Co-Located Community Health and Economic Activity Centers

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Abstract— Community Health Worker (CHW) programs have been implemented in many developing countries to combat the challenge of poor access to healthcare. CHWs are unpaid volunteers who provide basic health information, education, and resources to their communities. In rural areas the large distances between households make it difficult for CHWs to fulfill their responsibilities in a timely fashion. Additionally, difficult working conditions, lack of pay, and limited feedback severely hinder the success and retention of CHWs in these rural areas. Proper economic incentives can provide motivation for CHWs to make CHW programs sustainable. Income generating activities for CHWs can be focused on health services or can be coupled with other entrepreneurial ventures that provide benefits to local communities. After examining problems with retention and turnover of CHWs in rural areas, this article discusses a potential model of co-located community health and activity centers -- a place for the community to gather, socialize, and receive basic health information, education, and resources. The center will create an entrepreneurial opportunity for CHWs, providing them an economic incentive to improve their livelihoods and a motivation to continue as an unpaid health care provider.

Keywords— Community Health Workers; CHWs; Entrepreneurship; Zambia; Economic Incentives; Community Center

I. Introduction

Seventy percent of individuals in the least developed countries live in a rural area with low population densities [1]. In these areas, many individuals live on less than $2 a day. Rural areas in developing countries often face the greatest development challenges such as access to education, health care, nutritious food and clean water. One of the largest challenges, especially in geographically dispersed areas, is access to basic health care [1].

Community health workers (CHWs) are a crucial component of many international health care systems working in underserved urban and rural areas. The CHW workforce acts as a liaison between medical providers and surrounding populations. CHWs are committed members of their local communities that help provide access to family planning information, birthing care, basic record keeping, health education, and disease management [2]. They act as a conduit for individuals in these areas; making them an essential component to the health of their community [2]. Retention of CHWs is difficult due to lack of incentives, support structures, and resources [3]. In rural areas, a low concentration of health workers and working conditions also contribute to the lack of availability of CHWs and decreases their effectiveness.

Although CHWs can offer their communities access to health care and support, many lack motivation to continue serving their communities [4]. Community health programs have prospered without the requirement of regular, paid salaries; however, allowances greatly incentivize CHWs to continue their work. It is not uncommon for CHWs to look for alternative income streams, many agriculture-related, to sustain themselves and their families [5]. In many cases, a passion to help their communities is not enough to sustain themselves and their families. CHW programs have implemented other methods such as standardized training and allowances to help increase retention; however, many do not produce enough income for these individuals and thus still fall short at reducing turnover.

To provide healthcare access to rural areas, developing country governments may build health posts. Often managed by two or three CHWs, heath posts are a part of the lower levels of a country's healthcare system [6]. CHWs at health posts may offer basic healthcare services but more importantly can provide referrals up the healthcare chain. These health posts are most prevalent in rural communities that can be located far from the hospitals and clinics more often found in towns and cities. As an example, in Zambia, it is on average about 15 km to a hospital from a village; however, it is only about 7 km to a health post. Individuals from rural areas can visit a nearby health post when feeling ill and may be referred to a clinic or hospital located elsewhere if the CHWs determine there is a significant health issue. This step benefits the community, who will only have to spend time and money getting to the hospital if it is truly necessary, and also the health care system in general by only utilizing limited resources (i.e. doctors and nurses) for more serious cases.

In some cases, rural communities may also contain community centers, often supervised by religious groups, NGOs, or by the community itself, offering services and programs. Community centers act as an outreach center to the local community. They are a place where people from a particular community can meet for social, educational, or recreational activities. Additionally, to combat other socio-economic challenges, community centers have been built in many developing countries offering services that can include technical training, preschool education, and small markets

for buying, selling, and bartering [7]. For rural areas, these centers serve as an important factor in bringing the community together although they rarely involve health care activities.

