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Stronger Together: A community case study highlighting the benefits of pharmacy and community collaborations.

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Title Page

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Abstract

Background

The pandemic exposed weaknesses in existing social and health care infrastructures, disproportionately affecting health outcomes, particularly within rural communities. Addressing these challenges within rural settings requires innovative interventions. This study seeks to evaluate the role of an interagency network in increasing vaccine uptake in rural settings.

Methods

The Network, a partnership of community based clinical and social service organizations, including community pharmacies, community health workers and academic researchers, implemented outreach activities which targeted factors related to access to and acceptance of COVID-19 vaccines at the individual, interpersonal, community and environmental levels. Qualitative methods including in-depth interviews and content analysis of transcripts from planning and networking meetings, were subjected to narrative analysis to document the effectiveness of this multi-component intervention.

Results

Through different outreach efforts, the Network was able to achieve 84,206 educational touchpoints and administer 14,769 vaccines to individuals in the 16-county project area in southeastern Missouri. Leveraging the influence of community pharmacists and community health workers was found to be effective in overcoming barriers to access, improving vaccine uptake, and addressing social and health inequities. Facilitators for the partnership and the success of its initiatives included trust, capacity building, and enhancing access, while poor communication and unclear role definition created barriers.

Conclusion

Study highlights the benefits of community health workers (CHWs) and community pharmacists working collaboratively to increase vaccine uptake in rural Missouri. Findings provide support for expanding this model for future health initiatives.

KEYWORDS: rural health, community pharmacists, community health workers, community outreach, COVID-19

Key Points

Background

- Rural communities face health professional shortages and many barriers to accessing care. Within rural communities there is also a significant mistrust of governmental and medical professionals.
- Previous work has shown that community pharmacies can play a key role in providing access to care and health education within pharmacies, however, less is known about the factors that influence the success of pharmacies working collaboratively in community settings to enhance health and well-being.

Findings

- Collaborative efforts between community pharmacies, health and social service providers, community and faith-based organizations, and Community Health Workers (CHWs) successfully increased access to and uptake of COVID-19 vaccine in rural Missouri.
- Key factors contributing to the success of the intervention included working with trusted messengers like CHWs and community pharmacists; facilitating conversation and building partnership through a network of organizations, identifying real community needs and implementing targeted activities to address them.
- This collaborative approach to implementing a community-based intervention demonstrates the potential for expansion to other health initiatives in rural communities.

Background

The COVID-19 pandemic had a profound impact on many aspects of human life. Public and private infrastructures were thrown into turbulent and unfamiliar waters, while existing health care and public health structures, systems, and workforce in particular, were flooded[1]. Many of the standard public health approaches to ensuring the public's health were questioned, including one of the most widely accepted and strongly recommended preventive measures, vaccination[2,3].

Although a vaccine against COVID-19 was approved by the FDA in August of 2021, vaccine uptake varied among community members based on their place of residence, race, and ethnicity. According to Kaiser Family Foundation's (KFF) COVID-19 vaccine monitor, there was a lag in vaccine uptake among rural and suburban residents compared to urban, and Black and Hispanic adults compared to White adults, particularly among younger age groups[4,5]. The southeast corner of Missouri experienced these same disparities in vaccine uptake[5]. Given these circumstances, it was not surprising that the rates of COVID-19 cases (+9%) and deaths (+25%) in these rural areas were higher than in Missouri as a whole, whereas rates of vaccine initiation were lower (18% less than the state as a whole)[6].

During the earlier stages of the pandemic, the burden of disease was more in the densely populated urban areas[7]. However, as the pandemic progressed, this burden shifted towards rural communities, such as those living in Southeast Missouri. Already existing political polarities[8] and lack of trust stood as barriers to acceptance of preventive recommendations. Lack of access to providers and health care in general was exacerbated and communities had little to no access to personal protective equipment, testing, education, or vaccines as they became available. To address these emerging needs among residents in Southeast Missouri, the Health in the Heartland COVID-19 Response Network (the network) was formed.

Health in the Heartland COVID-19 Response Network

The Health in the Heartland COVID-19 Response Network was comprised of academic researchers and community-based clinical and social service agencies, many of which worked with community health

workers (CHWs, referred to by some as patient advocates, educators, outreach worker, promotoras etc.)[9]. These CHWs were trusted members of the community who worked as health educators, advisors, and service navigators[10]. The Network was co-facilitated by community and academic partners and used participatory approaches to engage broader partner engagement in all activities, meeting routinely (weekly) to share information and resources, guide project implementation, and foster collaboration. additional information related to the mechanisms of collaboration within the Network has been discussed in a separate paper [11]. [11]

As a part of this work, then collaborated to secure a grant to initiate an awareness campaign about COVID-19 and vaccines with the goal of increasing vaccine uptake in the 16-county project area. This allowed the research team, community-based organizations, and CHWs to collaborate with a regional community pharmacy, which in turn engaged other community pharmacies that were part of the Community Pharmacy Enhanced Services Network Missouri (CPESN MO).

