more than 4 options for funding including grants from VDH, UVAHealth, local governments, and HHS. Thus, considering high current reliability, 1 additional grant, and 4+ alternative funding sources, each sub-criterion is rated 5,3, and 5. Overall, Alternative 2 has a **4.33 sustainability rating.**

Feasibility: In the implementation of Alternative 2, external organizations across BRHD will need to attend meetings to help articulate a shared vision for the CHW program, however, these organizations will be mostly involved with planning not the actual implementation of the programming. Thus, Alternative 2 requires a high level of involvement from external organizations but low autonomy. Then, BRHD itself must take 13 steps, 6 of which are new steps. These steps are detailed in Appendix C but include the development of capacity building materials, monitoring and evaluation activities, and the implementation of a new case management system. Thus, Alternative 2 requires a high number of steps but a medium number of new steps. Finally, a draft timeline, also included in Appendix C, indicates that it will take until December 2025 to implement all these steps amounting to a medium time investment for BRHD. Considering all of these sub-criteria, which are scored 1,5,1,3, and 3 respectively, overall, Alternative 2 has a **2.6 feasibility score.**

Equity: Alternative 2 requires stakeholders to attend community gatherings to develop and implement a shared vision for the district. Thus, stakeholders face high time costs in the implementation stage. However, this alternative provides payment, childcare, and other benefits to stakeholders who participate in these convenings to help alleviate some of the time costs. Thus, overall stakeholder investment in implementation is medium. Stakeholders face low investment in the use of this alternative as connection between external organizations and

patients is entirely coordinated by CHWs. Finally, new organizations and services can easy be added to the roster of resources CHWs refer patients too. Considering these sub-criteria, which are scored 5, 3, and 5 respectively, overall, Alternative 2 has a **4.33 equity rating.**

Alternative 3: Investing in the Unite Us platform

Cost: Given independent investment in the Unite Us platform, a Unite Us coordinator, and stakeholder outreach, Alternative 3 costs $5,111,197. This amounts to an additional $751,892 or a 17.25% increase in spending as compared to the status quo. Costs are measured in present value with a discount rate of 5% while accounting for inflation. I rely on budget data to estimate the salary and IT costs of a new Unite Us coordinator. I also assume that BRHD would need to independently fund Unite Us after 2024. While the status of funding for Unite Us remains unclear, in my estimate VHD is likely to stop funding Unite Us after 2024. Should this happen, BRHD would need to independently fund the software costing about $45,000 per year (K. Goodman, personal communication, February 24, 2023). Details for the cost calculations are provided in Appendix A. Since Alternative 3 leads to a change in spending greater than 10% of the status quo budget, this alternative receives **1** cost rating**.**

Effectiveness: Unite Us is helping to streamline collaboration between different healthcare providing entities including BRHD, health systems, clinics, and social services. Experts within BRHD are incredibly excited about the potential of this software. Across four interviews, on a scale of 1 to 5, experts gave Alternative 3 a rating of 5, 5, and 4.5, and 2.5 – an average of 4.25. Quotes from these interviews are provided in Appendix B. However, research on programs like Unite Us is slightly less clear. The research base for of cross-sector collaboration generally does not evaluate improved collaboration as it is considered an inherent outcome of the programming. The literature that is available is promising. For example, an evaluation of CHIP found that children who received coordinated care services, meaning multiple providers were in communication about one patient, saw increased access to mental and specialty care (Miller, 2014). As described in the literature review, evaluations of other programs found that collaboration between different providers, social services staff, and governmental teams result in improved patient satisfaction and reduced costs (DeJonge et al., 2009, Clancy & Duffy, 2013). However, like Alternative 2, studies evaluating collaborative technology and coordinated care are usually less-rigorous case studies. Given the challenges with measurement and rigor, the literature is only somewhat promising. Thus, summing together the 4.25 points from expert evaluation and the 0.5 additional points from the literature, Alternative 3 has a **4.75 effectiveness rating.**

Sustainability: This alternative relies on funding for the Unite Us platform past 2024. As already discussed with Alternative 1, the platform was provisioned by Former Governor Ralph Northam, and it would be unsurprising if funding was discontinued under Governor Glenn Youngkin (UniteUs, 2020). If funding were to expire, BRHD would need two additional grants

to fund Alternative 3. They would need a grant to fund the Unite Us platform but also funding for a Unite Us coordinator. BRHD applied for funding for a coordinator in 2022, however, they did not receive the grant. This indicates that VDH does not have the resources to provide all localities with funding for a Unite Us coordinator. Since Unite Us is a Virginia specific program, only VDH is providing funding for the platform itself or related programs. Currently, BRHD is not aware of any alternative funding sources. Thus, considering low current reliability, 2 additional grants, and only 1 funding source, all sub-criteria are rated 1. Overall, Alternative 3 has a **1 sustainability rating.**

