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Table of Contents

Manuscripts

Editor’s Note

Welcome to our long-awaited issue! It is long-awaited because the Journal has undergone some changes, this year: our beloved editor Jen Jones from DBHDS has moved on after earning her doctorate and supplying the technical backbone of the Journal. I have also moved on, retiring to the bedside after 25 years of academic life. We are glad to re-welcome Marilyn Bartholmae from EVMS who now provides just about everything from reviews to technical management. And we are grateful for our VPHA volunteer, Jami Hinton, who is helping out while we make needed transitions. But here it is finally! We’ve got a beautiful set of papers for you:

Sonal Sathe and Adati Tarfa, contribute commentary to the Journal’s “Notes from the Field” section, publishing on the importance of social determinants, telehealth, and related support for HIV/AIDS control efforts in Virginia.

Kurtis Anthony, with interdisciplinary colleagues, and using the Vir3ginia Violent Death Reporting System, discusses the importance of spatial variation in suicide rates for targeting preventive measures where they are most needed.

Sophie Wenzel and UVA, Carilion Clinic, Va Tech, and Inova Health System colleagues have patiently awaited publication of their Lessons Learned from Community Health Research Partnerships grants programs. Noteworthy recommendations are made from these lessons so that others may build on their work implementing small grants programs successfully.

Patel, Blackstone, and Hauck were also very patient awaiting the publication of their manuscript regarding access to COVID-19 health information for refugees. This was and is a very important topic for those of us who worked during and continue to work after the pandemic in this population with special resource needs. Barriers are significant in both information and access to prevention and care for people who may be excluded from mainstream public health and health care efforts.

Batheja and colleagues from VCU, University of Florida, and UVA use the Community Health Assessment Survey to explore predictors of lung cancer screening in Virginia.
Predictors may not be all that predictive, it seems, and a look at the evidence of smaller groups along the trajectory of their disease process may be necessary to improve health disparities in screening.

Attin and colleagues from Liberty discuss Community Health Workers, their utility, and education for health screening programs in Guatemala but their findings were equally applicable to CHWs in Virginia and elsewhere. Education allowed for the continuation of independent CHW screening programs which contributes much needed prevention efforts.

That’s the line-up for this issue. Enjoy these important works in public health!

Best regards,
Maria deValpine, PhD, MSN, RN

Notes From the Field

Social Determinants of Health, Telehealth, and HIV/AIDS: Implications for Public Health Research and Practice in the State of Virginia

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Abstract

Purpose: The purpose of this commentary is to assert the importance of addressing the social determinants of health to support HIV/AIDS control efforts, to describe the importance of telehealth in HIV/AIDS control, and to recommend courses of action to support HIV/AIDS control efforts within the state of Virginia.

Discussion: We provide an overview of the social determinants of health and their role in HIV/AIDS control, telehealth and its uptake within the HIV/AIDS community, and issues in Virginia facing HIV/AIDS control.

Conclusion and Recommendations: We conclude that addressing social determinants of health, especially stigma, is an important measure of HIV/AIDS control efforts. We recommend that telehealth be effectively leveraged to that end to support the containment of HIV and AIDS within the state of Virginia.

Purpose

The purpose of this commentary is to assert the importance of addressing the social determinants of health to support HIV/AIDS control efforts, to describe the importance of telehealth in HIV/AIDS control, and to recommend courses of action to support HIV/AIDS control efforts within the state of Virginia. We provide an overview of the issues at hand regarding the goals for fighting HIV/AIDS first before discussing social determinants of health, exploring telehealth, and determining what it means to the state of Virginia regarding public health research and practice efforts.

Discussion

Overview

Curbing the incidence and prevalence of human immunodeficiency virus (HIV) infection and subsequent development of acquired immunodeficiency syndrome (AIDS) is a notable public health issue. The Joint United Nations Programme on HIV/AIDS (**UNAIDS**) currently calls for 95% of all people living with HIV globally to know their HIV status, 95% of all people with diagnosed HIV infection to receive sustained antiretroviral therapy, and 95% of all people receiving antiretroviral therapy to have viral suppression by 2025 (Joint United Nations Program on HIV and AIDS, 2014). Some scholars have determined the colloquially dubbed “95-95-95” goals to be an ambitious but essential target in the fight to end AIDS (Frescura et al., 2022). These 95-95-95 goals align with Healthy People 2023 goals for the U.S. (Office of Disease Prevention and Health Promotion, accessed 2023). These goals could also be considered as a critical part of the Virginia Integrated HIV Services Plan for 2022-26 (Virginia Department of Health, accessed 2023).One review paper asserted that while the United States was on target to reach the earlier “90-90-90” goals, there is a need to rapidly meet the new 95-95-95 targets (Hall, Brooks, & Mermin, 2019). Bearing these 95-95-95 goals in mind, though, we in the public health community have some important questions that need to be answered concerning social determinants of health, telehealth, and the state of Virginia.

Here, we seek to answer the following questions:

1) Should social determinants of health (SDoH) in people living with HIV be addressed by public health efforts, and if so, which of them is the most pressing?
2) What role will telehealth play in reaching the 95-95-95 targets?

How do the answers to the questions above (1 and 2) matter to public health research and practice efforts in Virginia?

Social Determinants of Health

Social determinants of health (SDoH) are the nonmedical factors influencing health outcomes (Centers for Disease Control and Prevention, accessed 2023). These factors have been shown in at least one study to be of note in people living with HIV (Menza, Hixson, Lipira, & Drach, 2021). There are five domains of social determinants of health: economic stability, education access, quality health care access, quality neighborhood and built environment, and social and community context (Office of Disease Prevention and Health Promotion, accessed 2023). There are challenges to determining this information within people living with HIV. One study reported that some participants with HIV felt distressed upon being asked about some of these determinants, especially those relating to trauma, discrimination, and stigma within the social and community context (Parisot et al, 2023). Another study reported that internalized stigma in people living with HIV could mediate mental health outcomes, among others, and play a role in lowering medication adherence (Turan et al, 2017). As discussed above, medication adherence is critical to achieving the 95-95-95 goals outlined by UNAIDS. Ascertaining SDoH in patient care settings has therefore interested health care workers, especially nurses, who aim to improve patient outcomes and inform their patient care (Schneiderman & Olshansky, 2021). The history of HIV/AIDS itself has been discussed extensively; the challenges in care, including difficulties in patient-provider communication, have been illustrated at length (Engelmann, 2018). Part of the driving reasons behind difficulties in patient-provider communication involves the stigma mentioned above. Barriers to, linkage to, and retention in care are also a point of note due to said stigma and other issues as applicable to social determinants of health (Tarfa, Pecanac, & Shiyanbola, 2022).

Telehealth

Telehealth is defined as using electronic information and telecommunication technologies to support long-distance clinical health care, patient and professional health-related education, health administration, and public health

(Health Resources and Services Administration, accessed 2023).

The uptake of telehealth services deserves special attention in the wake of COVID- 19; one issue brief reported that findings from the Household Pulse Survey indicated that telehealth uses consistently remained above 20% from 2021-2022 and for all population groups from the 1,180,248 adults who answered the telehealth question (Office of Health Policy, 2023). However, with the use of telehealth comes the acknowledgment of the digital divide.

The digital divide, defined as unequal access to or ability to engage in care using technological means, has been shown to be predicted by various socio-demographic factors such as age, income level, socio-economic status, and perceived social isolation (Estacio, Whittle, & Protheroe, 2019). Care must be taken to ensure that the uptake of telehealth measures does not widen such a divide, lest it exacerbates the health inequities described by Sun and co-authors (2020). A review paper by Labisi and colleagues (2022) also described the need for ensuring privacy of patient records as well as ensuring broadband access to telehealth. Labisi and colleagues' recommendations are worth consideration by those on the forefront of public health research and practice with respect to HIV and AIDS control and prevention efforts both at large and in the state of Virginia, as are the points made by Sun and co-authors, and Estacio and colleagues.

Without efforts to overcome the digital divide by those in public health research and practice within the state of Virginia, improvement will not be seen in the long run with telehealth integration for people living with HIV, and ultimately, reaching the 95-95-95 goals will not be possible.

Implications for Public Health Research and Practice in Virginia

Both SDoH and telehealth need to be considered within the context of the state of Virginia, considered by the Centers for Disease Control and Prevention to be in a high-incidence area of the nation for HIV and AIDS (Centers for Disease Control and Prevention, 2021). We take into consideration the points discussed above in our recommendations below.

In our opinion, public health researchers and practitioners should include efforts to address stigma concerning those who are HIV positive and to improve patient-provider communication throughout the state; a critical way of doing this involves addressing SDoH at large and focusing on addressing stigma. Doing so will improve medication adherence rates, linkage to and retention in care, and overall health outcomes. Future public health efforts should also involve community-engaged research to this end throughout the state, to reshape the social and community context of people living with HIV to deconstruct the aforementioned stigma. This could be accomplished by integrating telehealth services within an existing health system to focus on people living with HIV, as discussed by Dandachi and colleagues (2019) and ensuring effective dissemination and implementation of telehealth services to this population, using a framework such as RE-AIM as described by Brant and colleagues (2020).

It is the opinion of these authors, as well, that applications of the above points can go beyond patient care and enter the community space via systems such as cooperative extension. Since one of the goals of the cooperative extension system is to adapt to changing technology (United States Department of Agriculture, accessed 2023), it behooves cooperative extension to take note of the opportunities to integrate telehealth services within the existing system within their frameworks as well to reach those in remote areas of the state who may be HIV positive. In this manner, people living with HIV in the state of Virginia can be empowered outside the examination room of a healthcare provider. Doing so will enable people living with HIV in rural areas to become empowered citizens in their communities.

Conclusion and Recommendations

To sum up, we assert the following to be pertinent: 1) addressing SDoH will be critical to ensure optimal patient outcomes for people living with HIV and in reaching the target 95-95-95 goals, especially stigma; 2) uptake in telehealth services is notable in the wake of COVID-19 and should be effectively leveraged to ensure optimal outcomes for HIV patients; to that end, overcoming the digital divide is critical, and 3) the state of Virginia should focus on community engaged research, integration of telehealth within the healthcare system, and effective dissemination and implementation of telehealth to people living with HIV. In this manner, the state of Virginia will be instrumental in HIV prevention and control and ultimately serve as an example for other states to do the same—with the overall aim of reaching the 95-95-95 targets to ensure optimal outcomes for those living with HIV within the state of Virginia, and ultimately, overall health and well-being for the U.S. and the world.

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Policy Forum

Let Public Health Professionals Do Their Jobs

Benjamin Barber |

Designer: Brita Allen

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Introduction

Everyone has the right to be safe and healthy. Public health professionals work every day to defend this right. Like firefighters and police officers, public health professionals respond to threats that can sicken, injure, and kill. They save lives every day.

Public health professionals are responsible for some of our nation's greatest achievements. They partnered with scientists to eradicate smallpox, embedded with the military to end the West African Ebola epidemic and prevent it from reaching our shores, persuaded a generation of Americans to quit smoking, cleaned up our air, fluoridated our water, and helped transform HIV from a terminal illness to a chronic disease. They also worked tirelessly during the COVID-19 pandemic to provide testing, vaccinations, and prevention education and awareness.

Today, they assist in reviving our neighbors suffering from overdoses, prevent unintended pregnancies, and ensure parents and babies have healthy food to eat. They keep our food and our buildings safe. They care for those who cannot afford health care, and they serve those who too often go unserved. As such, they are an essential part of helping to ensure the health of all Americans.

Unfortunately, public health is under threat. Several states have passed laws that prevent public health professionals from doing their jobs. One such law prohibits elected officials and public health professionals from mandating the use of a facemask, even during a disaster or emergency such as a Tuberculosis outbreak.[1] Another prevents local health officials from temporarily closing a business, even if its employees or customers have been exposed to a highly contagious disease.[2] That's like telling the Fire Department they can't require a business to close when there is a fire burning in the building.