As mentioned before, Community Health Worker programs and health posts help bridge the gap between the communities and health care resources to improve livelihoods. Although there are numerous problems affecting them, they still have a positive influence improving basic health and health education. A potential to optimize Community Health Programs and health posts exists by pulling important features from community centers, such as an inclusive environment for social, educational, and recreational activities, and linking them with the most important features of health posts. In this article the case is made for combining aspects of these two entities into one co-located center to help address CHW retention and other problems in rural areas by creating an entrepreneurial opportunity for them, while still serving their community.

This paper begins by outlining challenges to health care delivery in rural communities, specifically looking at CHW programs and health posts that offer consultations and basic care. Next, the different models of community centers that provide services like education and technical training will be discussed. Then, a model exhibiting why a co-located center is significant and application scenarios describing its potential success will be presented. The findings of this paper will be of interest to development practitioners, government officials, and others responsible for community health programs, as well as academics interested in rural community livelihoods and health.

II. Challenges in Rural Communitites

There are many challenges that make the delivery of health care difficult in developing countries, especially in rural communities. Community Health Workers who work in these areas face specific challenges that hinder their effectiveness like poverty, access to healthcare resources, and food and water security. This section further discusses some of these challenges.

A. Access to health care

Generally, it is more difficult for rural areas in developing countries than urban areas to access basic health care due to long distances and poor road conditions. Communities in rural areas are often geographically dispersed, creating a large barrier for individuals to receive health care. For example, the current total population of Zambia is 14.54 million with an estimated 60% living in rural areas [1]. Zambia has been chosen as an example of a developing country where a co-located community-health economic center would be particularly viable. It is a large country with a relatively small population. Its level of economic development is low and the majority of Zambians are subsistence farmers. In 2010 there were approximately 23,500 CHWs and 1,072 doctors available to serve these people [8]. There are currently about 23,000 people per doctor and 619 people per CHW in Zambia. It is suggested by the WHO that there should be 5,000 people per doctor in Africa [8], but this is not always the case. Specifically, in Zimba, a town in Zambia, the Mission Hospital has a catchment area of 75,295 of which there are 100 CHWs to service this area, however the ideal amount of CHWs would be between 150 and 200 CHWs. CHWs are vital in rural areas, because without them, many people would not have access to necessary health care.

Another factor making access to health care difficult is the poor quality of roads. Quality roads provide easier distribution of supplies and allow for quicker travel times during emergencies [9]. Remote rural areas require more time and money spent on travel, further hindering these communities' access to health care. For example, in 2009 it took Zambian CHWs roughly 80 minutes on average to walk to their local health center [10]. There is too much time being spent on the travel aspect of health rather than the consultations themselves.

B. CHW Incentives

CHWs are respected, trusted, and dedicated individuals within their community. However, irregular income can decrease their willingness to continue work as a CHW. Monthly allowances can be a potential solution to incentivize them. Though certain standardized CHW programs do offer allowances, they often deliver the payments irregularly [6]. Community Health Assistants (CHAs), a standardized CHW program in rural Zambia, are on the government's payroll to receive a monthly allowance of 1,500 Kwacha ($220 U.S. dollars), but oftentimes the payment comes months late or not at all [6]. CHWs may enter their job assuming future compensation, but due to the resource-constrained setting, consistent payments may not always be practical or feasible. This failure to meet wage expectations exacerbates CHW turnover.

C. CHW Program Structure

There is a lack of comprehensive community health policies and strategies to guide the operations of the CHWs, and there are limited detailed structures to regulate and monitor the services. This structure can have negative effects on the impact and efficiency of CHWs. The task of regulating the CHW services is often left to government institutions or NGOs operating in cities far from the communities where they live and work [4]. The extent of central coordination and monitoring also often varies by country or area [9]. In Brazil, standardized CHW programs implement a hierarchical system that involves some more experienced CHWs supervising the rest of the CHWs. However, despite the formal supervision, many CHWs feel supervision does not provide sufficient technical and emotional support and instead focuses too much on the flaws of their work [11]. Therefore something beyond formal supervision is necessary for CHWs to provide more structure in their daily jobs.