Feasibility: External organizations will be involved in articulating goals for the platform, identifying how these goals should be materialized, and then onboarding themselves, Alternative 3 requires many external organizations to be involved while also demanding high levels of autonomy from these stakeholders. Additionally, to implement the Alternative 3, BRHD must take 11 steps, 7 of which are new steps. As before, these steps are detailed in Appendix C but include the hiring of a Unite Us coordinator, a series of community convenings, and the roll-out of the Unite Us platform. Since BRHD has never used a platform like Unite Us, 63.6% of the steps are new. Thus, Alternative 3 requires a high number of steps and a high number of new steps. A draft timeline, also included in Appendix C, indicates that it will take until June 2026 to implement all these steps – more than 3 years from May 2023. Considering all of these sub-criteria, all scored a 1, Alternative 3 has a **1 feasibility score.**

Equity: Alternative 3 requires large investments in the implementation and usage of the Unite Us platform. Stakeholders will need to invest time and staff in the design of the platform and the roll-out of the platform. Then, stakeholders will need independently use the platform accurately reporting which patients they are serving and how often. Due to the learning curve associated with Unite Us, new organizations will face steep barriers in their adoption of Alternative 3's programming. Considering these sub-criteria, all of which are scored 1, Alternative 3 has a **1 equity rating.**

Evaluation Matrix

	Status Quo	CHWs	Unite Us
Cost (2024-2029)	5 ($4,359,305)	4 ($4,419,673) [+60,368]	1 ($5,111,197) [+$751,892]
Effectiveness	5	4.25	4.75
Feasibility	3.4	2.6	1
Sustainability	3.67	4.33	1
Equity	1.6	4.33	1
Final Score	**3.73**	**3.90**	**1.75**

Figure 5: Evaluation Matrix

Presented above is the final evaluation matrix, Figure 5, summarizing all of my findings discussed in the previous section. Using equal weights across all criteria, I average these scores to identify a final score for each alternative.

Recommendation

Given each Alternative's total score, I recommend that BRHD implement Alternative 2, investing in CHWs. It allows for gains in collaborative care without a substantial increase in spending. Alternative 2 is also the most sustainable alternative – this is especially important given the negative effects of funding and staff fluctuations on a partnership's future. Additionally, it most equitable policy option as it is accessible to stakeholders of any size.

It is notable that the Alternative 1 and Alternative 2 have very similar scores. Thus, I conducted a sensitivity analysis, detailed in Appendix D, to evaluate the strength of my assumptions in making my final recommendation. For Alternative 1 to surpass Alternative 2's score, I would need either make substantial changes to the scoring of one criteria or smaller changes to the scoring of multiple criteria. Even when I alter my stronger assumptions, such as my expectation that Unite Us funding will expire in 2024, I find that Alternative 2 remains the highest rated policy option. Therefore, I am confident in my final recommendation of Alternative 2.

Implementation

The result of this analysis indicates that Alternative 2, investing in CHWs, is the best method of improving collaboration, communication, and connection between different health-adjacent entities in BRHD. However, a policy is only successful if implementation is successful. Figure 6 details an implementation timeline for Alternative 2 accounting for capacity building, CHW-system integration, and a new case management system.

The capacity-building component, indicated via the gray circles, entails having a trainer who offers mentorship and consultation, provides technical assistance, and conducts on-site supervision and training. BRHD is already hiring a trainer, but this trainer should be tasked with on-site observation and training of the CHWs before anything else. After the trainer develops an understanding of the current CHW program, they can develop didactic materials and provide technical assistance to address ongoing issues. Finally, BRHD should conduct an evaluation of this trainer and their work after about 2 years. If this trainer is no longer a necessary member of the team or has been generally ineffective, BRHD can consider putting this grant money towards other endeavors.