During this time the Network meetings served as a platform for exchanging information, sharing experiences, communicating needs and establishing connections with local organizations all of which assisted in maximizing utilization of available resources. These collaborative efforts also aided in evaluation of our efforts. For example, the community pharmacies created a shared data collection and event tracking and scheduling system for participating pharmacies. In addition, the project leads from the pharmacies, academic units, and community-based organizations met to discuss the data collection/tracking and intervention processes and challenges.

As an integral part of the Network, pharmacists and CHWs affiliated with them (pharmacy-based CHWs) were able to work in the pharmacy and attend community-based events and work with community-based CHWs to provide COVID-19 related education. They were also able to inquire about other social needs, vaccine status, answer questions when necessary, and administer the vaccine itself. The community pharmacists were well-established, trusted members of their communities and proved critical to the

Network's efforts in terms of planning (e.g., how many doses to bring, how to organize events and track vaccinations provided) and the delivery of educational messages. Pharmacies were also critical in terms of location. A nation-wide geographic analysis shows that nearly 90% of Americans live within 5 miles of a community pharmacy[12]. Studies also show that patients visit their community pharmacists twice as often as they visit their physicians, with the frequency increasing at an equal to or greater than rate for those with multiple chronic conditions [13]. The Network pharmacists were well aware of this context and understood that many community members have complex medical challenges that require routine medication and were able to address doubts about drug and vaccine interaction.

Although historically, pharmacists' roles have been focused on clinical care, our project is consistent with recent work to expand pharmacy involvement addressing both health education and social needs[14,15,16]. Community pharmacists' collaborative efforts with local organizations to enhance public health outcomes, particularly in rural settings, remain understudied despite their potential impact [17]. This body of knowledge is especially relevant when considering the role of pharmacies in improving vaccine uptake during the COVID-19 pandemic[18].

Objective

The objectives of the project were to increase knowledge and acceptance of the COVID-19 vaccine through collaborative pharmacy - social service community-based efforts in rural southeast Missouri. This paper describes the intervention approaches used, presents intervention impact, and identifies key factors that influenced the overall success of the project.

Methods

Intervention approach

This intervention consisted of culturally appropriate, locally generated activities targeting issues of vaccine equity among people living in the project area and were implemented through the collaborative efforts of

regional clinical and social service organizations. The two-pronged approach to the intervention focused on the following:

Education and awareness

The Network supported CHWs in their efforts to increase vaccine acceptance, through activities that either increased exposure to information about COVID-19 and COVID-19 vaccine or encouraged conversations on issues related to getting the COVID-19 vaccine. Community pharmacists in collaboration with CHWs partnered with employers, local businesses, faith-based, and cultural organizations to utilize locations frequented by community members to conduct educational outreach activities. CHWs used pre-existing and developed new educational materials (flyers, brochures, and posters) to respond to the specific educational needs of community members.

Facilitating access to vaccine: Shots in arms

Another key obstacle to vaccine uptake in rural Missouri stemmed from limited availability of transportation options to vaccine distribution sites. To address this issue, the Network partnered with community pharmacists and provided vaccines at educational outreach events in a number of community settings e.g., churches, libraries, parks. Moreover, the Network partnered with organizations to provide transportation services to and from vaccine clinics and locations where pharmacists were administering COVID-19 vaccines. It was within these settings that community pharmacists were able to reach at-risk community members with existing health conditions through direct patient engagement.

Study Design

A mixed methods study design was used to assess the impact of the intervention and the factors influencing the success of collaborative efforts of regional clinical and social service organizations to promote vaccination uptake among rural communities. Community, pharmacy, and academic partners collaboratively engaged a narrative approach to analyze and interpret data obtained for this study.

Study population

A total of 65 CHWs were mobilized to conduct outreach events in 16 counties within the Southeast Missouri. A little over half of the CHWs (55%) were employed by the partnering pharmacies, and the other half were employed by community-based organizations. Most of these CHWs (89.2%) were female, 20% were between the ages of 18-25 years, while around 77% were over the age of 25. The majority of the CHWs identified themselves as White (77%), while 17% of them identified themselves as Black or African American, generally reflecting the populations of the counties being served. Almost all (95%) CHWs involved had completed a GED or a high school diploma. Sixty-nine percent of the CHWs lived in the same community or in one of the communities where they worked. Additionally, forty-three percent of the CHWs reported having previously worked in various capacities such as outreach coordinator, community liaison, healthcare and social services navigator, health educator, or community health worker.

Eleven of these CHWs were recruited through stratified (by organization that employed them) convenience sampling to participate in a semi-structured qualitative interview. Their demographic characteristics mirrored that of the 65 CHWs in general (e.g., 77% white, 90% female). Among the eleven study participants, eight of them self-identified as white and the remaining as African American.

Data collection and analysis

Data regarding outreach events and vaccine uptake was tracked using online tools (Qualtrics). The factors that influencing the success of collaborative efforts of regional clinical and social service organizations to promote vaccination uptake among rural communities were assessed using qualitative interviews with CHWs and participating pharmacists.