In Zambia, there is a large gap due to how the CHW structure is run. Since the NGOs typically work with hospitals to train the CHWs, the CHWs that work in and around the hospitals typically receive some sort of stipend for their work whereas the CHWs in rural areas are just doing their work as volunteers. The rural CHWs were content just being volunteers but once NGOs started paying

some CHWs, the CHWs in rural areas lost their motivation because they knew that others were doing the same work for payment.

Sometimes, the lack of defined outcome indicators to measure CHW performance makes it difficult to objectively evaluate the quality of their work. In many cases, supervisors only serve to report to higher authorities that CHWs have been fulfilling their basic duties-- few are concerned with what has been done beyond the minimum requirements and rarely look at the quality of service provided [3]. CHWs need constructive, ongoing evaluation and motivation from superiors to succeed, especially in rural areas [12].

D. Health care supplies

Additionally, in resource-constrained settings, a lack of adequate supplies is common. In instances where governments do set aside CHW program budgets, there may only be enough money to provide only basic drugs and supplies [12]. In a study looking at CHW performance, CHWs from a community-run health post in the Kalabo District of Zambia reported regular shortages of drugs [3]. This study suggests the unavailability of drugs affects the performance of CHWs whose reputation may suffer when there is no medicine available. In the same study, researchers created a checklist to assess the available supplies, finding that the majority of health posts did not have basic equipment like thermometers, sterilizing pots, scissors, and/or gloves. The only supply generally present at the studied health posts was soap-- even then, only 59% of the health posts contained this commodity [3]. Working without these supplies make the CHWs' jobs even more difficult.

CHWs face a great deal of challenges in their efforts to successfully operate Community Health programs. Aside from the poor managerial structure which can be difficult to modify, a lack of salary and allowances have the potential for improvement.

III. Co-located Centers

Considering that several challenges faced by rural communities can be addressed, health posts and community centers were evaluated in order to decide the best method to combat the problems in rural communities.

A. Health Posts

Many CHWs operate health posts containing simple tools for offering basic health care, like basic medicines, thermometers, and other medical supplies, to their communities. There are typically two or three CHWs working in the health post as well as a staff member acting as a cashier, cleaner, or perhaps guard. Sometimes there is one trained staff member-- commonly a nurse [6]. Health posts are constructed to provide a place for basic consultations and shorten the distances individuals have to travel to access health care. In Papua New Guinea, these health posts are referred to as "aid posts" or "rural health services." They are a significant component of rural communities to bring CHWs and individuals together [13]. One "health house" serves communities and satellite villages, no more than one-hour walk away, in rural Iran [14]. In Zambia, health posts are the lowest level of health care and are built in communities far from health centers, the next level of health care facilities. They service a population of about 3,500 in rural areas and are placed within a 5km radius for geographically dispersed areas. There are currently 307 health posts in Zambia [15]. Local health posts offer their communities access to health consultations and referrals, but in many instances lack important elements such as sufficient supplies and CHWs in order to successfully run the health post. Figure 1 shows the different levels of health care present in Zambia as well as the services of each level [10]. While health posts do exist at the lowest level of this system, there is still an opportunity to provide healthcare services to those not currently covered by the health posts.