These extreme laws put our right to be safe and healthy at risk. It is crucial we prevent them from coming to Virginia.

Virginia's Rapid Response to COVID-19 Saved Lives

Virginians are healthy when public health professionals can do their jobs. At the start of the pandemic, former Governor Ralph Northam was able to quickly issue emergency orders that the health department carried out in response to rapidly changing circumstances. He eased restrictions on gatherings when the virus slowed, but – crucially – was able to reinstate these orders when the virus surged in late 2020 and early 2021.

These emergency orders bought time for scientists to develop the COVID-19 vaccines. Once the vaccines arrived, Virginia's public health professionals led an incredibly effective vaccination campaign, with over 90 percent of Virginians receiving at least one dose and 77 percent completing their primary series.[3] As a result, Virginia has one of the highest COVID-19 vaccination rates and a mortality rate below the national average.[4] Virginia's relative success in responding to the pandemic highlights why public health professionals need the ability to do their jobs.

Public Health Isn't Just Pandemics

Public health professionals don't only fight pandemics. They also protect us from other disasters, such as hurricanes, tornadoes, and even terrorist attacks.

During a disaster, public health professionals support medical personnel, help stand up emergency shelters, and protect people from hazardous water and other conditions. Virginia's Medical Reserve Corps (MRC) plays an essential role in the response to any type of public health threat. Virginia's MRC is a force of dedicated volunteers who prepare and respond to public health emergencies.[5] Like military reservists, they can be temporarily called upon during an emergency to aid disaster victims and communities. They served as a force multiplier during Virginia's COVID-19 vaccination campaign, allowing public health professionals to reach thousands of people they might not otherwise reach.

However, there's a catch. Public health professionals and volunteers are severely limited in how they can respond to disasters unless there is an emergency. That is why it is important for elected officials, especially the Governor and Commissioner of Health, to have the ability to declare emergencies. Unfortunately, Virginia passed a law in 2022 that arbitrarily limits an emergency declaration to 45 days unless the General Assembly votes to extend it.[6] While this may sound sensible at first, remember that in the early days of the pandemic, there were no vaccinations or reliable treatments to fight the virus. Large gatherings were extremely dangerous. Now imagine a similar scenario or an even more devastating disaster. Imagine public health professionals and other first responders being limited in what they could do to save lives as lawmakers struggled to convene. It's no wonder that governors from both major political Parties have vetoed these extreme measures.

It is essential that Virginia not further limit elected officials and public health professionals' ability to respond to future emergencies.

Extreme Bills Have Extreme Consequences

It shouldn't be surprising that extreme bills to tie public health professionals' hands behind their backs have extreme consequences.

Take Montana, for instance. In 2021, Montana passed a bill, HB 702, that prohibited individuals and businesses from requiring vaccination as a condition of employment. It also prohibited discrimination based on vaccination status. The bill, which applies to all vaccines - not just COVID-19 - unleashed chaos. It didn't exempt hospitals, meaning they could not require their employees to get vaccinated against smallpox, measles, and other deadly diseases nearly eradicated by vaccines. It put employers in an impossible situation as it directly conflicted with federal public health guidance. It also put national employers in a bind, as some states required vaccines and others didn't. Meanwhile, small businesses worried that asking a sick customer to put on a mask could lead to a lawsuit. Fortunately, a federal judge struck down part of this law, but the threat remains.[7]

It's also worth taking a moment to highlight an important point. Discrimination is almost always wrong. However, there are times when it is appropriate or even necessary. Most people would agree that the government should prohibit arsonists from being firefighters and violent criminals from being police officers. Most would also agree that the government can prohibit people with serious visual impairments from driving or operating heavy machinery. These rules are technically discriminatory because they treat one group of people differently from another, but few would argue that they are unreasonable. The same logic applies to public health. Discrimination should only be allowed when there is an extraordinarily compelling reason. **Protecting people from public health disasters like lethal pandemics is an extraordinarily compelling reason**.

Bills like HB 702 use terms like discrimination to wrongfully equate vaccination requirements to the horrors of racial discrimination. Proponents of these extreme bills have it exactly backward.

These bills disproportionately harm Black, Indigenous, and People of Color (BIPOC) communities. They also disproportionately harm kids, who were thankfully spared the worst from COVID-19 but tend to be more susceptible than adults to deadly viruses. The sick, disabled, and elderly –
three groups who bore the brunt of COVID-19 – would be among the most harmed by these extreme bills.

Conclusion

In 1871, the Great Chicago Fire destroyed 17,500 buildings, killed 300 people, and left a third of the city homeless.[8] It was a horrific tragedy that had one important silver lining: Chicago and many other cities passed numerous fire safety laws to prevent a similar disaster from ever happening again. It worked. While house fires and – increasingly – wildfires are very real threats, the image of a large American city utterly consumed by smoke and fire mostly belongs to the history books.

The COVID-19 pandemic is our generation's great fire. The worst thing we could do is reject the hard-earned lessons we learned. We owe it to ourselves and our children to protect the public's health by letting public health professionals do their jobs.

The Virginia Public Health Association is a 501(c)(3) non-profit organization dedicated to improving the health of all Virginians. Founded in 1950, VPHA's mission is to strengthen public health practice, foster health equity, and promote sound public health policy. Learn more about our work at www.virginiapublichealth.org.

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[1] House Bill 1323, North Dakota 2021 Regular Session.

[2] House Bill 257, Montana 2021 Regular Session.

[3] Centers for Disease Control & Prevention, "COVID Data Tracker," May 11, 2023.

[4] Centers for Disease Control & Prevention, "COVID-19 Mortality By State," February 15, 2023.

[5] Virginia Department of Health, "Medical Reserve Corps."

[6] House Bill 158, Virginia 2022 Regular Session.

[7] *Montana Medical Association et al. v. Knudsen et al.*, U.S. District Court for the District of Montana, December 9, 2022

[8] Mary Schons, "The Chicago Fire of 1871 and the 'Great Rebuilding," *National Geographic*, May 20, 202

Manuscripts

Detection of Suicide Clusters using Small-Area Geographic Data from the Virginia Violent Death Reporting System, 2010 – 2015

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Abstract

Introduction: From 1999 to 2020, the suicide rate in Virginia increased from 13.1 to 15.9 per 100,000 persons aged 10 years and older. Few studies have examined spatial patterns of suicide at geographies smaller than the county level.

Methods: We analyzed data from suicide decedents aged ≥10 years from 2010 through 2015 in the Virginia Violent Death Reporting System. We identified spatial clusters of high suicide rates using spatially adaptive filtering with standardized mortality ratio (SMR) significantly higher than the state SMR ($p < 0.001$). We compared demographic characteristics, method of injury, and suicide circumstances of decedents within each cluster to decedents outside any cluster.

Results: We identified 13 high-risk suicide clusters (SMR between 1.7 and 2.0). Suicide decedents in the clusters were more likely to be older (40+ years), non-Hispanic white, widowed/divorced/separated, and less likely to have certain precipitating suicide circumstances than decedents outside the clusters. Suicide by firearm was more common in four clusters, and suicide by poisoning was more common in two clusters compared to the rest of the state.

Conclusions: There are important differences between geographic clusters of suicide in Virginia. These results suggest that place-specific risk factors for suicide may be relevant for targeted suicide prevention.

Introduction

Suicide is a complex issue with risks occurring at the individual, relationship, community, and societal levels (U.S. Department of Health and Human Services, 2012; Stone *et al.*, 2018; Virginia Department of Health, 2016). Suicide risk varies according to age, sex, race, and other demographic factors. Some common circumstances preceding a suicide death include mental health problems, relationship problems, a recent crisis, alcohol or substance misuse, physical health problems, and financial problems. While understanding individual-level risk factors is essential for suicide prevention efforts, exploring spatial patterns and identifying high-risk areas of suicide can inform more targeted and comprehensive prevention efforts and improve resource allocation. Culturally appropriate suicide prevention interventions that address specific risk factors in different populations and places are most effective (Barnhorst et al., 2021).

There are some important limitations to methods that have been previously used to identify geographic clusters of suicide. Several studies have used spatial scan statistics to identify geographic clusters of suicide and characteristics associated with the clusters (Fontanella et al., 2018; Kulldorff & Nagarwalla, 1995; Saman et al., 2012); however, this method will identify the most likely clusters, even if they are not significantly different from the rest of the study area. Bayesian spatial regression is another method for identifying geographic clusters of suicide. One such study identified 52 counties in Virginia with greater than expected suicide risk and found that suicide risk was positively associated with the percentage of the White population and higher median age (Orndahl & Wheeler, 2018). However, using county boundaries severely limits the ability to detect geographic clusters since the risk of suicide can be highly concentrated in only one part of a county and can cross county boundaries. Therefore, new methods for identifying small-area geographic suicide clusters and community-level risk factors should be explored.

An important aspect of our method for detecting geographic clustering of suicide risk is our use of the National Violent Death Reporting System (NVDRS). The NVDRS is a state-based surveillance system containing individual-level data about each suicide, including demographic characteristics and the residential tract of each decedent. Importantly, this surveillance system contains unique information about individual circumstances that precipitated a suicide. Our method for detecting geographic clusters of high suicide risk differs from other studies because all geographic units in the state have a uniform and minimum level of statistical reliability instead of a minimum level of geographic precision. We accomplished this using a series of overlapping moving windows called spatially adaptive filters (Cai et al., 2011; Talbot et al., 2000; Tiwari & Rushton, 2005). Spatially adaptive filters are aggregations of smaller neighboring geographic units (in this case, Census tracts) that, by themselves, do not have sufficiently large populations to calculate statistically reliable disease rates (Matthews, 2018). The size of the spatial filters varies according to population density; filters are smaller in urban areas and larger in rural areas. Others have used spatially adaptive filters to create an interpolated map of disease rates with a uniform statistical reliability for other diseases. However, identifying geographic clusters, areas where disease rates are statistically significantly elevated compared to the state overall, is a novel application of spatially adaptive filters. Using Virginia as an example, we identified clusters with elevated suicide rates and then compared the suicide circumstances of the decedents residing within the clusters to all other parts of the state outside the clusters.

Background

Suicide was the 12th leading cause of death in the United States in 2020, with approximately 46,000 deaths from suicide or 15.9 deaths per 100,000 persons aged 10 years and older (National Center for Injury Prevention and Control, 2020). Furthermore, suicide rates have increased in 49 of the 50 U.S. states and by 25% nationwide from 1999 through 2016 (Stone et al., 2018). Virginia's suicide rate was 15.9 per 100,000 persons aged 10 years and older in 2020 and increased by 17.4% between 1999 to 2016 (Stone et al., 2018; National Center for Injury Prevention and Control, 2020). Consistent with the rest of the United States, people in Virginia who are over 65 years of age, White, and male are at higher risk of suicide than other groups (Hassamal et al., 2015; Mościcki, 2001; Virginia Department of Health, 2016). However, the suicide rate varies widely within the state; county-level suicide rates in the state ranged from 7.0 per 100,000 (Arlington County) to 62.5 per 100,000 (Patrick County) in 2020 (Centers for Disease Control and Prevention, 2020). In Virginia, firearms are the most common method of suicide, followed by hanging and poisoning (Hassamal et al., 2015; Viriginia Department of Health, 2016).