Tracking outreach events and vaccine uptake

At each outreach event CHWs completed an online Qualtrics form to capture information on types and number of activities conducted, educational methods and materials used, event locations, and the number and demographic description of the community members reached. Data exported from

Qualtrics were checked by the members of the research team for completeness and accuracy before being aggregated to document demographics of individuals reached (outreach attendance), outreach location within the community (outreach location), and strategies used to complete the project activity (outreach strategies). In addition, partnering pharmacies created online systems for the collection and curation of data on the number and demographics of the individuals being vaccinated. They also collected data documenting the reason behind an individual's decision to get vaccinated.

Qualitative data regarding factors influencing intervention success

Qualitative data from in-depth interviews and planning and networking meetings were analyzed to identify factors influencing intervention success. In-depth Interviews (IDI) with CHWs using a semi-structured interview protocol that focused on the context within which CHWs conducted their work, community perceptions about COVID-19 and the vaccine, strategies and messages used for educational outreach, and the impact CHWs had on a community as well as systemic level. Partnering community-based organization and academic members of the research team reached out to CHWs via email, and provided an information statement about the study, requesting their participation for the IDI. The interviews also focused on gathering lessons learned about implementing health interventions through the clinical and social service partnership. Interviews were conducted and recorded via Zoom after receiving verbal consent of the participant. Transcriptions of the interviews were completed using Zoom application's transcription option. These transcripts were reviewed by the interviewer to ensure accuracy and de-identified prior to sharing. All transcripts were then analyzed using an inductive approach, beginning with open coding by two members of the research team followed by a focused coding technique in which four members of the research team independently assigned codes to transcripts based on the interview topics, discussed disagreements, and came to a consensus on the best way to address discrepancies to ensuring intercoder reliability. After initial coding, codes were then arranged into clusters with summary paragraphs synthesizing key elements from each cluster, along with supporting quotations from the interviews.

In addition to interviews, the qualitative data analyzed for this paper includes transcripts of planning and networking meetings. The qualitative data extracted from them were coded and then assigned to relevant clusters. These results were then shared with partner organizations' representatives for member checking. Feedback received through this were duly incorporated for the finalization of the manuscript. Verbatim quotes have been presented in a Table 3 (T3), under relevant clusters.

Results

Outreach events

A total of 84,206 educational touchpoints were achieved through 891 outreach events implemented by CHWs over a 10-month period. Information on attendance, location and strategies used and has been provided in Table 1.

Outreach Attendance

First section of the data in Table 1 presents the characteristics of the community members attending these outreach events. It is important to note that the same individuals may have attended more than one "event". The majority of the outreach efforts were attended by adults, young adults, and senior citizens of the community. Of the people attending these events, 634 were male and 658 were female. Most of the individuals who attended the events identified as African Americans (546) followed by individuals who identified as White (494). Most of the events (755) included individuals who were members of a specific faith or religious group. Only a few of these events included individuals who were bilingual/multilingual (46) or were currently unhoused (14).

Outreach Location

Through coordinated efforts, CHWs hosted outreach events in locations where community members naturally gathered (see Table 1). Most of the events were held in public spaces such as community resource centers (694), faith-based sites such as churches (182), recreational spaces and parks (116), along with residential areas within a neighborhood (72). In addition to these, events were held at

businesses most frequented by residents such as beauty shops; existing community institutions such as schools, youth centers, and colleges; healthcare service points such as physician clinics and pharmacies were also utilized. Door-to-door visits, conducted as a part of maternal and child health home visits were also utilized as an opportunity to provide information on COVID-19 vaccine. Some of the outreach activities conducted (34) did not have a physical location and utilized virtual platforms like social media sites, community websites etc.

Outreach strategies

Outreach strategies predominantly consisted of a blend of diverse approaches (see Table 1). These approaches not only aimed to educate and create awareness about COVID-19 and the vaccine against it, but also did so in a way that maximized community trust, encouraged communities to make informed decisions, and increased their accessibility to vaccines, should they decide to obtain one. Different methodological approaches were utilized by CHWs to reach different communities. From print media like poster, flyers, and door hangers, to increase exposure to information on vaccine efficacy, to popular virtual platforms like social media, mass media and telecommunication methods were used to provide information on COVID-19 and how and where to access the vaccine.

Vaccine uptake

A total of 14,769 people received COVID-19 vaccines through the Network's coordinated efforts.

Characteristics of COVID-19 vaccine recipients

Table 2a presents the demographic characteristics of the people who received the COVID-19 vaccines Most individuals who received the vaccine were adults aged 30-64 years (49.48%), followed by seniors aged 65 years and above (29.78%). Most were female (52.15%), identified as white (86.28%), and identified as non-Hispanic (94.96%) (with racial and ethnic populations being proportional to the county demographics as reported earlier). Only a small percentage of individuals who received the vaccine were children aged 0-11 years (0.03%) and it is important to note that these data were collected over the period of the year 2021. It was only during the latter half of October 2021, while the project

was still under implementation, that the FDA approved the vaccine for emergency use among children 5 through 11 years of age[19]

Reasons for getting vaccinated

After receiving a vaccine, community members were asked about how they became aware of the availability of the vaccine and what influenced their decision to get vaccinated (see Table 2b).