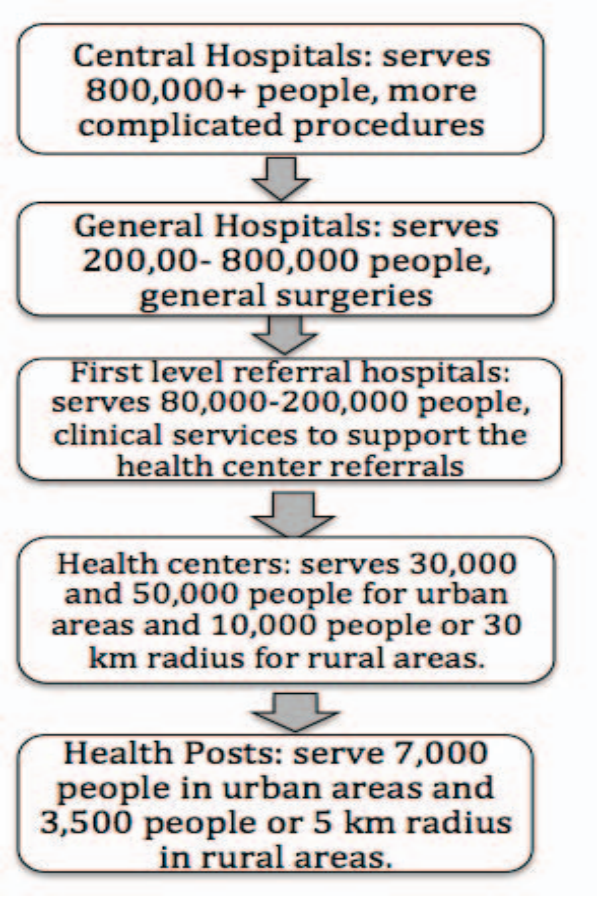

Figure 1: Health care system in Zambia

B. Community Centers

Community centers are built to create a supportive and non-stigmatizing environment accessible to everyone within the community and provide a space for education and activities like community meetings, classes, and celebrations. Due to the dispersed nature of rural communities, finding an appropriate location for local events can be difficult. Community centers can unite residents previously unable to easily collaborate. Centers can provide services to help address socio-economic needs like health concerns, economic disparities, and lack of technological availability.

Similar to other rural communities, community centers are especially important in many areas of Zambia. Several models for rural community centers exist across Zambia including church-based centers, community-run centers, and

NGO-run centers. St. Luke's Mission Hospital in Mpanshya, Zambia is a church-based center attached to the hospital offering community programs, like a preschool and nutrition education [16]. Tikondane, a non-profit, non-political, interdenominational, community-based organization in the Eastern Province of Zambia offers health education, entrepreneurship opportunities, and preschool and adult education [7]. Ugunja Community Resource Centre (UCRC) is an NGO-run center, but values community input. UCRC offers agriculture information, a library, a community health school, and a computer-training program, among other things [17]. Although community centers were built to improve livelihoods and strengthen communities, the community centers mentioned here do not necessarily incorporate health care into their model.

In some community centers, similar to the ones described above, problems have arisen due to the centers' locations. In some areas, the center was rejected by the community because of its placement between two ethnically different villages [18]. Additionally, the centers relied on only a single source of funding and may have been seen as competition to other institutions such as churches. Some that incorporated services that created stigma, like counseling and STD testing, were not widely accepted. Family centers in rural communities typically need diverse activities to address a wide range of community needs. They also need activities held in one central place with little to no boundary between the center and the community [18]. Taking into account the challenges that exist in rural CHW programs and limitations of health posts and community centers, we aim to merge together two models to improve rural community life.

IV. Co-Located Health and Economic Activity Center

A structure incorporating aspects from health posts and community centers could be more beneficial for a community than two separate entities. CHWs would perform activities typically seen at health posts like health consultations, screenings, and referrals to clinics and hospitals further away, with the addition of activities typically seen at community centers, like educational programs. In Zambia, where this model will be validated, the CHWs travel to community members rather than the community members traveling to them [19]. Although this model works in many contexts in the developing world, a health post or similar outreach structure is more valuable to the entire community. An established structure allows for the community members to know exactly where to find the CHWs and discuss any problems. Providing the CHWs with a central working location allows them to provide more reliable service to their communities who will not have to wonder where the CHWs are. Although CHWs will not have to travel to individual villages or house-to-house, the community members will be incentivized to travel to the co-located center due to constant availability of service from the CHWs. Walking a shorter distance to the center rather than traveling to a further clinic will be preferred. Community members will recognize that a CHW no longer coming to their front door will not be a barrier to accessing care.

While addressing community needs, this center would especially address CHW problems like retention by providing them entrepreneurial opportunities for additional income moving them from volunteers, with often-unstable incomes, to entrepreneurs. Examples of entrepreneurial opportunities include: CHWs providing additional products for an added price, collecting health information to sell, and selling nutritious food to their customers [20]. Although creating the center will call for more CHWs, adding this entrepreneurial activity will also increase retention by attracting more people to become CHWs.