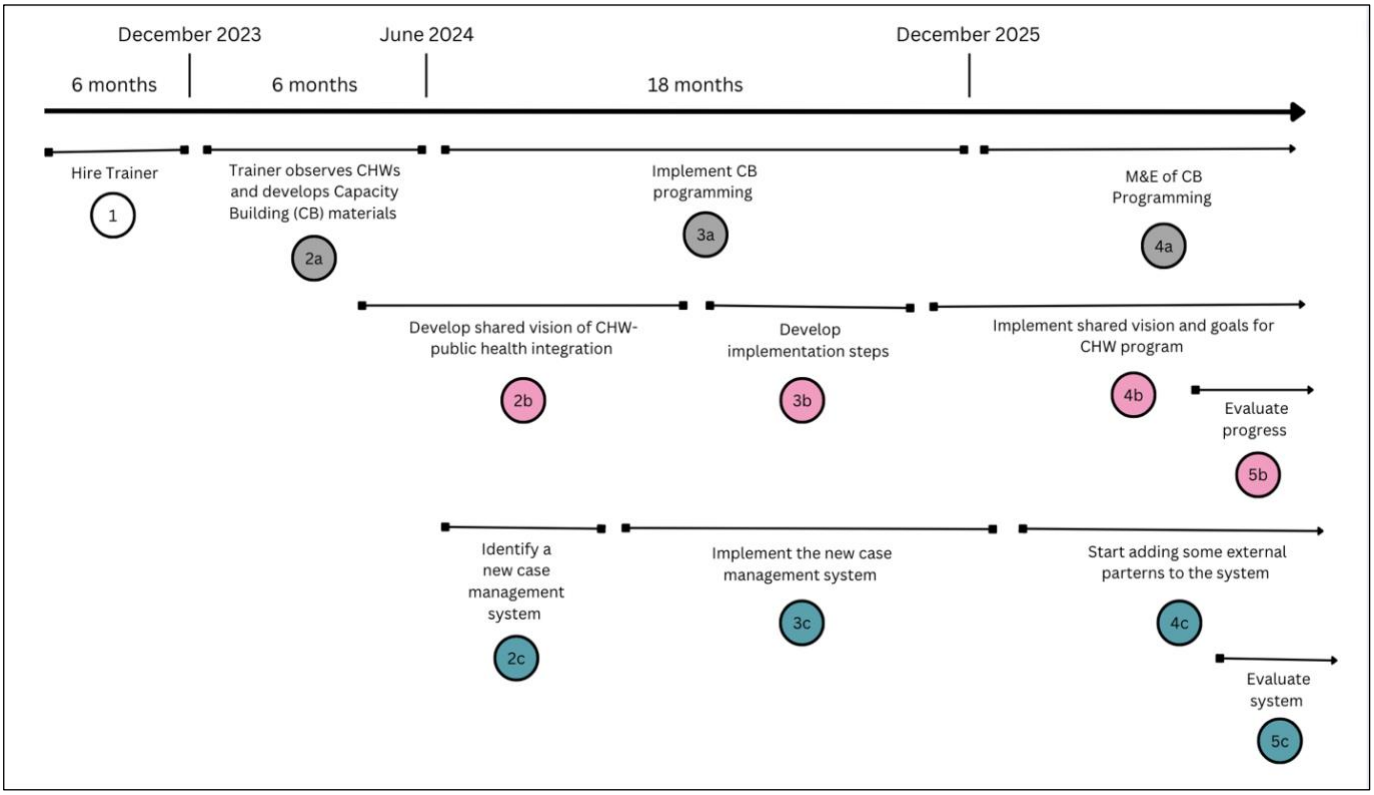


Figure 6: Implementation Timeline for Alternative 2

The integration component, indicated via the pink circles, aims to improve the connections between CHWs and other health-facing systems that might be wary of these workers. Engaging stakeholders in the pursuit of an improved and more trusted CHW program is a crucial step. BRHD should be highly inclusive in which stakeholders it chooses to engage inviting hospital systems, nonprofits, local governments, and clinics. BRHD should first demonstrate to these entities the value of CHWs in improving health outcomes using both academic research and BRHDs own internal data. BRHD and these stakeholders should also work together to articulate collective goals for the CHW program and determine how CHWs should be deployed in the community. Then, the CHW trainer and coordinator should collaborate to develop and implement some methods of achieving these goals. Finally, a throughline of this alternative is monitoring and evaluation. BRHD should begin to evaluate progress towards these shared goals soon after any programming is implemented.

The last component of this alternative is the identification of a new case management system. A new, affordable case management system would streamline the CHW's work, reduce their paperwork, and allow them to better monitor their patients. Figure 7 below is a preliminary list of potential case management tools with some rudimentary cost estimates assuming 7 users (Capterra, 2023). Administrators in BRHD should work with its CHWs to decide on a final case management system.