Of those who were vaccinated, the majority (63.27%) stated that they were influenced by information provided by their pharmacists. Remaining 47% of the 14,769 vaccinated individuals cited a variety of reasons for getting vaccinated, including being influenced by family members and/or peers, and mandates. In addition, community members reported that they received information about the vaccine through various channels, including home visits, communication via phone, mail, text, or email (1.68%), mass media devices (4.83%), and virtual platforms (6.79%). This suggests that a multi-faceted approach to vaccine education and distribution was successful in encouraging community members to get vaccinated against COVID-19.

Factors influencing intervention success

Analysis of qualitative data resulted in the identification of key themes influencing the success of the intervention. These themes are presented below, with supporting quotes from participants provided in Table 3.

Conversations and relationship building

CHWs along with community pharmacists noted that educational outreach events created an avenue for conversations between pharmacies and organizations within the community, for instance, faith-based organizations. These conversations developed some new and renewed relationships which then progressed into an approval from these organizations for setting up vaccine clinics (1a, 1b). These conversations helped build relationships not only at the organizational level, but also with community members. Conducting an initial community pharmacist-led informational session, was found to help

reduce existing misinformation and vaccine hesitancy while also serving as an opportunity for interested community members to pre-register for a vaccine clinic (1c). This process also permitted the pharmacists to estimate the number of doses required for future clinics, reducing wastage (1e). Moreover, by setting up vaccine clinics at or near an outreach event, community members were given the option to receive the vaccine, where they were (1b). This approach not only increased vaccine acceptance but also helped address the issues of access.

Community pharmacists: Trusted, Influential and Accessible vaccine recommenders

CHWs noted the utility of having pharmacists provide technical information to increase the reception of the information provided, even when the community members 'did not know them' (2b). They further noted that having a pharmacist provide the facts was similar to having your doubts clarified at a 'doctor's office' (2a).

Community pharmacists noted that not all queries around the vaccine against COVID-19 arose from vaccine hesitancy. Patients dealing with chronic health conditions had questions about how the vaccine would interact with their existing health conditions. These "legitimate concerns" could be addressed by community pharmacists who are known to be well versed in potential drug interactions (2c, 2d). Community pharmacists shared that they are in a unique position in terms of accessibility, particularly to people with complex health conditions providing them with the ability to reach an otherwise hard to reach population without increasing their risk of exposure to COVID-19 infection.

One community pharmacist emphasized the need for community members to feel like they were talking to a person from their own community, not outsiders. The fact that the Networks' partnering pharmacies were already an embedded part of the community serving the 'same people' for a long time added to their credibility among members of the community they served (2e).

Trust was also increased by the pharmacists' having cultural and historical understanding of the community. Many of the successful vaccine clinics were organized through the initial outreach efforts

carried out by community pharmacists. They travelled to faith-based organizations such as churches for informational sessions dispelling misinformation while catering to the faith of the audience, they were addressing.

Addressing inequities beyond access to vaccines

Apart from making people aware of facts about COVID 19 and empowering them with the ability to connect to reliable and accurate sources of information, the CHWs were also able to connect people to resources needed to access vaccines, such as transportation to vaccine sites (3a, 3b).

CHWs noted that having trusted members embedded within a public health initiative helped foster 'trust' and open communications among service providers and community members (3c). Moreover, involvement of trusted members in the outreach events, allowed community members to comfortably express health related social needs that went beyond the scope of just COVID-19 response (3d).

The Network facilitated collaboration and expanded access to resource

The Network allowed religious leaders such as pastors, representatives of partnering pharmacy organizations and community-based organizations, in the area, to come together to determine the logistics of conducting outreach events and vaccine clinics. It also conducted capacity building activities that supported CHWs in successfully completing project initiatives. Quotes supporting the themes identified below, provided by CHWs and community pharmacists during interviews and in collaboration meetings, are provided in Table 3.

Facilitation of collaboration and capacity building

Collaboration between community and faith-based organizations and community pharmacists allowed the Network to capture hard to reach at-risk groups within the communities (4a). However, there is a certain art to collaboration, and it was important to have the leaders of these institutions involved in conversations from the very beginning (4b).

Supporting CHWs

The Network worked with the CHWs to ensure that they had up-to-date and necessary information on COVID-19 and the vaccine against it (5a, 5b) along with skills to help address mental health challenges (5c) CHWs faced during the pandemic. CHWs from all participating organizations emphasized that this additional support, over and above the educational resources and trainings provided by the Network, was highly valued. They particularly highlighted the benefits of support that was provided through reflective supervision helping CHWs build relationships and foster inter-agency sharing of resources (5d). CHWs noted that perhaps it was because of the work entailed in establishing the relationships for this grant, that they saw the initial signs of sustainability of the relationships (5e, 5f).

Challenges in Collaboration

While there were many factors that enhanced success of the interventions, there were also some things that served as challenges to intervention success. Both pharmacy and community organization (CO) based CHWs voiced challenges in working across organizations. Some pharmacy-based CHWs expressed their frustrations about what they viewed as under-performance and lack of accountability demonstrated by CO-based CHWs when organizing community events, specifically vaccine clinics (6a, 6b). Pharmacy-based CHWs also voiced concerns about the pharmacists, in their team, feeling "burnt-out" and overloaded with the additional responsibility of having to attend to information-request calls and event coordination responsibilities on top of their duties as pharmacists (6b, 6c).