Methods

Data and Study Sample

The National Violent Death Reporting System (NVDRS) is an active state-based surveillance system that collects and compiles information on violent death, including suicide, from three required data sources: death certificates, coroner/medical examiner reports, and law enforcement reports. NVDRS collects information related to the manner of death (e.g., suicide), mechanism of injury (e.g., firearm), demographics, toxicology, and circumstances preceding the decedent's death. Data used in this analysis were collected by the Virginia Violent Death Reporting System (VVDRS), which has been participating in NVDRS since 2003 (Virginia Department of Health, 2020). The VVDRS follows standardized methodology, coding, and web-based data collection. The NVDRS does not collect personally identifying information. NVDRS defines suicide as a death resulting from the use of force against oneself when most evidence indicates that the use of force was intentional (Jack et al., 2018). In addition, NVDRS collects geographic information related to the incident, including the Census tract of the decedent's residence. Census tracts are small geographic units containing between 1,200 and 8,000 people (US Census, 2020).

We obtained data for suicides occurring in Virginia among people aged ≥ 10 years from NVDRS. From these, we selected decedents who were residents of Virginia and who died between 2010 and 2015 (n= 6,290). For decedents who were missing Census tract information but had a known residential ZIP code (n=428), we assigned a Census tract using the population-weighted centroid of the ZIP code. We excluded decedents who were missing both Census tract and ZIP code information (n=69). In addition, we excluded three suicide decedents in Census tracts with zero population. As a result, we had a final study population of 6,218 decedents from NVDRS.

Spatial and Statistical Analyses

We constructed spatial filters to generate statistically reliable estimates for suicide risk across areas of varying population density throughout the state.

Spatial filters are moving windows constructed by combining the data from a given geographic unit with data from neighboring geographic units. We combined units by measuring the Euclidean distance from the population-weighted Census tract centroids of the target unit to the population-weighted Census tracts of the neighboring units (Hallisey et al., 2017). Each spatial filter contains a threshold number of at least 20 expected suicides to ensure reliable estimates. If the expected number of suicides in a Census tract were less than 20, it would expand to include expected suicides from the nearest neighboring Census tracts until it reaches the threshold. To avoid the possibility that a suicide rate for a rural tract is obscured by the rate in a neighboring urban tract, filters for Census tracts that are classified as rural by the Rural-Urban Continuum Codes (RUCC) only used rural Census tracts, even if an urban tract was nearer (WWAMI Rural Health Research Center, 2020).

We calculated standardized mortality ratios (SMR) and indirectly adjusted age-sex standardized suicide rates (IAR) for each of Virginia's spatially adaptive filter areas (Breslow & Day, 1987). We calculated the expected number of suicides for a given Census tract by multiplying the age- and sex-specific state-level suicide rates for people aged ≥ 10 years by the stratum-specific Census tract population. We then calculated the SMR for a spatial filter as the observed number of suicides within a spatial filter divided by the number of expected suicides. Next, we calculated the IAR by multiplying the Census tract-level SMR by the statewide crude rate of suicide. We represented the suicide rates continuously across space using inverse distance weighting interpolation and applied a diverging classification scheme to symbolize areas where the IAR was higher (red) or lower (blue) than the state suicide rate.

We identified geographic clusters of suicide using the filter SMRs and compared the characteristics and precipitating circumstances of decedents in those clusters. We identified any spatial filter with an SMR greater than 1.69 as part of a geographic cluster because the suicide rate for these filters was significantly greater than the statewide rate at the $P < 0.001$ level for 20 expected suicides (Cai et al., 2011). We assigned a unique cluster identifier to each geographically distinct cluster that did not share a border with other qualifying Census tracts and then assigned each decedent to the cluster that contained the decedent's residential Census tract. We compared the demographic characteristics, suicide method, and precipitating suicide circumstances between decedents in clusters with decedents outside all clusters using Chi-square tests sequentially for individual clusters and all clusters combined ($P < 0.05$). We performed spatial analysis for this paper in STATA/SE 14.0 (StataCorp LP, College Station, TX), created maps in ArcGIS 10.5 (ESRI, Redlands, CA), and conducted statistical analysis in SAS v 9.4 (SAS, Cary, NC).

Results

We analyzed data for 6,218 suicide deaths reported to Virginia VDRS from 2010 through 2015. We identified 13 high-risk suicide clusters, which captured 1,005 (16.1%) suicides in the state over the six years. These high-risk clusters accounted for 8.7 % (n = 166) of the Census tracts in Virginia and represented 9.0% (n = 626,864) of the population at-risk. The clusters were dispersed throughout the state and the geographic variation in the IAR is high (**Figure 1**). The clusters had a population ranging between 22,915 and 124,232 and an SMR for suicide ranging between 1.7 and 2.0 (**Table 1**). Six of the clusters contained rural Census tracts as defined by RUCC.

Figure 1. Suicide Clusters and Risk Surface in Virginia, Virginia Violent Death Reporting System, 2010-2015

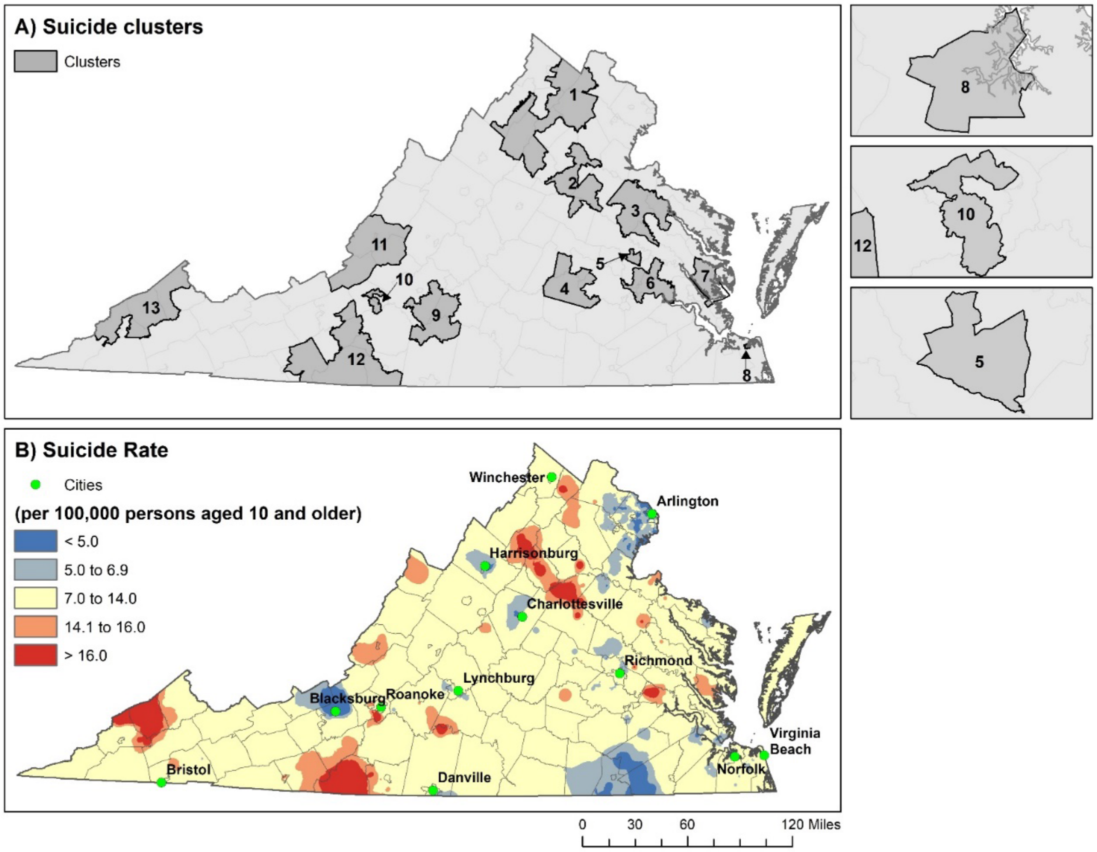

Figure 1 A) Suicide clusters in Virginia identified using spatially adaptive filters with an expected count of 20 and significance of p < 0.001 B) Indirectly age-sex standardized suicide rates per 100,000 persons ages ≥ 10 years (smoothed)

Table 1. Observed and Expected Counts and Indirectly Age- and Sex-Adjusted Suicide Rate in Virginia by Spatial Cluster, Virginia Violent Death Reporting System, 2010 – 2015

Cluster	Observed Suicide Count	Population (aged ≥10 yrs)	Expected Suicide Count[*]	Standardized Mortality Ratio	Indirectly Adjusted Rate[†]	Rural Pop. (%)
1	191	124232	112	1.7	25.2	8
2	52	32885	30	1.7	25.8	59
3	39	23360	21	1.8	27.0	0
4	38	24110	22	1.8	26.1	0
5	42	25197	22	1.9	28.5	0
6	52	29161	26	2.0	29.2	0
7	55	35300	32	1.7	25.5	0
8	36	22915	21	1.8	26.1	0
9	72	44772	41	1.8	26.1	17

10	154	97369	87	1.8	26.2	0
11	43	27563	26	1.7	24.9	6
12	147	89678	83	1.8	26.3	77
13	84	50322	47	1.8	26.6	100
n/a‡	5213	6352686	5648	0.9	13.7	7
Total	6218	6979550	6218	1.0	14.8	9

*Expected number of suicides for each area were calculated by multiplying the age- and sex-specific state-level suicide rates among persons aged ≥ 10 years by the stratum-specific population. †Rates were calculated as suicides per 100,000 population. ‡Represents locations in Virginia that were not part of any suicide cluster.

The clusters differed from the rest of the state for certain suicide decedent characteristics (**Table 2**). Suicide decedents in the clusters were more likely to be older (40+ years), White, and widowed/divorced/separated than decedents in the rest of the state (i.e., decedents outside the clusters). Firearm was the most common suicide method in clusters and the rest of the state, accounting for 62% of suicides in clusters compared to 55% of suicides in the rest of the state. The proportion of suicide by firearm was significantly higher in cluster 9 (78%, *P* < .01), cluster 11 (79%, *P* < .01), cluster 12 (72%, *P* < .01), and cluster 13 (75%, *P* < .01) compared to the rest of the state. The proportion of suicide by poisoning was significantly greater in clusters 1 (25%, *P* < .01) and 2 (29%, *P* < .01) compared to the rest of the state; however, the proportion of suicide by poisoning was not significantly different from the rest of the state for all clusters combined.