System	HIPAA Compliant	Annual Cost Estimate
Casebook	Yes	$5,964 - $14,580
Charity Tracker	Yes	$3,360 - $5,040
Collaborate	Yes	Upon Request Only
Simple Practice	Yes	$5,796 - $8,316
FHASES	Yes	Upon Request Only
NewOrg	Yes	Upon Request Only

Figure 7: Potential Case Management Tools

Of course, with any new policy program, there are several things which could go wrong. First, throughout this analysis I assume that funding for BRHD's CHWs will be renewed. Should this funding not be renewed, BRHD will no longer be able to pay its CHWs. In that case, BRHD should transition to a support role for other CHWs and CHWs-alike positions within the district. BRHD will still have a trainer, so this trainer can now start to offer support for these non-BRHD CHWs. Additionally, BRHD's CHWs should share their caseload with other CHWs in the district to ensure that these patients continue to have access to a CHW. Second, BRHD might struggle to find funding for an alternative case management system. In this case, BRHD should maintain their current method of case management while working with their CHW team to determine if BRHD can make small changes to streamline their CHW's work.

However, assuming that CHW funding is renewed and BRHD can implement the recommended programming, BRHD should keep in mind a few future steps that were unfortunately outside of the scope of this analysis. First, while this policy focuses on ensuring CHWs have the training and resources they need to support patients, BRHD should explore mechanisms to increase these individual's compensation. Currently, CHWs are contract workers meaning that they do not receive benefits like paid leave or health insurance. Supporting CHWs also means ensuring that CHWs can support themselves and their families. Second, while monitoring and evaluation is emphasized throughout this policy alternative, BRHD should consider implementing mechanisms to ensure that these evaluations are published and shared. The collaborative care literature is sparse, and BRHD has the potential to contribute to this understanding and knowledge. Importantly, any evaluations that BRHD publishes should be rigorous with lots of detail to ensure future researchers know exactly what actions BRHD took and why these policies were successful.

Conclusion

Michael Johnson's story at the very beginning of this report is fictional, but it is based on a conversation I had with a local CHW, Willie Mae Gray. Willie Mae described her work helping a recently incarcerated individual schedule a doctor's appointment that he desperately needed. Rather than waiting 2-3 months like he was told by UVA Health, Willie Mae found him an appointment within the next week. CHWs like Willie Mae are an essential part of the

healthcare team. They can bridge gaps in care provision to address health at all levels. CHWs are also able to develop close relationships with individual patients while maintaining a connection to the broader community. They remain attentive of the services provided by governmental actors and nonprofits and can quickly connect patients to the services that they need. The analysis presented in this report demonstrates that BRHD's CHWs have a huge potential to improve collaboration across the district and ultimately improve the health of BRHD residents. With additional support, they will only be more effective.

Appendix A: Cost Calculations

The following table represents the calculations used to produce the cost estimates for each alternative. Data and budgets were provided by BRHD (K. Goodman, personal communication, February 24, 2023). I made a few assumptions in producing these calculations. First, my cost estimates for the status quo do not represent the total BRHD budget. Due to data constraints, I do not account for any costs unrelated to collaborative care like certain staff and IT costs. These costs likely would not have been relevant anyhow since they would not be changing over time or would they have changed in Alternatives 2 and 3. Second, I assume that VHD will stop funding Unite Us in 2024, but funding for the CHW trainers will not stop. This assumption is based on interviews with key BRHD staff, but it is not guaranteed that Unite Us would expire in 2024. After 2024, I then impose the costs of Unite Us on BRHD because they will need to fund it independently without VDH's support. Finally, I use estimates of inflation from the Congressional Budget Office's Economic Outlook Report. The CBO estimates the inflation rate to be 3%, 2.2%, 2.1%, 2.1%, 2.3%, and 2.3% for 2024-2029 respectively (Swagel, 2023).

Status Quo							
Items	2024	2025	2026	2027	2028	2029	
5 CHWs	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	
CHW Trainer	$90,720	$90,720	$90,720	$90,720	$90,720	$90,720	
IT for CHW Trainer	$3,619	$3,619	$3,619	$3,619	$3,619	$3,619	
Total	$794,339	$794,339	$794,339	$794,339	$794,339	$794,339	$4,766,034
Inflation	$818,169	$835,645	$852,326	$869,007	$887,277	$905,546	$5,167,970
Present Value (r = 0.05)	$779,209	$757,954	$736,271	$714,934	$695,204	$675,733	$4,359,305
CHW Intervention							
Items	2024	2025	2026	2027	2028	2029	
Outreach/Meetings	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	
New Case Mangement	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	
Total Additional Costs	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	
Inflation	$11,330	$11,572	$11,803	$12,034	$12,287	$12,540	
Present Value (r = 0.05)	$10,790	$10,496	$10,196	$9,900	$9,627	$9,358	$60,368
Status Quo + Additional	$789,999	$768,450	$746,467	$724,835	$704,832	$685,090	$4,419,673
Unite Us Intervention							
Items	2024	2025	2026	2027	2028	2029	
Unite Us Coordinator	$90,720	$90,720	$90,720	$90,720	$90,720	$90,720	
Unite Us Coordinator IT	$3,619	$3,619	$3,619	$3,619	$3,619	$3,619	
Unite Us Platform		$45,000	$45,000	$45,000	$45,000	$45,000	
Outreach/Meetings	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	
Total	$100,363	$145,364	$145,365	$145,366	$145,367	$143,339	
Inflation	$103,374	$152,923	$155,977	$159,030	$162,375	$163,406	
Present Value (r = 0.05)	$98,451	$138,706	$134,738	$130,835	$127,225	$121,936	$751,892
Status Quo + Addditional	$877,660	$896,660	$871,010	$845,769	$822,429	$797,669	$5,111,197