CO-based CHWs expressed the inconsistency in the information provided by some pharmacists and stressed the significance of everyone on the team, particularly pharmacists, communicating the same facts (6d). They pointed out the need to educate pharmacists with the same up-to-date information on COVID-19 that the CO-based CHWs obtained (6e).

All CHWs noted inadequacies in the cross-agency communication structures (6f). Although, scheduling was initially a struggle, improvements helped and all CHWs saw to the utility of having each other's support at the outreach events (6g).

There were also several challenges faced specifically among the pharmacies. Collaborating across pharmacies required creating and/or modifying documentation and tracking systems for enabling pharmacies to share records among themselves, with the funding agency, as well as with state mandated reporting agencies. This created an added task of data entry and management and within pharmacies, systems had to be created to differentiate between education and information provision versus other activities with pharmacies having to either hire additional staff members to handle this additional responsibility or having pharmacists themselves take on this task when necessary (6h, 6i).

Discussion

An individual's decision to accept a vaccine is shaped not only by the social and structural barriers present around them but also by human-factors such as knowledge, attitude, and belief about the vaccine[20–22]. Current literature on addressing vaccine uptake shows that it is a complex topic that needs a multi-disciplinary perspective[23]. This study highlighted the benefits of using trusted messengers to increase vaccine confidence. CHWs can prove to be effective in providing human-centered information that encourages community members to engage in decision-making rather than demanding action, along with community pharmacists and other health and biomedical care providers[20,22,24]. Historically integration of community pharmacists into the realm of public health interventions has primarily been to address curative aspects of health such as medication adherence[14]. However, over the course of the pandemic, the range of services provided by community pharmacists has expanded to incorporate preventive health services, including health education and promotion services to increase acceptance of the vaccine against COVID-19[16,25].

While there is an emerging area of literature documenting the integration of pharmacists into the preventive aspects of health, this study adds to the previous literature highlighting the benefits of CHW and community

pharmacy engagement in public health interventions in several ways[15]. The study highlights how these interventions can not only enhance the clinical outcome of interest (in this case increased vaccine acceptance) but in doing so can increase collaboration between community pharmacies and other health and social service providers and thereby increase the capacity of pharmacies to address social determinants of health[26]. One of the findings of this study was related to the importance of leveraging the level of patient-accessibility a community pharmacist holds within their community, especially among groups that are already dealing with pre-existing health conditions. A qualitative study on the contributions made by community pharmacists during the pandemic in France reported similar findings[27] suggesting that they can play an important role in the management of emerging infectious diseases and further emphasizing the need for them to be integrated in the planning of emergency responses. It is known that community pharmacists are located in most communities within the country and are visited more frequently by patients with chronic conditions[12,13]. Similarly, the community pharmacists present at the outreach events conducted by the Network were effectively able to answer legitimate concerns among community members about drug and vaccine interactions. The study also found that conducting informational sessions, led by community pharmacists, addressing questions and concerns regarding the vaccine not only helped address misinformation and vaccine hesitancy but also helped recruit community members interested in getting vaccinated. This process helped plan the number of doses required for future clinics, reducing wastage.

Apart from this, all efforts made to increase vaccine uptake in the Network's project area were implemented as a part of a clinical and social service collaboration. One of the major benefits of the Network was the sustainability of the connections fostered during the project period. Both CHWs (pharmacy and community based) reported that they continue to utilize the relationships formed with other agencies in the project to connect to clinical and social resources in the community. The study also found that it was possible to make strong vaccine recommendations in outreach efforts that married the ideas of both reaching community members where they are and ensuring that the message is communicated by someone who has a good cultural and historical understanding of the community. This adds to the literature of studies evaluating

collaboration models involving social service and clinical organizations that are imbedded within the community and have CHWs that share lived experiences of the community they are serving[28].

Some of the barriers of collaboration identified are consistent with other studies that have found barriers such as increased workload, inadequate staff training, increased documentation demands along with a friction created due to an existing gap in clearly understanding the roles of CHWs across various organizations. This highlights the need for enhancing cross organization reporting systems, shared training opportunities and better communication channels. It further sheds light on how additional programs that may benefit communities may inadvertently increase staff burnout, and the importance of building supports when and where possible.

Limitations

One limitation of our work is related to the way data was collected. We did not assign participant numbers to community members and track the community events they attended over time. Rather, data about outreach events was collected at each event to assess who attended the event. As a result, participant measures related to project implementation are subject to double counting as the reported metrics were based on the total number of events conducted, 891, and the same individual may have attended multiple outreach events conducted by the Network. A further limitation is that we interviewed CHWs working with the community members, rather than the community members themselves. It is likely that the CHW perspectives represent some, but not all perspectives in the community. We did not conduct a randomized control trial, and it is therefore not possible to compare the vaccine rates we obtained to those that would have been obtained in the absence of our study.