One example of a co-located center could include the additional product of fruits and vegetables through the placement of a greenhouse run by CHWs near the community center. In one trip, an individual can consult with a CHW about nutrition and health care as well as purchase nutritious food, allowing for the community to go to one place rather than multiple (market and health clinic). For some, including pregnant women and the elderly, frequently traveling to multiple places to run their errands can be difficult and costly. Community members would also have the opportunity to create and conduct other enterprises at the center. Although primarily run by the CHWs, a heavy emphasis on community input is essential for the success of the co-located health and economic activity center model. In order to ensure community acceptance as well as its future success, primary and secondary stakeholders have been determined. The primary stakeholders include CHWs and community members. The two groups are directly affected by the center and are a vital aspect of the center's advancement. The secondary stakeholders consist of government officials overseeing the CHW program, NGOs connected to the CHW program, and clinics, hospitals, and health posts in the surrounding areas. These stakeholders, although perhaps not involved in the day to day activities of the center, will have a direct influence on the center's success within the community. The concept behind the co-located model was created with the stakeholders' interests in mind. Figure 2 shows the model highlighting the relationships between the CHWs, the community, and the other entrepreneurial activities. In Zambia much of the healthcare system is free; however, CHWs could charge a fee for additional products and services.

All community centers and health posts have a specific set of core activities along with complementing key features. For example, a center's core activity may be providing a space for buying, selling, bartering goods and holding educational workshops. Through the core activities, the center seeks to improve the community economically and socially. Generally, a health post's core activity is to supply a place for CHWs to perform consultations and referrals. Its key features may be selling basic medicine and located in a central, accessible place. Figure 3 contains a graphic illustrating the core activities and key features of both community centers and the health posts. Our co-located center intends to integrate the two aspects of community centers and health posts.

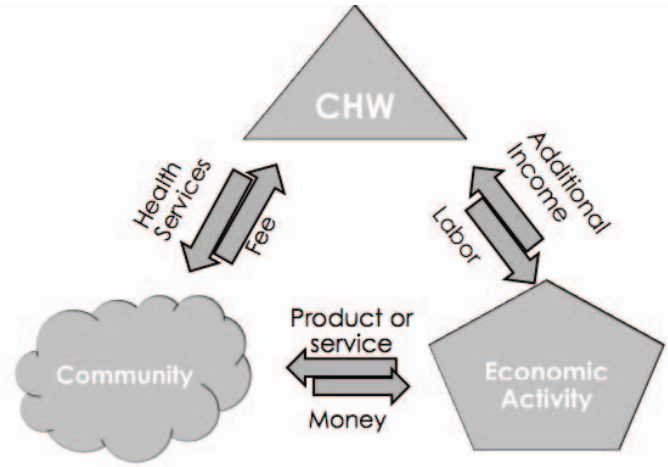

Figure 3: Co-located center model

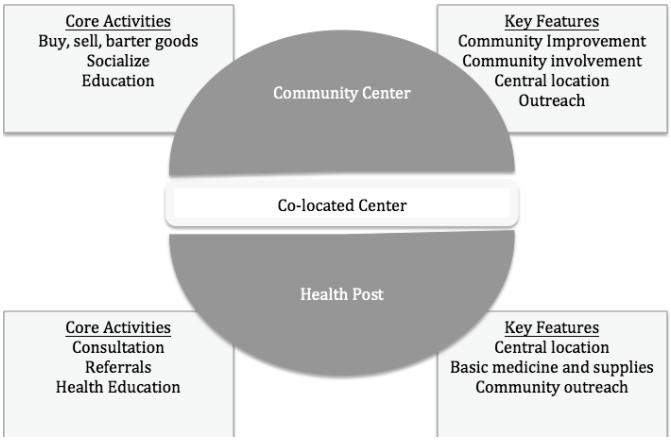

Figure 2: Health post-community center comparison

V. Application Scenarios

Scenarios will be presented to show potential applications for our model. The technique of scenario-based design is useful to imagine use cases of any system that can be used to further guide its design [21]. The first describes Alice, a pregnant Zambian woman, in need of nutritious food for her and her children. The second scenario describes Natasha, a CHW in need of additional income to support her children attending school.