Appendix B: Interview Quotes

Including direct quotes from interviews in an important method to establish rigor in qualitative research. Below are key quotes from each interview I conducted.

Kathryn Goodman (K. Goodman, personal communication, February 23, 2023)

- In response to how can CHW's improve collaboration: "We will be able to better engage [alike positions] and increase the collaboration and partnership amongst those also to not duplicate efforts and to actually better align our efforts to really maximize on the all of the strengths that we have for the staff throughout the district."
- "Probably give [the CHW intervention] like a three and a half. Because investing in the CHWs is one piece, but we also have to invest in the system and the infrastructure to support the CHWs."
- "CHWs are a part of this public health 3.0. It's where we're moving in public health, it's that direction of working more directly in the community and addressing the social determinants of health. And so my hope is that there will be more grant funding opportunities, and I will seek them out"
- "If we had a total ideal scenario, pigs flying here, and we had every provider in this area was enrolled in Unite Us there was money invested in it, five out of five"
- "Unite us is one of those systems, it's more in general, we need to have some sort of electronic referral system that everybody is utilizing. Ideally, unite us because it's there."
- "[Funding for Unite Us] is just a giant unknown. It's hard to know, I think that if we more and more agencies over the next year start to really utilize it and show that there's a value in it, then potentially it will get funded."

Tia Waters (T. Waters, personal communication, March 2, 2023)

- When asked to rate status quo: "I would say to five because we currently have plans to create a district wide CHW network hub."
- "I don't think there would be much difference in terms of our collaboration efforts with other organizations... [Alternative 2] really only pertains to the CHWs interactions with community members, so I don't I don't think that there would be much of a difference.
- When asked to rate the efficacy of Alternative 2: "I would say maybe two or three, just depending on if we don't utilize Unite Us platform. Where would we take that time?"
- "However, I do think that, given [CHWs] roles, and what they do, there are definitely grant opportunities available. However, it's different when you're talking about funding one CHW for a couple of years, versus funding five of them, you know, the cost, there's a huge cost difference."

- “We are going to be able to connect anyone that walks through our door to a resource or service that is available to them much more efficiently than just giving them information… I definitely think on a scale of like, zero to five, I would give that scenario five. Unite Us would definitely greatly impact how [stakeholders] collaborate.”
- “No, there are no alternatives [to VDH funding Unite Us] right now, right now that I know of. We also are in a really weird space right now, where we don't have a lot of bandwidth either [to look for alternative platforms].”

Willie Mae Gray (W. M. Gray, personal communication, March 3, 2023)

- When asked about the status quo: “Four or even plus… right now, we're collaborating with one another, and we're getting out into the communities, we're holding events for community residents, and so forth. So, I think the collaboration right now is going in a very, very positive flow, so to speak.”
- “I had a client that called me that was recently incarcerated. And he called in a panic, he was supposed to get an appointment with UVA, UVA told him that they were like maybe two to three months out, and they couldn't get him in. So, I got on the phone along with him and started calling around to places like the free clinic, and the bottom line is we were able to get him an appointment within a week. [It’s about] working hand in hand with the clinics and other organizations and resources… yeah, CHWs are a five.”
- “Compensation [for CHWs] is a big factor. You know, we're often contractors, so I would love to see that turn into wage employees where there's insurance and benefits.”
- “I think [Unite Us] would improve collaboration a lot. I'm excited about the platform, it could do wonders…. It opens up a whole lot more resources… I would rate it a four plus.”