Conclusion

Community pharmacists are a highly accessible and integral part of the healthcare system with the ability to provide a wide range of services[26,29]. The diversity of their roles and responsibilities have become clearer over the course of the COVID -19 pandemic. According to this study, within rural communities where access to health care providers is already suboptimal, if leveraged properly, interventions implemented

409 through the collaborative efforts of clinical and social service organizations, including pharmacies and
410 CHWs, holds the potential to positively impact health outcomes. Community pharmacists were viewed as
411 trusted messengers and critical health care providers.

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Table 1. Outreach events

Outreach attendance	
Characteristics of community members attending outreach events	
Age	**Count**
Children (people aged 0-11 years old)	230
Adolescents/teenagers (people aged 12-17 years old)	393
Young adults (people aged 18-29 years old)	621
Adults (people aged 30-64 years old)	713
Seniors (people 65 years old and above)	500
Gender	
Men	634
Women	658
Race (Individuals self-identified as)	
African American or Black	546
White	494
Hispanic or Latino/Latina/Latinx	109
American Indian or Alaska Native	46
Asian	45
Native Hawaiian or Other Pacific Islander	17
Other	
Members of a specific faith or religious group	755
Language (bilingual/multilingual/English not a primary language)	46
People who are currently unhoused (homeless)	14
Outreach Location	**Count**
(Events may have been double coded, e.g. an event may have been identified as being held in a location that was a beauty shop which also identified as a small business)	
Community resource center for people sharing common background. (Language/culture/ethnicity)	694
Church, temple, or other faith-based/religious site	182
Park/similar public space	116
Homes in a neighborhood	72
Pharmacy	53
Local/Small business site	51
Educational locations (School/College)	43
No physical Location - Virtual	34

A housing or apartment complex	34
A Beauty shop	21
Aiding access vaccine site (transportation)	17
Community recreation center	14
Government/Public building	12
Community health center	9
Doctor's office	9
Public assistance centers	6
Youth center	2

Outreach strategies	**Count**
Method used (events may have used more than one strategy)	
Providing information by participating in community events (fair, vaccine clinics)	899
Transportation assistance for accessing vaccine delivery site	716
Using print media (Flyer, Door Hangers, Posters, Billboards, Signs, Sending Mail)	1070
Utilizing virtual and telecommunication platforms (Social media sites, Community websites, Mass media (TV/Radio spot), Electronic Mail, Telecommunication (Telephone calls/Text messages)	1162
In-person events conducted by visiting organizations within the community (educational, religious sites/buildings, community based recreational and resource centers, and public library)	210
Visiting a community/resource center for a population of people sharing a common background with me (Italian Americans club, a meeting place for Spanish-speakers, etc.)	13

Table 2a: Demographic Characteristics - Recipients of COVID vaccines

Demographic characteristics of people receiving vaccine	Count	Percent
Age range		
Children (people aged 0-11 years old)	5	0.03
Adolescents/teenagers (people aged 12-17 years old)	1286	8.71
Young adults (people aged 18-29 years old)	1733	11.73
Adults (people aged 30-64 years old)	7308	49.48
Seniors (people 65 years old and above)	4398	29.78
Not available (NA)	39	0.26
Gender		
Male	6970	47.19
Female	7702	52.15
Transgender	16	0.11
Genderqueer, gender nonconforming, or nonbinary	0	0.00
Agender	0	0.00
I prefer not to answer	71	0.48
Other (not specified)	10	0.001
Race		
White	12742	86.28
Black or African American	1614	10.93
American Indian or Alaska Native	32	0.22
Asian	61	0.41
Native Hawaiian or Other Pacific Islander	14	0.09
I prefer not to answer	306	2.07
Hispanic or Latino/Latina/Latinx (Ethnicity)		
Yes	154	1.04
No	14024	94.96
I prefer not to answer	591	4.00

Table 2b: Reasons stated for getting vaccinated.

Reason for getting vaccinated	**Count**	**Percent**
My pharmacist / pharmacy (provided information/referral)	9344	63.27
My medical provider / doctor's office	539	3.65
Both medical provider / doctor's office / pharmacist / pharmacy	310	2.11
Work provided information	115	0.78
News _ print / social media / broadcast media / internet	101	0.68
Vaccination clinic at place of employment	75	0.51
Family Influenced	42	0.28
Friends and peers	24	0.16
Other - wanted to do on own	18	0.12
Employer mandated / Work Requirement	14	0.09
Mandated other _ shared living, travel etc.	4	0.03
Loss of family members due to COVID	2	0.01
Word of mouth locally	2	0.01
Not Available	4179	28.30
Total	**14769**	**100**