Table 2. Associations between Spatial Clusters and Demographic Characteristics/Precipitating Circumstances for Suicide Decedents in Virginia, Virginia Violent Death Reporting System, 2010-2015

	Cluster Number													Number (percent)†	
	1	2	3	4	5	6	7	8	9	10	11	12	13	Within Clusters	Outside Clusters
Sex															
Male	↓	↓	↑	↑	↑	↓	↑	↓	↑	↑	↑	↓	↑	785 (78.1)	4034 (77.4)
Female	↑	↑	↓	↓	↓	↑	↓	↑	↓	↓	↓	↑	↓	220 (21.9)	1179 (22.6)
Age group (years)															
10-17	↑	↓	↑	↓	↓	↓	↑	↓	↓	↓	↑	↓	↓	22 (2.2)	162 (3.1)
18-39	⬇	↓	⬇	↓	↓	↑	↑	⬆	↓	⬇	↓	↓	↓	**281 (28.0)**	1755 (33.7)
40-64	↑	⬆	↑	↓	↑	↓	↓	↓	↑	↑	↑	↑	↑	**500 (49.8)**	2404 (46.1)
65+	↑	↓	↑	↑	↓	↓	↑	↓	↑	⬆	↓	⬆	↑	**202 (20.1)**	892 (17.1)
Race/Ethnicity															
White, nH	⬆	↑	↓	↑	↑	↓	⬆	↑	⬆	⬆	⬆	⬆	⬆	**934 (92.9)**	4383 (84.1)
Black, nH	⬇	–	↑	↓	↓	↑	⬇	↓	↓	↓	↓	⬇	⬇	**48 (4.8)**	502 (9.6)

Hispanic	↓	↓	↓	↓	↓	↓	↓	↑	↓	↓	↓	↓	↓	**11 (1.1)**	137 (2.6)
Marital Status															
Married	↑	↑	↑	↓	↑	↑	↑	↑	↑	↓	↑	↑	↑	329 (32.8)	1574 (30.3)
Widowed, Divorced, or Separated	↑	↑	↑	↑	↑	↑	↑	↓	↓	↑	⬇	↑	⬆	**408 (40.6)**	1845 (35.5)
Single	⬇	↓	↓	↓	⬇	↓	↓	↓	↓	↓	↑	↓	⬇	**267 (26.6)**	1774 (34.2)
Suicide Weapon															
Firearm	↓	↓	↑	↑	↑	↑	↑	↑	⬆	↓	⬆	⬆	⬆	**623 (62.0)**	2884 (55.3)
Hanging, Strangulation, or Suffocation	⬇	↓	↓	↓	↓	↑	↑	↓	⬇	↓	↓	⬇	↓	**182 (18.1)**	1217 (23.4)
Poisoning	⬆	⬆	↓	↑	↓	↓	↓	↑	↓	↑	↓	↓	⬇	157 (15.6)	752 (14.4)
Suicide Location															
Home	↑	↑	↓	↑	↑	↓	↓	–	–	↓	↑	↑	↑	778 (77.4)	3911 (75.0)
Road/vehicle	↑	↓	↑	↓	↑	↑	↑	↑	⬆	↑	↓	↓	↓	92 (9.2)	442 (8.5)
Veteran status															
Military	↓	–	↓	↑	–	↓	↑	↑	↓	↑	↓	↓	⬇	202 (20.7)	1119 (22.0)
Home injury															
Injured at home	↑	↑	↓	↑	↑	↑	↓	↑	↑	↑	↑	↑	↑	**780 (77.7)**	3845 (73.8)
Suicide Circumstances															
Current mental health problem	⬆	↑	↓	⬇	↓	↓	⬇	↑	↓	↑	⬇	↑	↓	574 (58.2)	2978 (58.6)
Current mental illness treatment	↑	↓	↓	↓	↑	⬇	↓	↑	↓	↑	↓	↓	–	387 (39.3)	2146 (42.2)
History of mental illness treatment	⬆	↓	↓	↓	↓	↓	⬇	↑	↓	↓	↓	↓	↑	487 (49.3)	2616 (51.5)
Alcohol problem	⬆	⬆	↓	↓	⬆	↓	↑	↓	↓	↓	↓	↓	↓	211 (21.4)	1073 (21.1)
Intimate partner problem	↑	↓	↓	↓	↓	↑	↑	↓	↓	↓	↑	↓	↑	322 (32.7)	1681 (33.1)
Suicide attempt history	↑	↑	↓	↓	↓	↓	↑	↑	↓	↑	↓	⬇	⬇	207 (21.0)	1137 (22.4)
Recent criminal legal problem	↑	↓	↑	↓	↑	↑	↑	↓	↓	↓	↓	↓	↓	101 (10.2)	531 (10.5)
Physical health problem	↑	↑	↑	⬆	↓	↑	↓	↑	↓	↓	↓	↓	↓	199 (20.2)	968 (19.0)
Job problems	⬆	↑	↓	↓	↑	↓	↓	↑	⬇	⬇	⬇	⬇	⬇	**109 (11.1)**	740 (14.6)
Financial problems	⬆	↑	↓	↓	↓	↓	–	↑	↓	↓	↓	⬇	⬇	**117 (11.9)**	751 (14.8)
Eviction or Loss of Home	↑	↑	↓	↑	↓	↓	↓	↓	↓	↓	↓	⬇	⬇	**34 (3.5)**	253 (5.0)

Boldface text indicates statistical significance; ↑/⬆: Proportion higher/significantly higher than the rest of the state; ↓/⬇ : Proportion lower/significantly lower than the rest of the state; – : Proportion same as the rest of the state. †: A total of 6218 suicides occurred during the study period. Counts may not sum to total due to missing data.

We found differences in decedents' suicide circumstances between clusters (**Table 2**); however, no precipitating suicide circumstance was more prevalent for all clusters combined compared to the rest of the state. "Current mental health problem" was the most common circumstance in all clusters (58%), followed by "history of mental illness treatment" (49%) and "current mental illness treatment" (39%). Some individual clusters differed from the rest of the state for specific suicide circumstances. Clusters 4, 7, and 11 had significantly lower proportions of suicides with reported mental health problems than the rest of the state (Cluster 4: 38%, $P = .01$; cluster 7: 39%, $P < .01$; cluster 11: 40%, $P = .02$). Similarly, the proportion of suicides with current mental illness treatment was lower in cluster 6 (28%, $P = .04$) and the proportion of suicides with a history of mental illness was lower in cluster 7 (37%, $P = .03$) compared to the rest of the state. The proportion of suicides with "job problems" as a precipitating circumstance was significantly lower in clusters 9 through 13 (range: 2-8%; $P \leq .02$) compared to the rest of the state. The proportion of suicides with “financial problems” was significantly lower in cluster 12 (5%, $P < .01$) and cluster 13 (4%, $P < .01$) compared to the rest of the state; similarly, the proportion of suicides with “eviction or loss of home” was significantly lower in cluster 12 (1%, $P < .01$) and cluster 13 (0%, $P = .03$). Among all clusters combined, the proportion of suicides with job problems (11%, $P < .01$), financial problems (12%, $P = .02$), and eviction or loss of home (3%, $P = .04$) was significantly lower than the rest of the state.

Discussion

This analysis demonstrates the potential utility of enhancing surveillance systems such as NVDRS with small-area level geographic data. The pairing of geographic information with surveillance data can assist in the identification of both areas with higher than state average suicide rates and place-specific suicide risk factors. In this descriptive analysis, we described the location of high-risk areas in the state to encourage future investigations into causes and protective factors of suicide in Virginia and to develop data-driven, targeted suicide prevention activities.

We used a novel approach to identify clusters with spatially adaptive filters, which diverges from the contemporary literature on suicide cluster identification. The most commonly used method for detecting suicide clusters, the spatial scan statistic method, identifies a most likely cluster even when the statistical significance of the test statistic is low. However, our analysis used spatially adaptive filters as the basis for our clustering method to address the impact that different population sizes have on the statistical reliability of the disease rates (Choynowski, 1959; Waller et al., 2006). While other studies have used spatially adaptive filters to represent geographic patterns of disease rates as a continuous surface (**Figure 1B**), we extended the use of spatial filters as a new way to identify geographic clusters. In doing so, we detected several highly geographically detailed clusters where suicide rates were significantly higher than in Virginia (**Figure 1A**). Moreover, the identified clusters in this analysis tended not to follow county administrative boundaries; they either occurred within counties or contained regions from neighboring counties. These results could inform future work examining sub-county clustering of suicide and changes in suicide clusters over time.

This analysis revealed important differences in suicide methods between high suicide risk clusters. Compared to the rest of the state, four clusters in western Virginia had a significantly higher proportion of suicides from firearm-related injuries, and two clusters in northern Virginia had a significantly higher proportion of suicides from poisoning. These clusters contain a higher proportion of rural Census tracts than any other cluster in the study. An important driver of urban-rural differences in suicide is the increased rate of suicide by firearm in rural areas (Ivey-Stephenson et al., 2017; Nestadt et al., 2017). Two firearm suicide clusters were previously identified in Ohio, in the Appalachian region of the state (Fontanella et al., 2018); the clusters with a higher proportion of firearm suicides in this paper, which also occurred in or near the Appalachian region of Virginia, may indicate larger regional trend. Poisoning has a relatively low case fatality rate, which may suggest high levels of non-fatal substance misuse in the clusters with a higher proportion of poisoning suicides (Miller et al., 2004).

The pattern of mental health circumstances in all suicide clusters combined was not different from that of the rest of the state, although the proportion of decedents reporting mental health circumstances did differ for some individual clusters. Overall, mental health circumstances were common among decedents inside and outside clusters, which underscored the importance of preventing and treating mental health conditions for suicide prevention. However, some individual clusters reported a significantly lower proportion of mental health conditions (clusters 4, 7, & 11) and mental health treatment (cluster 6) compared to the rest of the state. Treatment for mental health conditions could be affected by various individual (e.g., health insurance status, mental health condition) and environmental (e.g., health and mental health provider density) factors. Furthermore, these results do not account for regional variations in mental health care, such as differences in quality of care between urban and rural areas (Gamm et al., 2010; Ziller et al., 2010).

Job problems, financial problems, and eviction or loss of home were less likely to be reported as precipitating suicide circumstances in all clusters combined compared to the rest of the state, although these circumstances varied regionally. Decedents in three high-risk clusters (9-11) in western Virginia were less likely to have known job problems, and decedents in two high-risk suicide clusters (12 & 13) in rural Appalachian Virginia were less likely to have known job problems, financial problems, and eviction or loss of home compared to the rest of the state. Some research has found an association between individual socioeconomic disadvantage and suicide, but the association is inconsistent (Burrows et al., 2011). The results from this analysis may indicate the relative importance of precipitating factors other than job problems, financial problems, and eviction for suicide in clusters 9-13.

Limitations

This analysis has some important limitations. First, information about precipitating circumstances, medical/mental health status, and/or intent of the deceased may be misclassified or incomplete depending on the circumstances of the death investigation. In particular, the probability of a death being classified as undetermined instead of suicide is substantially greater for poisoning deaths than gunshot/hanging deaths when documentation of a suicide note is missing (Rockett et al., 2018). Virginia's statewide medical examiner system likely mitigates some of these data quality issues (Institute of Medicine, 2003). Second, the bivariate descriptive analyses in these surveillance data do not account for confounding, which could be addressed in future studies through multivariate analysis.

However, we standardized suicide mortality ratios in the analysis by age and sex to control for demographic differences across the state. Third, the associations from the bivariate analyses may be inaccurate due to multiple comparisons testing and the variation in cluster size, which may lead to false positive results and/or limit statistical power. Finally, we did not examine the effects of contextual factors such as neighborhood poverty in this analysis. Future studies could examine the interaction between individual-level risk factors from NVDRS and contextual factors.

Conclusions

Information about spatial variation in suicide rates could help direct suicide prevention resources to areas with the greatest need in Virginia and elsewhere. These data could encourage the development of more targeted, effective prevention programs, such as strategies described in the CDC's suicide prevention technical package (Stone et al., 2017). The integration of small-area geographic data to NVDRS provides valuable information about spatial variation in suicide risk factors that can facilitate place-based suicide prevention strategies and be used in small-area geographic analyses with other topics (e.g., homicide). This analytic strategy is useful for guiding targeted suicide prevention efforts and informing additional research to understand the increasing rates of suicide.

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Empowering Community Health Workers in Guatemala

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Abstract

Introduction: Community health workers (CHW) have been integral in helping middle- and low-income countries. This research paper discusses the benefits of the involvement of CHWs in health screenings.

Methods: Health screenings were performed for three rural communities in Guatemala in 2021, alongside a church in Zacapa, to identify community wide health risks. The screenings included a detailed questionnaire that collected demographic data, height and weight, a blood glucose check, a hemoglobin check, and a blood pressure reading. Additional nutritional data was collected to understand diet patterns and habits. In-depth educational sessions were done with the CHWs, emphasizing preventive care, and the teach-back method was used to verify the effectiveness of instruction.

Results: Educational efforts were measured by accurate demonstrations and correct answers to questions at the end of the sessions. The results yielded 47% of the CHWs displayed a correct return demonstration on the first try, 33% did on their second try, and 20% on their third.