A. Scenario 1-Pregnant woman in rural area

Alice is a pregnant woman in her first trimester from a rural area in the Southern Province of Zambia. She already has three children and lives with some of her extended family including her elderly mother. Alice's family owns some farmland near their home where they grow maize, a local staple. As is common in many developing countries, Alice does much of the agricultural work needed to keep the farm running, something that has been getting harder as her pregnancy progresses. Although they are able to keep some of the maize produced on their farm, much of it is sold in the market to provide the family with income.

Alice must travel to the Mission Hospital in Zimba from the outlying village where she lives in order to receive care for her and her baby. At this point in her pregnancy, she has visited the hospital once for her initial examination and will not return until she is further along in her pregnancy due to the amount of time it takes to travel to the hospital and the time she needs to work their farm. However, during her first examination at the hospital, nurses advised her on the importance of nutritional foods for both her own health and her baby's. The nutritious vegetables that Alice could buy to increase her own nutrition (and also her other family members') can be found in the Zimba market but prices are high due to the seasons, and the market is far from home. Despite learning the importance of nutrition for health, Alice does not give it much thought; the combination of far distances to the market and high prices make her disregard the advice given at the hospital.

Alice's family's diet relies heavily on *nshima*, a porridge made from ground maize, with added ingredients based on the meal. This is a traditional meal eaten by many families in the area but it does not supply many of the nutrients needed by Alice and her family. A lack of proper nutrients leads Alice's pregnancy to be less healthy than it could and should be, something she will be unaware of until returning to the Zimba Mission Hospital towards the end of her pregnancy.

The introduction of a co-located community health and economic center located near Alice's home would transform the way in which her pregnancy and life in general turn out. This center is located along the route that Alice travels from her home to the family's farmland and is an area that often sees a relatively large amount of the traffic in the rural area. Alice can now visit this center on the way to or from her fields and interact with the other individuals there, including some community health workers. The CHWs working at the center would be knowledgeable about maternal health allowing Alice to consult with them throughout her pregnancy to insure it goes as good as it possibly can. These more regular visits will allow the CHWs to keep track of Alice's progress as well as give them the opportunity to provide Alice with reminders of practices that can improve her, her baby's, and her family's health. If any issues due arise during the rest of Alice's pregnancy, the CHWs will refer her to the Zimba Mission Hospital ensuring that she only has to travel to the hospital if truly necessary. Daily discussions about nutrition remind Alice how important it is to add nutritious ingredients to the nshima she prepares at home. She is even able to purchase some of these ingredients at the center where the CHWs manage a greenhouse that is used primarily to grow nutritious vegetables that can be sold to local women.

Alice is also able to meet and socialize with other village members at the center. After talking to some of them she realizes that there is a demand of maize from the local residents who also must travel to the Zimba market to purchase most of their food and other products. Alice decides to begin selling a portion of her maize at the center, proving the family income without the need to transport their agricultural goods all the way to Zimba, increasing their margins. The introduction of this center has multiple benefits for Alice and her family including better health care during her pregnancy, an improved diet enabled by the purchase of nutritious vegetables from the center greenhouse, and

economic opportunities in the form of another place to sell the maize produced on her farm.

B. Scenario 2-CHW in rural area

Natasha is a CHW in a rural community outside of Zimba in the Southern Province of Zambia. Since she was in high school, Natasha dreamed of becoming a doctor. However, due to family issues that occurred during her childhood, she was unable to complete her high school diploma and therefore did not have the opportunity to go to university in order to become a doctor. Not wanting to give up on her dream of working in medicine, Natasha decided to become a community health worker. This allowed her to work in a health-related role despite not being able to complete her studies.