Qualitative Data

Table 3: Quotes

Factors influencing intervention success	
Cluster sub-theme	**Quotes**
1. Conversations and relationship building	*a. "We can ask people, we can set up a vaccine clinic, but if we haven't gone to that area, that church, to do some education first, no one's going to show up to the clinic'. So, we really need this education and question answering piece for it (successful vaccinations)"*
	b. "Some of them (organizations), if their members are anti-vaccine, would at least let us (CHWs) come in and do an educational visit first and then we could come in and educate the people because some people just like education, like knowledge. And so, we came in to educate and then, (…) the people right there during the education process, as we still carried the vaccine with us, some will get vaccinated right there after getting educated and some who didn't they will come back a few weeks later when we were there to set up a clinic."
	c. "I (community pharmacist) will volunteer, to any of the preachers here, if you'll give me five or ten minutes at the beginning of a service I'll come down and speak to your congregation, reassure them, give them any information and access to me to answer any questions they have about the vaccine, so I mean that's something we (the church and the pharmacy) could arrange beforehand." [excerpt from the planning meeting between pastors and members of the Network organizations]
	d. "And I'm wondering if part of that process could be a sign up and the Q and A session before the actual vaccination clinic so those who may have reservations with now have the opportunity to hear the information go home and think about it. [excerpt from the planning meeting between pastors and members of The Network organizations]
	e. "And you know there's a finite amount in each file, so if we have walk ins, we don't know how much to bring…how much…to avoid waste. And we also don't want to run the risk of having more arms than vaccine, so the scheduler is pretty important end of the day, we always have a few walk ins, we have a few no shows, and we, we end up working through those with a calling list." [excerpt from the planning meeting between pastors and members of The Network organizations]

2. *Community pharmacists: Trusted, Influential and Accessible vaccine recommenders*	a. *"It's kind of like going to the doctor's office really. So, you go to the doctor's office, and you have a doctor that comes in – sometimes a doctor doesn't even come in. You can't ask them the questions you want, even though the nurse may know the answer. But you feel more comfortable when you have…(someone to answer the questions)*
	b. *"I (CHW) went with 2 of the pharmacists, and both of them talked before we started giving the shots and they both did an excellent job, and to me, I think if they hadn't talked the way they talked, people wouldn't have gotten their shots. I think they really rely on the pharmacists to know what they're doing and what they're saying, even though they didn't even know them… They listened, and they (the pharmacists) got the questions, and they did a very good job."*
	c. *"…well they (outreach events) look like typically, large vaccination events or informational events where people come for answers to questions and because healthcare professionals and people that are very fluent in vaccination knowledge, in particular around COVID, are there, and a lot of the questions happen, and they come not necessarily because vaccine hesitancy but from, at least in our experience, from healthcare complexities right? There are a lot of complex patients. And they have got a legitimate concern about their health and other complexities and chronic conditions that they have. And so that's really where the pharmacist comes in, in a lot of these discussions." [Community Pharmacist]*
	d. *"…when you got sick people (pauses)… is taking them to a community event the best thing for them? (Rhetorical question) with hundred other people…that's not great, it's not a great option…so there's some real good literature out there that show that primary care physicians see complex patients about three and a half times a year, but (these same patients) have some experience with their pharmacy or the pharmacy staff 35 times a year. So, the sickest most complex patients usually are already using a pharmacy…" [Community Pharmacist]*

	e. *"Knowing that vaccination rates are low (in these counties) pharmacy providers have been working in these same counties for a long time…Community outreach offices, non-profits, CHWs, local Public Health (organizations)…Most of our pharmacy colleagues and our pharmacist, our crew, we've been working with those same people up to this point. So, when this opportunity (to join The Network) was brought to us, the idea was, 'how can we help facilitate vaccination in this process of our existing community engagement.'" [Community Pharmacist]*
3. *Addressing inequities beyond access to vaccines*	a. *"So, I can say that I did notice with a few people that I encountered it did make them you know, like "okay maybe I need to look this up for myself" and stop seeing or just listening to what I see on Facebook or conspiracy theories."*
	b. *"I (CHW) would have to say, probably transportation because some of our people don't have vehicles, so they have resources that are in place for that, because we don't transport them to be able to get the resources that they need to get to them."*
	c. *"I (CHW) think Education (in the community). Building a better trust and openness to communication (between service providers and community people). I think diversity being more unified."*
	d. *"One day, when we were having a clinic in the pharmacy this person came in…and this poor man, his house had burned, and he had lost everything and…didn't have a lot of options, so one of the community health care workers that works at the pharmacy sat down and met with him and tried to help with housing. So, you end up talking to people about more things than just COVID when they come in…"*
The Network facilitated collaboration and expanded access to resources	

4. *Facilitation of collaboration and capacity building*	a. *"So, he (the provider) wants to engage (with thepharmacy). He(the provider) said that their long them care facilities that they have access to in this region, there are over 600 employees, and they want to create a concerted effort with those employees and run them through our…I am calling them our interventions…going through the vaccine hesitancy questions…if they've had one (dose) help them follow-up second (dose), follow -up with them for a month until they get their second dose." [planning meeting between pastors and community pharmacist]*
	b. *"…we're (community pharmacist) kind of to the point now in our county that we have vaccinated people that really want to come to us and we're beginning to do outreach and some education to the folks that are maybe a little more reluctant to get the vaccine or want more information or were slow to make the decision to get vaccinated." [planning meeting between pastors and community pharmacist]*
5. *Supporting CHWs*	a. *"I (CHW) felt like, (trainings) made me a lot more confident in my ability to talk about it (COVID and vaccines) and answer questions for them (community members)."*
	b. *"I felt better equipped to answer them back (after attending capacity building and educational trainings)."*
	c. *"The training that we (CHW) did for our own mental health, (…) that was really good because it really brought everything back into perspective of how it could really affect us and you know, sometimes we were doing the job and not really being aware of the danger or things that could really happen, and so it made us really safe and cautious."*
	d. *"She (Trainer) was obviously supportive during (reflective supervision), though she was always (available), I know if I needed something I could reach out to her, if I needed to, (…) (she) made us feel like if we ever needed that extra support she would be there and I know that, even if, today, if I felt like if I contacted her, she would find a way to spend some time with me."*
	e. *"So, I (CHW) think that's for me, that's a big change. Before this project, nobody, no pharmacist would call me and say hey do you have any name, so you have anybody, you know that is still wanting the vaccination, so I think that was a change as far as me personally reaching out."*