Conclusion: Using the methods described above and the data collected on previous trips, the study allowed for health screenings and education, along with the resources to continue screenings independently. Some limitations of this study include participant age or previous illness, along with the missing data from the 2020 trip, which was postponed due to COVID-19. Recommendations include first-aid response training to combat the limited emergency medical services and additional studies to continually educate the communities in Guatemala.

Introduction

Globally, a shortage of skilled and professionally trained healthcare workers has brought to light the importance and usefulness of community health workers. Community health workers (CHWs) are defined by the World Health Organization as members of the community who are not trained health professionals, chosen and trained to work in their own communities (Huang et al., 2018). The value of CHWs goes beyond the fact that they are already conveniently placed in their communities of need, but rather the fact that they can provide care centered around their community's needs. A CHW can be of any age, gender, nationality, or even educational level (Lehmann et al., 2021). The most important requirement needed to be a CHW is a willingness to learn and a dedication to their community.

The COVID-19 pandemic that devastated the world shed light on the many insecurities that are found in the public health sector, including Guatemala. Not only did Guatemala suffer from health and social insecurities, but there was a nutritional strain as well. Travel restrictions inherently caused many to have limited access to food in rural areas, as well as a significant rise in prices to accommodate the restrictions put into place (Ceballos et al., 2021). For a country that already has high rates of malnutrition in children, as high as 48%, limited access to affordable and fresh foods creates a massive impact (Corvalán, 2017). This was shown when completing health screenings in the rural areas of Guatemala, where participants were found to have high blood sugar or low hemoglobin, both of which are largely affected by dietary choices. When asked about their diets, many were not aware they had access to Chaya, a Mayan spinach high in nutrients used to combat anemia (Amaya et al., 2019).

Guatemala is considered the fifth poorest economy in Latin America and the Caribbean (Overview, 2021). A very large percentage of the Guatemalan population is made up of indigenous peoples, who are disproportionately affected by chronic illnesses. Health structures were also compared to those in the United States, including the emergency medical services that were used to take care of critical patients. In conjunction with the health screenings, cultural awareness was used to communicate with members of the community. The primary aims of this study were to provide health screenings for communities in Guatemala and to educate community health workers as an intervention to address a community need. These are significant due to the lack of healthcare and healthcare education in rural and indigenous populations.

Methods

To empower community health workers who are willing and able to devote their time and energy to their community, it is necessary to invest proper time and training in the workers. For this research, the teaching method was used to instruct the community health workers. The CHW's role in the health screenings was to interview patients and register them in the registry, followed by an educational class at the end of the screening. The purpose of assigning them interviewing roles in the health screenings is to have them familiarize themselves with the health problems and diet patterns that are experienced in the community. Assigning the CHWs to the questionnaire was also an attempt to close a trust gap that can be found when foreigners providing outside health services arrive and leave (Mohajer & Singh, 2018). The screenings were translated from English to Spanish prior to arrival in Guatemala. CHWs are extremely important in this role, as they are the first point of contact with the patient prior to the health screening and can use their local knowledge and beliefs to explain health in simple terms, as well as share care and concern to motivate behavioral change (Mohajer & Singh, 2018).

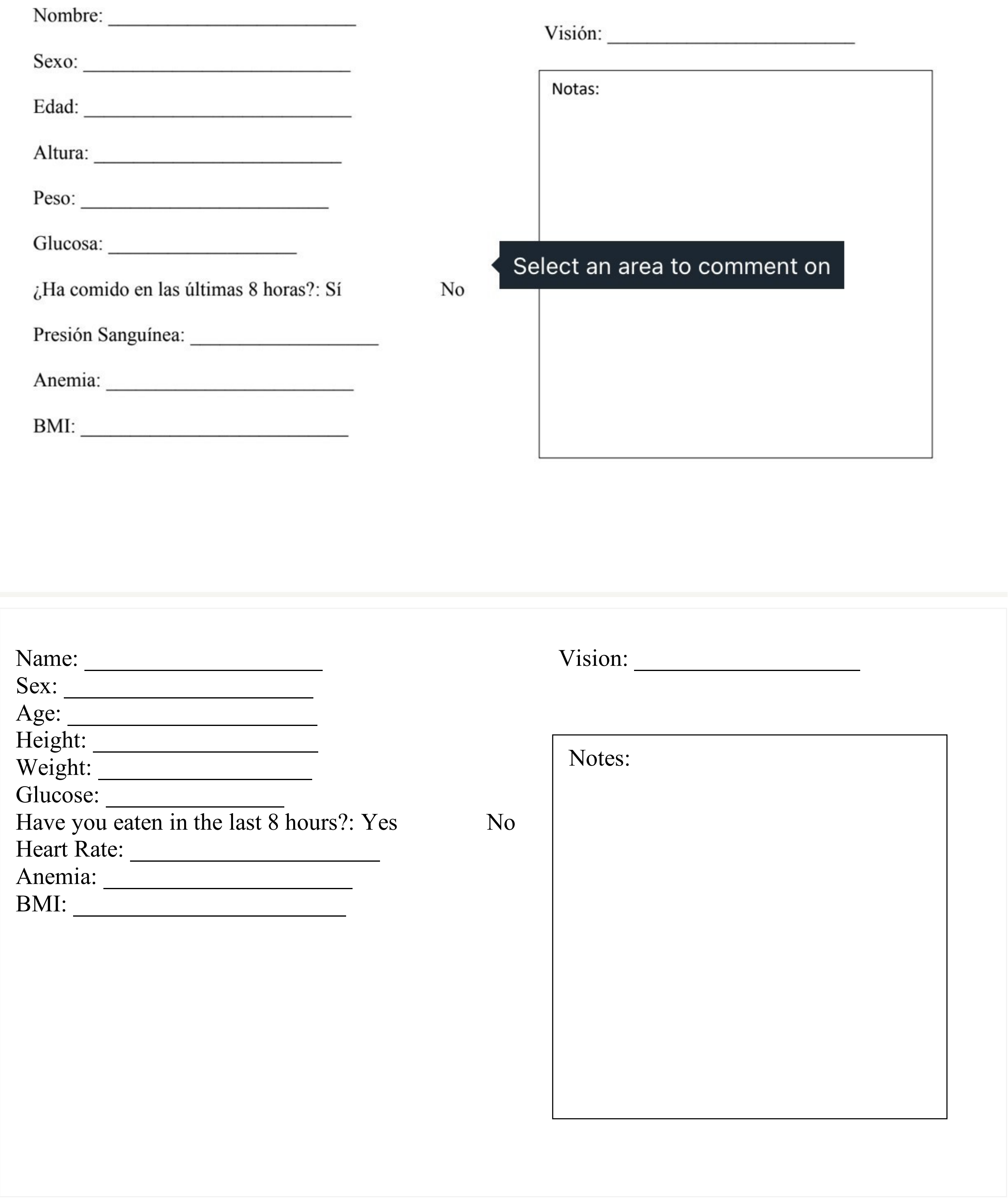
Prior to departing on the trip to Zacapa, Guatemala, a questionnaire was formulated to collect data on the patients seen in the community during the health screening. This questionnaire included general demographic information and in-depth questions. These were formulated, and then translated into Spanish. These questionnaires were discussed and filled out by each person who attended the health screening by a CHW. Additionally, a health screening form (represented in Figure 1) and a training brochure (represented in Figure 2) were both made prior to the trip to aid in the screening. The health screening form included sex, age, height, weight, blood glucose, the last time food was consumed, blood pressure, hemoglobin, and body mass index (BMI). These values were obtained and documented on the form as the patient went through the health screening. The training brochure served as a guide and visual for each CHW during the educational session that was held after the health screenings. Focusing on basic preventive care and knowing when to refer sick patients to a higher level of care is the most important aspect of the educational session training of the CHWs (Rosales et al., 2020).

Each person that walked into the health screenings had a questionnaire filled out as well as a basic health screening done prior to having a medical consultation with the team's physician. Once the health screening was done, the results were reviewed for each patient and then compared to normal values. Additionally, the patients were asked if they were experiencing any symptoms and if they had any chronic diseases for which they were actively seeking recurring medical attention. These chronic illnesses were noted and documented in the patient's health screening for future reference. The interaction between the patient and the healthcare professional was done with patience, time, and adequate health training and capabilities. To achieve the best quality patient-centered care, cultural competence is helpful to understand and reduce disparities that are found in healthcare (Ahmed et al., 2018). One factor that largely affects ongoing care for patients once they have been evaluated by a medical professional is a limited level of culture-related knowledge, skills, and experience from the provider (Ahmed et al., 2018). The acknowledgement of these factors and bringing awareness to them helps create a safer place of trust between the patient and provider. This can be achieved by evaluating one's inner self and feelings about the culture and then addressing the barriers found within.

Once the health screenings were completed for the day, the community health workers were gathered in a group and given a presentation from the group leaders. It was crucial to note that one of the most important goals of the training was to emphasize basic preventive care and knowing when to refer sick patients to a higher level of care (Lapidos et al., 2019). Starting the session by explaining the importance of preventive care was to ensure that everyone knew the primary reason for doing the health screenings. It was necessary to remind each person there that the only qualification they needed to be a community health worker was to be dedicated to their community and have the willingness to learn (Lehmann & Sanders, 2021). Together, a presentation was formulated to explain the importance of preventive medicine and health screenings in the community. Then, blood pressure checks, hemoglobin checks, and blood sugar checks were demonstrated, and the CHWs ability to perform the checks were evaluated. The team made sure to include an informational piece about the regular values that should be found for each reading, which is represented in Figure 3. After the session, the CHWs were asked questions about the verbal education and skills education to evaluate the effectiveness of the training session.

Figure 1

Health Screening form in Spanish and English, used by graduate students and CHWs to obtain assessments



Nombre: ________________________

Sexo: __________________________

Edad: __________________________

Altura: ________________________

Peso: ________________________

Glucosa: __________________

¿Ha comido en las últimas 8 horas?: Sí No

Presión Sanguínea: __________________

Anemia: ________________________

BMI: __________________________

Visión: ________________________

Notas:

Name: ______________________

Sex: _______________________

Age: _______________________

Height: ____________________

Weight: ____________________

Glucose: ________________

Have you eaten in the last 8 hours?: Yes No

Heart Rate: ______________________

Anemia: ______________________

BMI: _________________________

Vision: _____________________

Notes:

Figure 2

Translated Educational Brochure

"La salud medica es importante para todos de vez en cuando, pero la salud publica es importante todo el tiempo."

- C. Everett Koop

GRACIAS POR TODO LO QUE HACEN!

Katelyn Espenship, MPH
Dr. Oswald Attin
Liberty University

Translated by Andrea Harper, MPH

Intervenciones de Educación de Salud para aumentar la conciencia de desnutrición y la colección de datos en Zacapa, Guatemala.

Guía de Entrenamiento

TU TRABAJO:

Folleto Educacional y Cuestionario de Nutrición e Información Demográfico:

[solamente en la primera visita]

-El participante tiene que llenar la encuesta principal, luego revisar el folleto educacional, y llenar la encuesta final.
- El participante tiene que llenar el cuestionario.
- Se coleccionaran los documentos, y seguidamente se escribirá la municipalidad y el numero de identidad del registro en el examen y en el cuestionario.

Registro:

[en cada visita]

- Se tomarán los signos vitales del participante y se escribirán en la columna apropiada en el registro.

ALTURA

-El participante tiene que quitarse los zapatos y pararse en frente de la pared con la espalda contra la pared.
-Tomar la parte de metal de la cinta métrica y ponerla en el piso al lado del participante.
-Usar el pie para detener la parte de metal en el piso.
-Tomar el otro lado de la cinta métrica y jalarlo hasta que llegue a la cabeza del participante.
-Documentar la altura en centímetros.

PESO

-El participante se quitará los zapatos si ya no lo ha hecho.
-El participante se parará en la balanza.
-Se documentará el peso en kilogramos.