Betsy Peyton (B. Peyton, personal communication, March 7, 2023)

- “My name is Betsy Peyton. I'm the director of Well Aware, community health worker program. We are co-sponsored by a partnership of different health practices in town. So UVA primary care, the Charlottesville free clinic, and Central Virginia Health Services are three partners.”
- When asked to evaluate status quo: “[Currently] Tia and I are close allies, because we're both managing community health worker programs. We compare notes about the kinds of things that are needed, the different needs between our rural communities and our urban communities…. It’s sort of on the fringes, but it looks really promising. Maybe a four.”
- “We're just getting into evaluating our first year now but seeing some first numbers that show the kinds of improvements that we're having. I think even just setting up what kind of information will show success is an important step for us… Capacity building, absolutely, the more we can get, the better… It's really important for community health

workers to be sort of an integral part of the health pain not over off to the side… So, I think five… they sound like great ideas."

- "BRHD has been big boosters of Unite Us. When I was first getting started, we had a lot of engagement with them, and technically we are participants in Unite Us. But we have never gotten a referral from there, and we've never made a referral through there. It just, it feels like an extra layer of documentation… I was on board in the beginning, and now that we've really started doing the work, I'm not as compelled to use it. I think it has a lot of potential, but it just never got off the ground to be as user friendly and as seamless as it needs to be. So maybe a two or a three"

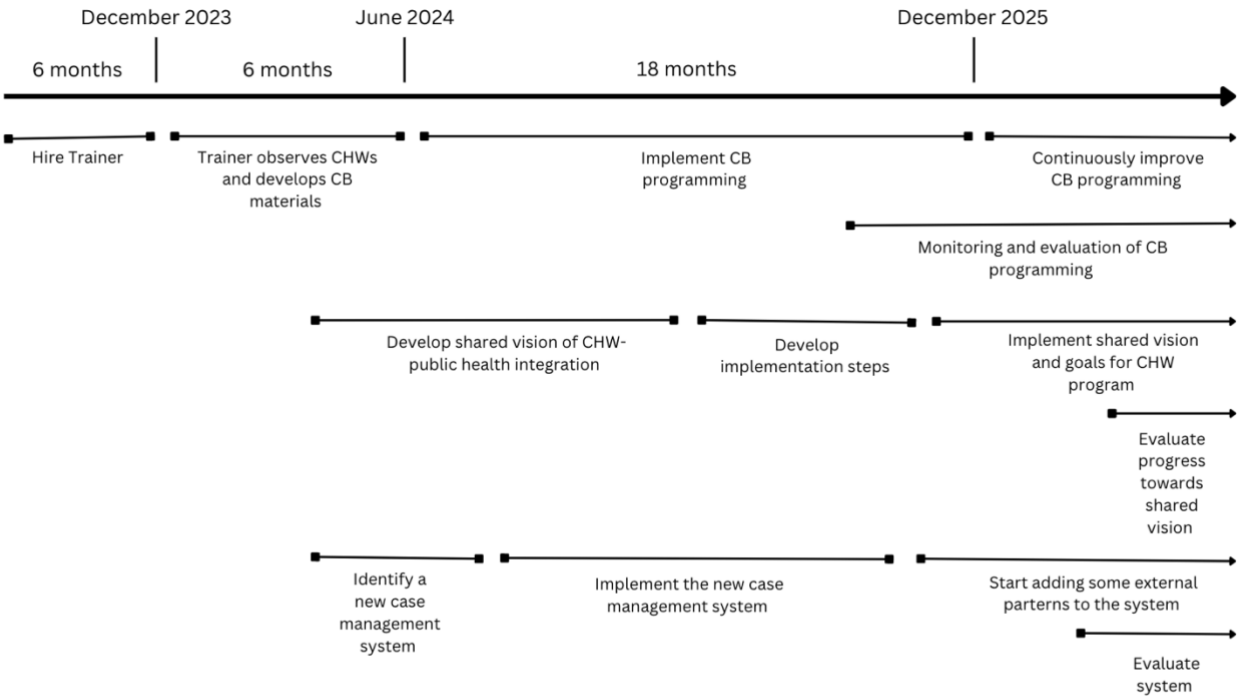
Appendix C: Implementation Steps and Timelines

For each alternative, I drafted a series of implementation steps that were then confirmed by key personnel at BRHD. Steps which are new are highlighted in blue. I consider steps new if BRHD has never completed the same or an extremely similar task – BRHD has completed somewhat similar tasks for nearly all these steps. For the timeline, I assume BRHD will start implementation in May of 2023.