	f. *"I (CHW) feel like, probably in the whole, like the community of pharmacies, the [organization name] – I feel like all of us together, it was like a united front. We all worked together, but we all PULLED together to try to get done what needed done. So, I felt like there was this…a closeness probably that was formed because we were all in this together that maybe wasn't there as close before that hopefully will stay, will continue with anything that comes up as a challenge in a community that we can face now that we've kind of you know…(had that initial collaboration)"*
6. *Challenges in Collaboration*	a. *"I'm a community health worker (pharmacy CHW) but yet, I went there, and I helped. I didn't arrange the clinics. I went to help my boss. I went to help him do so it all runs smoothly. They (Other CHWs) weren't doing anything. Every clinic I went to, they were not doing anything that I saw that they got paid for." [Pharmacy CHW]*
	b. *"And I'm (Pharmacy CHW) thinking, our pharmacists were worn out. I mean totally worn out, day in day out working the work and then going into the clinics at night, and I was like this is ridiculous, right? And so, as far as whoever puts the clinics, one, I didn't think they (community events organizers) did a very good job…"*
	c. *"…I mean they are pharmacy workers, but it was frustrating for them, because they felt like so much of their time got taken up by people calling them because we (CHWs) weren't there every day, so it was disruptive to their regular work, where my perspective was different because my only goal was doing this outreach work. And for them…they wanted to help people, but still [name] finally started having us come into the actual pharmacy more to deal with those kinds of questions, so it was, I think it was overloading the regular pharmacy workers."*
	d. *"One thing was that one particular pharmacist never had the right information. Okay, for a prime example. They changed the ages (vaccine eligibility) twice. We had shots in the park this particular day and we probably had about 10 teenagers that came out to get vaccinated that day. They're not reading the updated CDC (information)…So what I'm saying, even the pharmacists, they need to have a right material, or they need to read, if you follow where I'm going, like she says in front of the people "Oh, no, they shouldn't have done that. I ain't losing my license", all the stuff in front of the public." [Community CHW]*

	e. *"Everyone needs to have the same correct and up-to-date information to provide to the public." [Community CHW]*
	f. *"The structure was kind of confusing, you know, because there was a lot of emails. I'm (CHW) pretty sure that I know I missed. So, I know if I missed some, someone else possibly could have overlooked it. So, I think the structure of it could have been, but this is brand (new), this is the learning experience for all of us, the structure next time should maybe eliminate a lot of back and forth."*
	g. *"I (CHW) know just looking back on things, I met a lot of different pharmacists, and they are still open to, even though the pharmacy network kind of diminished at the end of last year, I still have pharmacists reaching out saying hey, if you still know anybody, send them over here, you know, so I'm thankful for that little bit of change."*
	h. *And so, that means that it (collected data) needs to be manually input into an aggregating system, so we had to build that architecture…so when the question is where is the data? (the data) is on paper until it gets in this (the system developed), and so we feel like the turnaround time here has been, I would say, adequate to pretty rapid considering the approval (of the IRB) to now, and also from close the business Friday to close the business Tuesday, which is our data cut off time we went from somewhere around 17 lines of patient intervention that it's a 2500…we scrubbed it (data) and end up going down to about 1800 lines of data and that's just our first, that's what two days of the weekend and two business days.*
	i. *Been (Community Pharmacist) talking to providers all week, actually I've talked to three today, and you know we're expecting a high level of input data…most of these guys are even hiring folks now (to help with it). Again, I'm going to pat our pharmacy providers on the back with this. Not only did they agree to do this in good faith and now they're delivering on the data, but some of them has some really good ideas I think we're going to be excited about that we want to share with…*

Author contribution

Anusha Ban: Data Curation, Formal analysis, Validation. Writing – original draft preparation and review and editing. **Ashish Shrestha**: Data Curation, Formal analysis, Validation. Writing – review and editing. **Carissa Van-den Berk Clark**: Conceptualization, Formal analysis, Resources. Writing – review and editing. Supervision, Funding Acquisition. **Janice Ballard:** Conceptualization, Resources. Writing – review and editing. Supervision, Funding Acquisition. **Richard Logan:** Data Curation Conceptualization, Resources, Project Administration. **Tripp Logan**: Data Curation Conceptualization, Resources, Project Administration. **Sr. Anne Francioni**: Data Curation, Resources, Project Administration. **Megan Murray:** Resources, Project Administration. **Elizabeth A. Baker**: Data Curation, Conceptualization, Formal Analysis, Resources. Writing – original draft preparation and review and editing. Supervision, Funding Acquisition.