PRESION ARTERIAL

-Se le preguntará al participante que se siente en una silla, que coloque el brazo en una mesa, y se asegura de que no cruce las piernas ni los tobillos.
-Se colocará el esfigmomanómetro para medir la presión arterial en la parte de arriba del brazo, asegurándose que quede bien ajustado en el brazo.
-Encender el monitor, dejar que el esfigmomanómetro se infle, y luego que se desinfle.
-Documentar la presión arterial.

GLUCOSA EN LA SANGRE Y HEMOGLOBINA

-Se le dirá al participante que se siente en una silla.
-Ponerse los guantes.
-Encender el glucómetro e insertar la tira reactiva para medir la glucosa en la maquina.
-Limpiar la punta del dedo anular del participante con una toallita de alcohol.
-Seguidamente, pinchar al lado del dedo en el área que se limpio.
-Colocar una gota de sangre al final de la tira reactiva para medir la glucosa.
-Mientras el glucómetro procesa los resultados, encender el HemoCue.
-Colocar una gota de sangre en el microcuvette.
-Después, decirle al participante que se ponga un algodón en el área sangrada.
-Documentar el nivel de glucosa en la sangre y hemoglobina.
-Limpiar el área sangrada del dedo con una toallita de alcohol y ponerle una curita.

*Asegurase de vigilar el glucómetro para que no se apague antes de documentar el resultado.

"Medical health is important for everyone from time to time, but public health is important all of the time."
-C. Everett Koon

Thank you for everything they do!

Katelyn Espenship, MPH
Dr. Oswald Attin
Liberty University

Translated by Andrea Harper, MPH

Interventions by Health Education to increase the awareness of malnutrition and the data collection in Zacapa, Guatemala.

Guide to training

Your Job:

Educational Brochure and Nutrition Questionnaire and Information Demographic: [only in the first visit]

-The participant has to fill out the main survey, then review the educational brochure, and fill out the final survey
-The participant has to fill in the questionnaire
-The documents will be collected, and then the municipality and the registration number will be written in the examination and in the questionnaire

-Vital signs will be taken from the participant and will be written in the appropriate column on the record.

Height

-The participant has to take off their shoes and stand in front of the wall with their back against the wall
-Take the metal part of the tape metric and put on floor next to participant
-Use your foot to stop the metal part on the floor
-Take the other side of the tape measure and pull it until it reaches the head of the participant
-Document the height in centimeters

Weight

-The participant will remove their shoes if they haven't already
-The participant will stand on the scale
-Document the height in kilograms

Blood Pressure

-The participant will be asked to sit down in a chair
-Place their arm on the table and make sure they do not cross their legs or ankles
-Use the sphygmomanometer to measure blood pressure in the upper part of the arm, making sure it fits snugly on the arm
-Turn on the monitor and let the sphygmomanometer inflate and after it deflates document the blood pressure

Blood Glucose and Hemoglobin

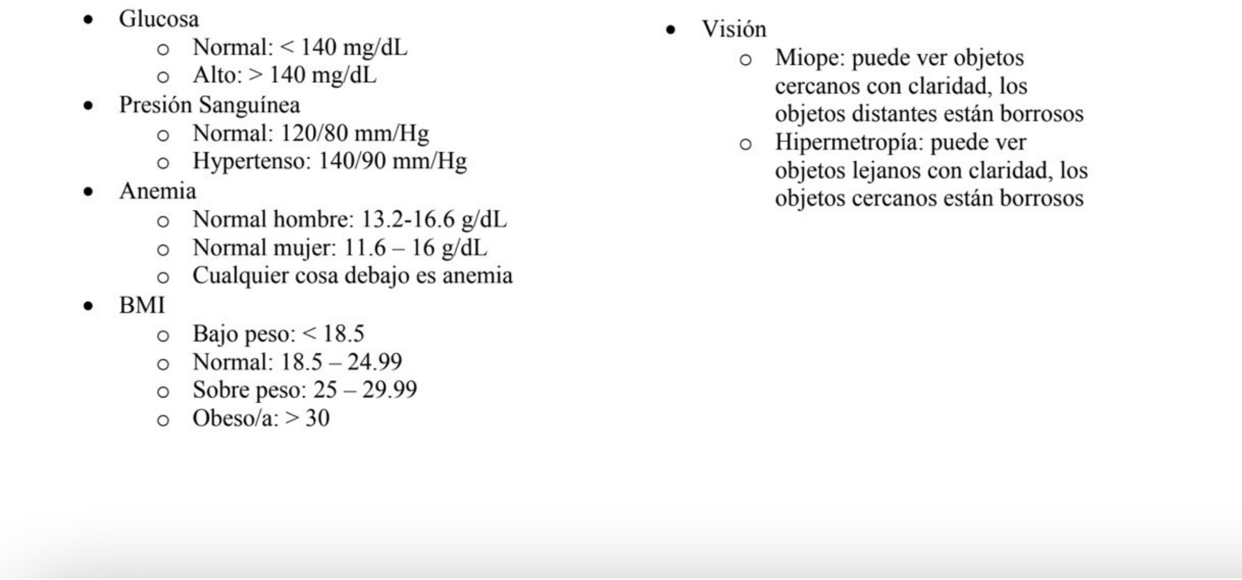
-The participant will be asked to sit down in a chair
-Put on the gloves
-Turn on the glucometer and insert the test strip to measure glucose in the machine
-Clean the tip of the participant's finger with an alcohol wipe
-Next, pinch the area on the finger that you have cleaned
-Place a drop of blood on the end of the test strip to measure glucose
-While the glucometer processes the results, turn on the Hemocue
-Place a drop of blood in the microcuvette
-Then tell the participant to put a cotton ball on the bleeding area
-Document the blood glucose level and hemoglobin
-Clean the bleeding area of the finger with an alcohol wipe and put a cloth or bandage on it

-Be sure to monitor the glucometer so it does not turn off before documenting the result

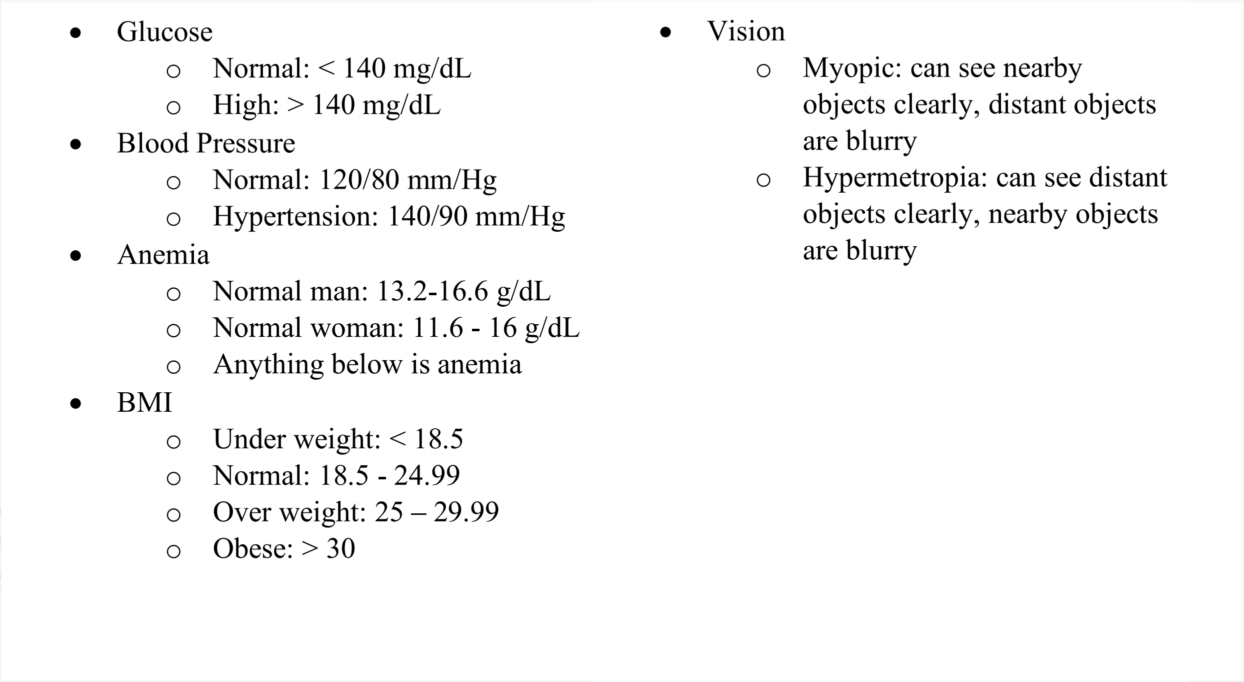
Note: Figure 2 is a brochure in English that was created by a graduate student in 2019 and translated to Spanish by members of the team for use in the educational portion of the CHW training session.

Figure 3

Normal and abnormal values used as a reference for health screening



- Glucosa
    - Normal: < 140 mg/dL
    - Alto: > 140 mg/dL
- Presión Sanguínea
    - Normal: 120/80 mm/Hg
    - Hypertenso: 140/90 mm/Hg
- Anemia
    - Normal hombre: 13.2-16.6 g/dL
    - Normal mujer: 11.6 – 16 g/dL
    - Cualquier cosa debajo es anemia
- BMI
    - Bajo peso: < 18.5
    - Normal: 18.5 – 24.99
    - Sobre peso: 25 – 29.99
    - Obeso/a: > 30
- Visión
    - Miope: puede ver objetos cercanos con claridad, los objetos distantes están borrosos
    - Hipermetropía: puede ver objetos lejanos con claridad, los objetos cercanos están borrosos



- Glucose
    - Normal: < 140 mg/dL
    - High: > 140 mg/dL
- Blood Pressure
    - Normal: 120/80 mm/Hg
    - Hypertension: 140/90 mm/Hg
- Anemia
    - Normal man: 13.2-16.6 g/dL
    - Normal woman: 11.6 - 16 g/dL
    - Anything below is anemia
- BMI
    - Under weight: < 18.5
    - Normal: 18.5 - 24.99
    - Over weight: 25 – 29.99
    - Obese: > 30
- Vision
    - Myopic: can see nearby objects clearly, distant objects are blurry
    - Hypermetropia: can see distant objects clearly, nearby objects are blurry

Table 1

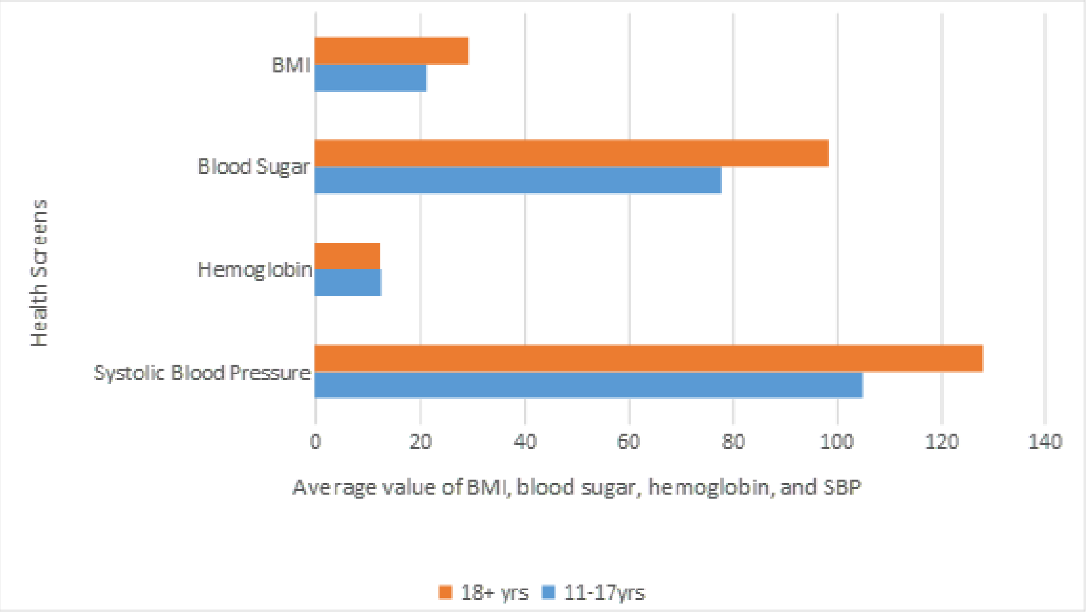
Demographic Characteristics of Total Participants in Health Screening in Zacapa, Guatemala

Characteristic	**Frequency**	**Percent**
Gender (n=182)		
Male	44	24.2
Female	138	75.8
Age (n=182)		
11-17	32	17.6
18+	150	82.4

Note: Table 1 lists the demographics of the participants who were able to provide values for all four screenings, including BMI, blood sugar, hemoglobin, and systolic blood pressure.