Alternative 1: Status Quo Implementation Steps

1. Hire a trainer
2. Trainer starts to work with CHWs
3. BRHD sets up Unite Us platform internally
4. Train CHWs on how to use Unite Us
5. Start using Unite Us for internal case management
6. Start onboarding key external partners onto the platform

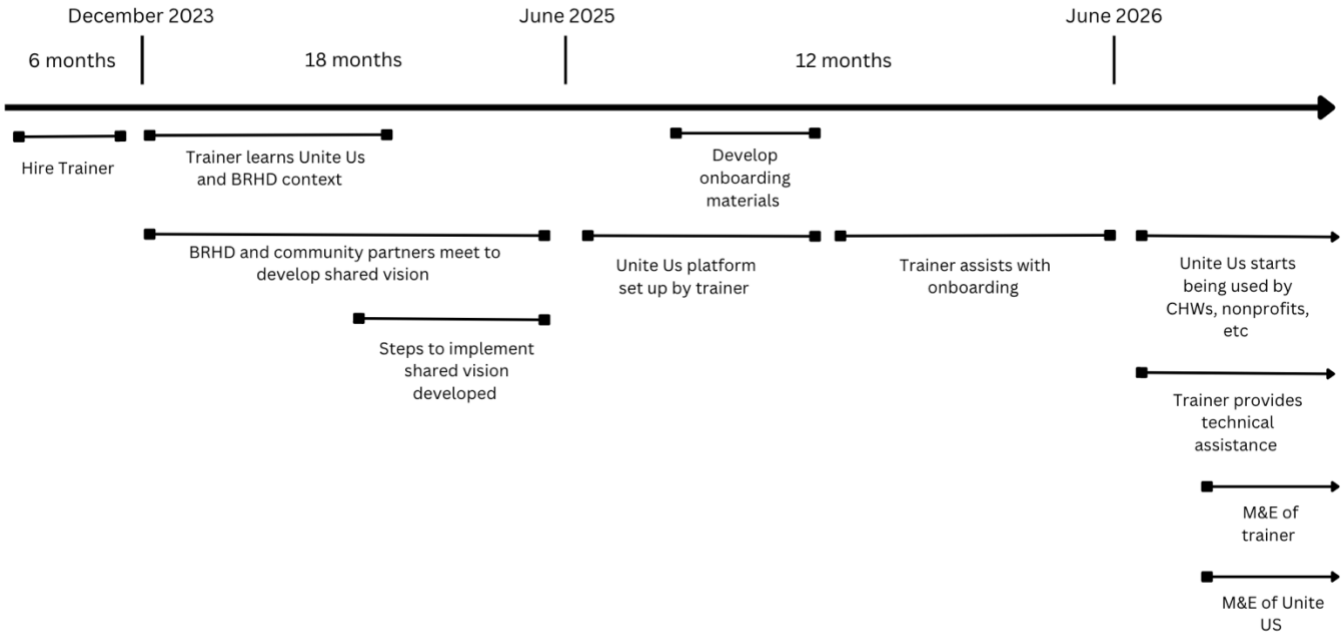
Alternative 2: CHW Investment Implementation Timeline and Steps



1. Trainer conducts on-site observation
2. Develop capacity building activities – teaching, mentorship, supervision materials
3. Implement capacity building programming – supervision, training, etc

4. Conduct monitoring and evaluation of trainer and CB activities
5. Meet with local health systems and public health agencies to develop shared goals
6. Shared goals are established and articulated
7. Trainer identifies steps to make progress on shared goals
8. Implement changes informed by shared goals
9. Evaluate progress on integration with public health services and hospitals
10. Identify a new case management system for CHWs that BRHD can fund independently
11. Implement case management system
12. Add other entities onto case management system
13. Evaluate efficacy of case management system

Alternative 3: Unite Us Investment Implementation Steps



1. Hire trainer for Unite Us
2. Trainer learns Unite Us platform and BRHD context via on-site observation
3. BRHD and community partners meet to establish and articulate shared vision
4. Steps to implement shared vision developed by trainer
5. Unite Us platform set up as informed by shared vision by trainer
6. Develop onboarding materials
7. Trainer assists others with onboarding
8. Unite Us starts being used by CHWs, nonprofits, etc
9. Trainer provides technical assistance
10. Conduct monitoring and evaluation of trainer

11. Conduct monitoring and evaluation of Unite Us platform

Appendix D: Sensitivity Analysis

Evaluation Matrix			
	Status Quo	CHWs	Unite Us
Cost	5.00	4.00	1.00
Effectiveness	5.00	4.25	4.75
Feasibility	3.40	2.60	1.00
Sustainability	3.67	4.33	1.00
Equity	1.60	4.33	1.00
Total	**3.73**	**3.90**	**1.75**

This analysis below showcases how my evaluation changes if VHD were to continue to pay for Unite Us. Alternative 3 would see reduced costs going from 17.19% of the status quo budget to only 12.60%, however, this did not change their cost rating. Additionally, the sustainability rating for both Alternative 1 and Alternative 3 increases. For the status-quo alternative, Alternative 1, all 4 grants are likely to be renewed, BRHD would need no need grants to fund their status quo programming and would have 3-4 alternative funding sources for other needs. Thus, Alternative 1's new sustainability rating is 4.33 (the average of 5, 5, and 3). For Alternative 3, the one grant is likely to be renewed, but they still need one additional grant with only one funding source. This, Alternative 3's new sustainability rating is 3 (the average of 5, 3, and 1). Ultimately, if Unite Us is renewed, Alternative 2 remains the highest rated alternative, but only by 0.03 points.