Now in her tenth year as a CHW, Natasha is married and has several children that she cares for. While Natasha is quite happy to be working in public health, CHWs in Zambia are irregularly paid volunteers. This means that Natasha must find ways to earn an income outside of her work as a CHW. One way she does this is farming the land that her family owns. However, she does not have much extra time to spend in the field. This becomes a problem in the planting and harvesting seasons when she has to get up quite early, prepare food for her family, and take care of the children, all before going to the fields. After spending several hours at her farm, Natasha then returns home and prepares to begin her day as a CHW.

As a CHW, Natasha has to travel from house to house, covering a large distance daily. Natasha was assigned about 20 households by the Zambian Ministry of Health. These are households that Natasha regularly visits in order to discuss health issues and provide advice about anything the families may be experiencing. Natasha's 20 households are located in the rural areas around Zimba. However, there is still a great deal of distance from Natasha's home to each of the other families' homes, which are themselves spread out across a rather large distance.

To perform her CHW duties, Natasha must carry a backpack full of supplies, which gets heavy during her travels. This backpack includes informational materials about common health topics, like nutrition and maternal health, as well as some basic medical supplies that are sometimes useful. Because of the long distances that she must travel between households, Natasha is only able to visit individual families about once every two weeks. If a family experiences a medical issue that they wish to discuss with Natasha, they may call Natasha's cell phone. However, this is not always effective with some issues requiring in-person interactions in order to be most beneficial. Making this happen requires Natasha to modify her schedule for the next day in order to make the journey to see that family, disrupting her planned visits to other households.

Natasha's life and work could be transformed with the help of a combined community center. This center would be located in the rural area where Natasha lives but at a centralized location between Natasha and her assigned family's homes. Each day when conducting her CHW duties, Natasha now travels to the community center and works there. Because of the centralized location, the families that Natasha is responsible for often travel by the community center regularly. This allows Natasha to see the families more often than she would otherwise be able to if she had to travel to their homes. She can also offer health advice to multiple individuals simultaneously, making her more efficient. The community center also contains a small market that sells vegetables and other food items. Natasha can purchase nutritious food from this market rather than travel into Zimba, a time-consuming journey. Over time the community center becomes a gathering place for individuals living in this rural area. After seeing some youth who are regularly there at the center with nothing to do, Natasha decides to offer several of them employment on her farm. This provides the youth with employment and also reduces the time that Natasha has to spend working her farm by herself. This results in Natasha becoming a much more effective CHW who can spend more time working on her passion, public health, rather than spending time in the field. She is able to see some of the vegetables grown in her fields at the community center and eventually decides to open a greenhouse next door to the center. This provides the community with even more nutritious food and an additional source of income for Natasha.

VI. IN DEPTH ANALYSIS OF CO-LOCATED HEALTH AND ECONOMIC CENTER MODEL

Health posts and community centers generally exist separately, sometimes having characteristics of the other, but never fully incorporating them together. The co-located model adds an entrepreneurial opportunity that is not limited only to CHWs, but is available to the rest of the community. Although this specific co-located model describes the entrepreneurial opportunity as CHWs selling produce from their greenhouse to make an additional income, because it is a community center, community members could also sell their own goods in the center. The co-located model has the advantage of using the trusted CHW network as the core component, using this advantage as an opportunity to gain trust with the rest of the community, something needed for the success of a co-located center. The model is easily capable of adjustments according to the context and can be tailored to the exact needs and wants of a community. It can be further adapted to address the specific problems that exist in other locations where it is used, for example a lack of medical supplies or lack of motivation from supervisors.