Figure 4

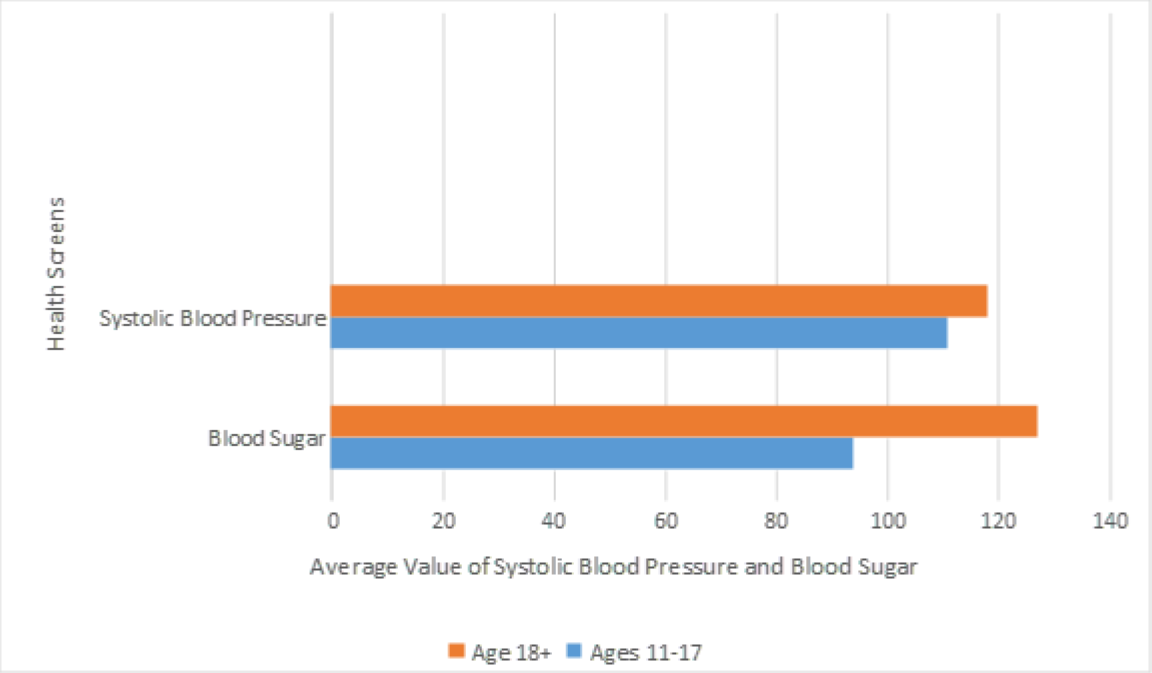
2021 Participant's BMI, blood sugar, hemoglobin, and Systolic Blood Pressure



Note: Figure 4 represents the averages of the values taken from the quantitative values of each health screening evaluated in 2021. The younger population, ages 11 to 17, is represented by the blue row, while the population of ages 18 and over is represented by the orange row.

Figure 5

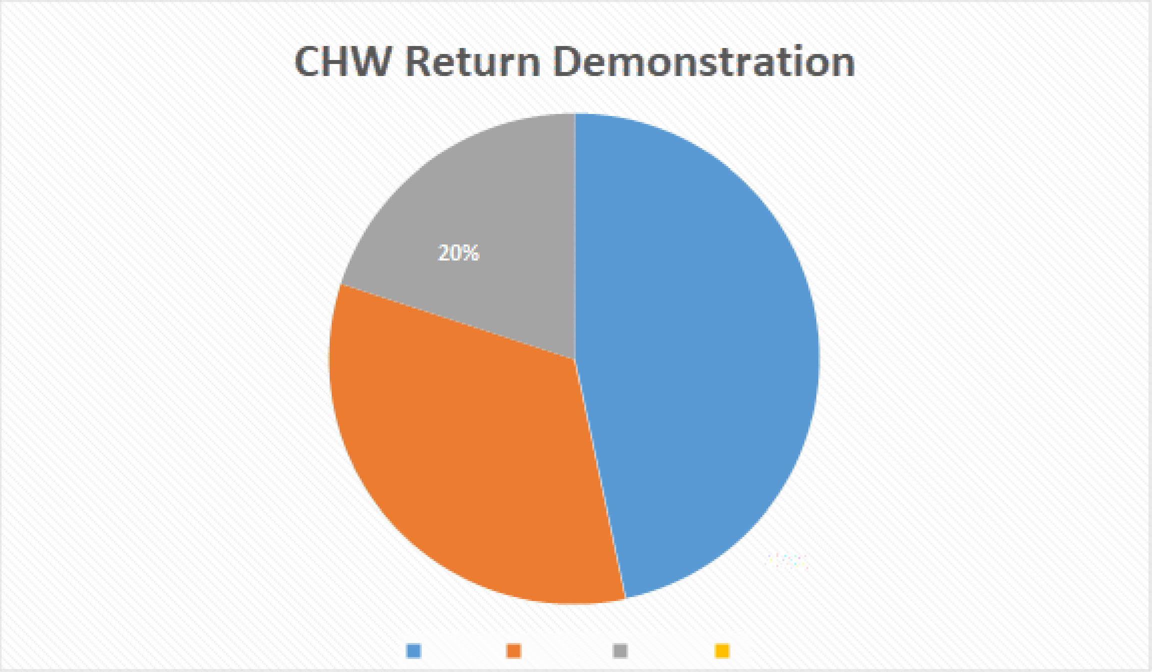
2019 Participant's BMI, blood sugar, hemoglobin, and Systolic Blood Pressure



Note: Figure 5 represents the averages of the values taken from the quantitative values of each health screening evaluated in 2019. The younger population, ages 11–17, is represented by the blue row, while the population of ages 18 and over is represented by the orange row. There is less data represented here due to the absence of collection of hemoglobin and BMI in prior findings.

Figure 6

Community Health Worker Return Demonstration Effectiveness



Note: Figure 6 is a visual representation of the percentage of community health workers who did a correct return demonstration on the first try, second try, or third try after the educational session.

Results

The data above does not represent every single participant that attended the health screenings. The total was more than 237, but some data could not be used due to gaps in information that did not allow for a full depiction of the data. There were more participants over the age of 17 (82.4%) in comparison to those who were between the ages of 11 and 17 (17.6%); additionally, there were more female participants (75.8%) in comparison to their male counterparts (24.2%). The data represented by the figures above showed that participants over the age of 17 had higher BMIs, higher systolic blood pressures, and lower hemoglobin values than those participants who were between the ages of 11 and 17. The same was found to be true when comparing the data with the 2019 data for systolic blood pressure and blood sugar. The health screenings also indicate that diabetes and kidney disease are among the most common health issues, which are closely related to nutritional habits and the age of the participants.

Figure 6 indicates how effective the educational efforts and sessions were with the community health workers, based on the return demonstration and questions asked at the end of the session. Almost half of the group was able to do an accurate return demonstration of the skills taught and answer the questions at the end correctly on the first try. The other half was able to do this on the second and third tries.

Discussion

This result from the health screenings

correlates with the fact that young adolescents between the ages of 10 and 14 have the lowest risk of death of all age groups, although between the ages 10 to 24 have the highest probability of dying in many countries including Latin America (World Health Organization, 2021). Though this is the case, deaths are not related to chronic illnesses such as hypertension or diabetes but rather unintentional injuries, violence, mental health, alcohol, and drug use, etc. (Huang et al., 2018).

The World Health Organization states that to have effective teaching and educational approaches to increase the number of rural health workers worldwide, it is important to focus on rural education, regulatory, financial, and personal and professional support (O'Sullivan, 2020). This was accounted for by the educational methods that were previously discussed. This will produce skilled and satisfied rural health workers, but it is important to note that this dedication requires continued dedication, development, and support. Without this, the development of a successful rural workforce is likely to fail and will not have sufficient tools to succeed (O'Sullivan, 2020).

When conducting interviews with the participants who were found to have abnormal blood pressure readings, blood glucose readings, and hemoglobin readings, each participant's nutritional habits were identified to determine similarities in health risks in the community. These findings were used as a learning opportunity, given the importance of this knowledge in preventing the development or further worsening of Type II diabetes. There is a large percentage of people in low- and middle-income countries, such as Guatemala that are diagnosed with diabetes, approximately 75% to be exact (Flood et al., 2017). Shockingly, of the 75% of people diagnosed with diabetes in low- and middle-income countries, only 29% are taking a medication regimen to help control their blood sugars (Duffy et al., 2020). It is crucial for diabetics to be able to self-manage diabetes safely and effectively.

Guatemala imposed strict measures to control the spread of COVID-19. As a result, rates of food insecurity increased. These restrictions were necessary for the safety of the Guatemalan people but caused secondary effects on the country's economy. A large percentage of the country's economic growth depends on agricultural output, and though this sector was exempt from governmental limitations, there was still an evident disruption in the trade as well as shortages of employees (Ceballos et al., 2021). When households in rural communities were questioned about how this change affected them directly, it was noted that there was a decrease in the amount of food available in their local markets, as well as an increase in prices. Due to lower reported incomes, which were also a result of COVID-19, rural communities experienced a great deal of nutritional insecurity. It was quite evident that this was still the case when performing the health screenings in May and that most people were just trying to get by on the less expensive foods they had at home. Eighty percent of households interviewed for this study reported an increase in fruits and vegetables, while ninety-one reported an increase in grains (Ceballos et al., 2021). These findings emphasize the need to educate this population about maintaining a balanced diet of fruit and vegetable servings throughout the day.

A major strength of the health screening assessments done in various areas of the Zacapa District of Guatemala was that this trip was an accumulation and continuation of two previous trips that had begun the work and assessments in these communities. Because of this, there was access to baseline assessment information on participants from previous years. Additionally, steps were taken to improve the work of previous trips by implementing more culturally appropriate and competent care in the areas of work. The data that was obtained from previous groups helped determine what additional assessments were needed. Another strength of the health screening assessments and educational sessions with community health workers was that three of the six team members spoke fluent Spanish, which allowed for less need for translation services and a better capability of communicating with the participants. Being able to speak the native tongue also builds rapport and trust with the participants. The government of Guatemala donated several leftover medication samples that were able to be distributed for free to the participants of the health screening, which was another benefit to outreach efforts, as many of the participants that came did not have the money or access to purchase these medications.

Conclusions

Even with our teams' short time in Guatemala, health screenings and education were provided to a large population. Our team was able to leave supplies, a registry, and education in these communities, which allows them to continue the health screenings on their own so they can monitor their health. With the education and resources provided, our hope is to see the health screen readings improve, as well as the nutrient density of this population's diet, to lessen the burden of chronic diseases.