VHD Continues to Pay for Unite Us			
	Status Quo	CHWs	Unite Us
Cost	5.00	4.00	1.00
Effectiveness	5.00	4.25	4.75
Feasibility	3.40	2.60	1.00
Sustainability	4.33	4.33	3.00
Equity	1.60	4.33	1.00
Total	**3.87**	**3.90**	**2.15**

Changes to Alternative 3			Changes to Alternative 1	
Additional Spending	$ 549,076		Sustainability	4.33
Total Budget	$ 4,908,381			
Share of Status Quo Budget	12.60%			
Cost Rating	1			
Sustainability	3			

This analysis below showcases how my evaluation changes if I assume increased bias from the expert evaluations. In my official analysis, I docked 0.25 points if I felt that an expert was particularly biased. I only removed points from Alternative 2 due to the overwhelmingly positive reviews from the CHWs I interviewed. Here, I dock 0.5 points from Alternative 2 instead. Alternative 2 still remains the highest rated alternative.

Increased Bias in Expert Evaluations

	Status Quo	CHWs	Unite Us
Cost	5.00	4.00	1.00
Effectiveness	5.00	4.00	4.75
Feasibility	3.40	2.60	1.00
Sustainability	3.67	4.33	1.00
Equity	1.60	4.33	1.00
Total	**3.73**	**3.85**	**1.75**

The analysis below showcases how scores change if I embed more uncertainty into the expert evaluations for the status quo. Some may be concerned that that status quo is rated higher on efficacy compared to Alternative 2 and Alternative 3. This is not necessarily an issue for my final recommendation as the efficacy rating, which we can conceptualize as average efficacy, is just one component of the analysis. Other components of the analysis like sustainability and equity help to indicate efficacy over time and for certain groups. However, it is still useful to consider why the status quo might be rated so highly by experts within BRHD. One reason could be that individuals within BRHD are biased and are overestimating the efficacy of their ongoing programming. Another explanation could be that they are comparing Alternative 2 and 3 in relative terms to the status quo, so they rated these two alternatives lower than otherwise. I also always asked about the status quo first during my interviews which could create disparities in scoring. Thus, I dock 0.25 points from the status quo efficacy score and find that Alternative 2 remains the highest scored alternative.

Increased Bias in Status Quo

	Status Quo	CHWs	Unite Us
Cost	5.00	4.00	1.00
Effectiveness	4.75	4.25	4.75
Feasibility	3.40	2.60	1.00
Sustainability	3.67	4.33	1.00
Equity	1.60	4.33	1.00
Total	**3.68**	**3.90**	**1.75**

While I make other assumptions throughout this analysis especially in my scoring of sub-criteria, Alternative 2 almost always remains the highest rated alternative. Below, I show three circumstances in which Alternative 2 has fewer points than Alternative 1. I either needed to make substantial changes to one criteria or smaller changes to multiple criteria. To change my criteria in this manner would require considerable changes to my assumptions, so I feel confident in my final recommendation of Alternative 2.

Altering Alternative 1

	Status Quo	CHWs	Unite Us
Cost	5.00	4.00	1.00
Effectiveness	5.00	4.25	4.75
Feasibility	3.40	2.60	1.00
Sustainability	4.57	4.33	1.00
Equity	1.60	4.33	1.00
Total	**3.91**	**3.90**	**1.75**

Altering Alternative 2

	Status Quo	CHWs	Unite Us
Cost	5.00	4.00	1.00
Effectiveness	5.00	3.33	4.75
Feasibility	3.40	2.60	1.00
Sustainability	3.67	4.33	1.00
Equity	1.60	4.33	1.00
Total	**3.73**	**3.72**	**1.75**

Altering Alternative 1 & 2

	Status Quo	CHWs	Unite Us
Cost	5.00	4.00	1.00
Effectiveness	5.00	4.00	4.75
Feasibility	3.40	2.60	1.00
Sustainability	4.00	4.00	1.00
Equity	1.60	4.33	1.00
Total	**3.80**	**3.79**	**1.75**

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