Moving forward there are challenges that may arise with the co-located model. Without further validation, it is difficult to ensure regular CHW attendance to provide a reliable place for the community, retain their interest in the entrepreneurial opportunity, and confirm that the community finds the center beneficial. Finding a source of funding for the creation of co-located centers will also be a challenge. However, the model was developed with the intention of being inexpensive by, for example, not including an expensive permanent structure. Management of the center may also be a challenge. Will the center be community or government managed? What if the community and government have differing intentions for the center? These are all issues that will need to be dealt with when co-located centers are created and are generally contextual issues for

which there is no one answer. Additionally, the balance of health services and economic activities should be considered, both for the center itself and the CHWs more specifically. The goal of these centers is not to take the CHWs away from their healthcare work by presenting them with economic opportunities by for example, selling vegetables. Instead, the economic activities provide a consistent source of income that will allow CHWs to focus more on their passion – healthcare. Where previously they may have had to spend time earning an income for their families, they may now be able to do that while also providing health services to their fellow community members. Table 1 presents both the opportunities and advantages of the model as well as some future challenges that must be overcome for the model to succeed. Creating a successful co-located center will require balancing the challenges with any opportunities and advantages that may arise.

Table 1: Opportunities, advantages, and challenges of combined centers

Opportunities and advantages	Future Challenges
♣ CHW network ♣ CHWs requested the structure for daily meetings and consultations ♣ Established greenhouse venture to provide entrepreneurial opportunity ♣ Co-located centers are not prevalent ♣ Shifting CHWs from volunteers without many incentives to giving them an additional income stream	♣ Reliability of CHWs to consistently work out of the center ♣ Community use of center ♣ Community acceptance ♣ Sustainable model ♣ Maintenance of the center ♣ Management of the center ♣ Balancing CHW activities

VII. RESEARCH AND VALIDATION

Additional research was gathered in Summer 2015 in the Southern Province of Zambia, specifically in the Luskaka, Choma, and Kalomo districts. Research comprised of interviewing CHWs to better understand their financial standing as it pertains to their health care work. The CHWs that were interviewed mentioned that the minimal stipend that they receive for their work (if they receive any at all) is not enough to sustain themselves and their families. Thus, the health workers that were interviewed said that they have additional means to generate an income. Examples included having a store run out of their home or selling vegetables that were grown in their garden. All of the CHWs that were interviewed enjoyed their CHW work but due to only being volunteers, most of them could only take 3 days a week to be a health care worker. The other days of the week were spent generating an income by other means. With the center, the CHWs could spend more time focused on helping their community rather than spending it on side jobs since the co-located center would generate some income for the CHWs. Validation was also gained through visiting and helping during Children's Health Week at the health posts. Once a month the health workers work at the clinics to weigh kids under five, distribute medicine, and provide family planning services to those that need it. During these clinics, women take the opportunity to sell vegetables and biscuits to other people attending the clinic. While it is infrequent and informal, this is the basis of the Co-Located Center. In order to determine the best potential location for a center, important locations around the rural community were identified, such as existing clinics, health posts, and hospitals and their distances from the areas they service. Doing this research assisted in finding other business models to help expand the co-located center model into other rural areas in the developing world.

VIII. CONCLUSION

Our findings suggest that a Co-located Health and Economic Activity model will best benefit rural communities whose inhabitants have difficulty accessing basic health care. This model attempts to solve the challenge of retention and turnover within CHW programs. By providing an additional entrepreneurial opportunity we hope that the CHWs will be more incentivized to work as an unpaid volunteer health worker. The importance of this paper lies in the concept of merging community centers and health posts. The co-located model will lead to the reduced turnover rates, more access to health care for the community, and improved nutrition.

Our Co-located Health and Economic Activity model is dependent on the entrepreneurial opportunity, which can be altered in order to fit the context. The context changes according to the structure of the CHW program and the needs of the community. This model could also be used in a more urban setting, again requiring adjustment according to the surrounding areas. First and foremost, our model looks to combat the challenge of CHW retention. The current model does not specifically address the lack of supplies and the disparities present in CHW program structures. After this model has been applied, validated, and built, the problems we have not addressed can be tackled for the center. Success depends on the reliability of the CHWs, the community's involvement, and the sustainability of the entrepreneurial opportunity. We aspire to create a mutually beneficial situation for all stakeholders involved in the creation and use of the co-located health and economic activity center model.

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