Limitations

A limitation of the study is the gaps of missing data that were mentioned previously, as some of the participants were too young to have their blood checked or their blood pressure measured. This created a discrepancy in the data when it was compiled and evaluated during the final steps of the study. An assessment tool that potentially would have been of value is noting the participants who previously had a diagnosis of hypertension, diabetes, or anemia prior to having their assessments done during our health screenings. This would have been a good measurement of how well they were managing their chronic illnesses. Additionally, data from the previous trip was missing BMI values and hemoglobin values, so these were unable to be compared to previous years. Due to the COVID-19 pandemic, international travel was halted, and a group was unable to continue the health screenings in 2020, leaving over a year gap in data that could have been collected and studied. This was a major limitation, as there is a large gap of missing data that could have shed light on blood pressure, hemoglobin, and blood sugar trends.

These health screenings in various communities in the Zacapa district could not have been made possible if it were not for the support of a local church organization in Guatemala that has been working with teams from Liberty University for the past three years to determine the communities that need the most assistance and outreach. Leaders from this church were our liaisons in Guatemala; they transported us, housed us in safe areas, and fed us while we were there. This church also provided a large number of volunteers who worked alongside our team and learned the process of health screenings in order to become community health workers.

Ethical Considerations

This was Institutional Review Board (IRB) human subjects research, approval number 3554.112918. To perform this study, we obtained ethical permissions from the

Institutional Review Board (IRB), with which the authors are affiliated, including the IRB Annual Review Form, Change in Protocol Form, Investigator Agreement, Questionnaires, and Consent Forms. These consent forms explained the purpose of this study and data confidentiality. To keep the data confidential, no names or identifying information were collected on the consent forms or questionnaires. This study was approved on December 23, 2020. To continue the confidentiality of the study, all the data acquired will be kept in a secure filing cabinet within the Department of Public and Community Health, where only the student and co-researchers will have access to the data. All data will be deleted and cross-shredded after three years. Before participating in the community health assessments, verbal and written consent from respondents was required. Those who consented were assured of their right to participate in and withdraw from the study. There was no compensation for participating in this study.

Recommendations

After having the privilege of working with the various communities and identifying needs specific to their risks, there are recommendations based on the assistance they have available from the Community Health Workers we trained. The first recommendation would be to implement a first aid response for first responders to provide medical aid while the victim waits for emergency medical services. The skills and tools that can be taught from this would be valuable to any community health worker to identify and respond to medical emergencies if they were to present at a general health screening. This is important because the most common injuries in Guatemala include firearm violence and road traffic injuries (Delaney et al., 2020). Unfortunately, the healthcare infrastructure in Guatemala does not allow for enough emergency medical services personnel, significantly increasing the time the victim has from the accident to reaching a hospital. This is due to many reasons, including the culture and community, a lack of communication and coordination, inadequate transportation, outdated equipment, and a lack of personnel (Kironji et al., 2018). The reason there is a shortage of staff is due to inadequate budgeting for the municipal firefighters and volunteer firefighters, who make up the emergency services team, to receive training courses that can adequately prepare them for emergency situations (Delaney et al., 2020). This is a very crucial problem to address because less than 1% of populations in low-income countries have access to emergency medical transportation services (Kironji et al., 2018). This means that the care they can receive from first responders could be lifesaving.

An additional recommendation is telehealth, a strategy that has been suggested and studied to reach healthcare professionals in a low-cost manner while providing high-quality education and support in rural settings in Guatemala (McConnell et al., 2017). Telehealth is defined as the use of electronic information and telecommunication technologies to support long-distance healthcare, patient and professional health-related education, public health and health administration (McConnell et al., 2017). In-person training of these workers can be very costly and time-consuming, averaging about $3,000 to send just one person who will provide education to Guatemala for two weeks (McConnell et al., 2017).

By implementing telehealth, CHW's can be educated and trained in a cost-effective manner on a variety of health topics. When evaluating telehealth in accordance to this research, the CHWs can be educated on the health topics discussed above, such as height and weight, blood glucose, hemoglobin, blood pressure, and nutrition. The CHWs need to be trained in the skills to perform these checks and then in the ability to dissect what the numbers and data mean. Additionally, the community would benefit from education and preventive based resources for health-related issues such as chronic illnesses and mental health. One way to measure the effectiveness of the implementation of telehealth is to ask the CHWs and the community being reached. Any kind of healthcare is only as effective as the community's willingness to adopt it. Conducting surveys for the CHWs and the community is a way to explore the reach of telehealth and improvements that need to be made for efficient use of telehealth. Not only can telehealth help to develop CHWs but the community as a whole could benefit as well. It has the possibility to broaden the understanding of common health issues and more specific, community-based problems. Telehealth allows for a more open line of communication and an easier accessibility between health professionals and rural and indigenous communities. This is without mentioning the tremendous cost that is saved by the institution. However, telehealth requires resources and the ability to provide communities with the support to ensure its success.

Implications for Practice

This particular study addresses the need for and importance of community health workers, specifically in low- and middle-income communities. The data gathered from the study determines there is a positive outcome when time, support, and education are given to community health workers. Additional conclusions reinforce the need for education that includes nutrition, preventive care, and information on common health issues. Providing these communities with resources to continue the screenings after the team leaves is necessary to provide a lasting impact and ensure the people in these indigenous communities are receiving sustainable healthcare.

Furthermore, additional studies are needed to understand if the training of community health workers will help educate the communities in Guatemala and provide access to care where they can receive treatment for chronic diseases. Future studies will help us understand if education does help prevent these chronic diseases as well. Further research will allow for the implementation of population-specific interventions that will reduce the prevalence of chronic diseases in these communities in Guatemala.

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Promoting Community Health Research Partnerships Through a Small Grants Program: Processes and Lessons Learned

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Abstract

Introduction: While there are multiple ways to engage communities in health research, one approach is through partnership-based research in which community representatives are involved as intentional partners in the research process, from conceptualization and co-creation to implementation, analysis, interpretation, and dissemination. However, there remain numerous challenges to supporting and sustaining such partnerships.

Methods: Since its launch in 2019, the integrated Translational Health Research Institute of Virginia (iTHRIV) has sought to foster community engaged health research among its four research/clinical institutions through a community partnership-based grant program.

Results: Over five funding cycles, iTHRIV has awarded 14 one-year research grants addressing topics such as opioid use disorder, cancer, hepatitis C and autism. Each funding cycle has provided valuable experience and feedback toward iterative program refinements.

Conclusion: Key lessons have included: 1) the Request For Proposals (RFP) must be very clear and community-vetted; 2) transparency regarding administrative burden required for compliance is critical to inform cost-benefit decisions; 3) giving different modes of communication, adequate and creative marketing of the RFP is necessary; 4) establishing a centralized program officer for all grantees facilitated post-award procedural navigation; 5) one year is insufficient to carry out most studies involving human subjects. Additionally, while the program anecdotally promoted collaborative partnerships, the true impact may be difficult to evaluate.

Purpose

Community engagement is a critical component of translational health research. Community-engaged research ensures that research addresses community priorities, targets health disparities and inequities, engages participants who are representative of their communities, and generates findings that are more readily translated into policy and practice (Diallo and Frew, 2015, Holzer et al., 2014).

While there are multiple ways to engage

communities in health research, one approach is through community-research institution partnerships in which community organizations are involved as intentional partners in the research process, from conceptualization and co-creation of the research idea to implementation of the research, including analysis, interpretation, and dissemination of findings (Coombe, 2022, Janna and Oscos-Sanchez, 2007). Yet even for all its benefits, there remain numerous challenges to successfully fostering community-research institution partnerships. Mistrust, misaligned perspectives, competing priorities, and limited resources can all serve as barriers, especially when researchers are operating from institutions with complicated and often exploitative historical relationships with the communities in which they are situated (Martinez et al., 2012).

In 2019, with a Clinical and Translational Science Award (CTSA) from the National Center for Advancing Translational Sciences of the National Institutes of Health, four Virginia institutions launched the integrated Translational Health Research Institute of Virginia (iTHRIV). Building on partnerships between Inova Health System in Northern Virginia, the University of Virginia in Central Virginia, and Virginia Tech and Carilion Clinic in Southwest Virginia, the iTHRIV program is a collaboration of public and not-for-profit institutions across the Commonwealth of Virginia that bring together a dedication to team science, innovation, and a commitment to train the next generation of clinical and translational researchers. One of iTHRIV's core priorities is to strengthen community connections by engaging community stakeholders (including the lay public, patient groups, non-profit organizations, government agencies, and industry partners) to better address community needs.

One way that iTHRIV has fostered such engagement is through a Community Organization and Research Institution Partnership Grant program, administered through iTHRIV's Community and Collaboration Core (C&C). The creation of the grant program was informed by the work and lessons learned of successful academic-community partnerships (Tendulkar, 2011, Kegler, 2016.) Between 2019 and 2023, iTHRIV awarded $390,665 to 14 research projects that each involved an iTHRIV institution researcher and a community partner organization. The topics of the research grants have included autism, maternal mental health, lead in water, summer reading programs, benefits of walking and green spaces, access to Medicaid for non-citizen children, hepatitis C, healthy eating, HPV, colorectal cancer screening, and opioid use disorder. The purpose of this paper is to share Partnership Grant processes and lessons learned during the first five years of implementation and to offer recommendations for others hoping to replicate this community engagement approach. Previous papers have described various conceptual models for academic-community engagement (Kegler et al.); this paper seeks to build on that work by describing lessons learned in the process and practice of implementing this program.

Methodology

Proposal Solicitation

A critical first step in developing the funding program was to clearly establish the purpose and priorities of the program, which the team identified as: to develop or promote partnerships between faculty at one of the four iTHRIV research/clinical institutions and community organizations in each of our communities working to advance health. In alignment with broader iTHRIV goals, there was a focus on addressing health disparities and serving under-resourced communities;

this led to a broad definition of "health-related research" that was inclusive of social determinants of health. Additionally, these partnerships needed to be authentic and truly meaningful, with potential for long-term sustainability, rather than potentially exploitative "name only" partnerships.

In accordance with the above priorities, much time was spent on developing the initial Request For Proposals (RFP), as well as defining community engaged research, health-related outcomes, and social determinants of health. From the outset, the C&C team established "community health priorities" by requiring proposals to be based on a local community health needs assessments (Centers for Disease Control and Prevention, 2023). The C&C team promoted partnership authenticity by requiring that both the research and community Principal Investigators (PIs) submit a letter of support to each other, sign the proposal submission, and propose a budget that demonstrated a minimum of 40% of the funds going directly to the community partner. There also had to be a research component to the project, rather than simply health services delivery. As seed funding, the projects were intended to be completed within one year, ideally providing pilot data toward securing a larger, extramurally funded grant. Additionally, the RFP emphasized the need for a strong dissemination plan with accountability to report back to the communities involved in and impacted by the project.

The first two cycles of the seed grant program, some applications that were not conducive to community partnership work were submitted, leading the C&C team to iteratively revise and refine the RFP to be increasingly concrete in terms of partnerships, eligibility, and health related outcomes. For example, there needed to be a clear map or definition of the catchment area for eligibility (e.g., could the research be conducted anywhere in the Commonwealth of Virginia as long as the research partner was in one of the participating institutions, or did the research itself need to be serving a community within iTHRIV's catchment area?). Another eligibility challenge was that two of the partner research institutions were academic institutions, whereas two were large not-for-profit healthcare providers; this presented important differences both in terms of how researchers were titled and eligible (e.g., having "PI status") and also what community partnerships looked like (e.g., healthcare institutions can in some ways themselves be both the research institution AND community partner when they house community health programs and clinics).

For the first two years, the available $80,000 in funding was allocated to four projects at up to $20,000 each. Feedback from the community partners indicated that the administrative processes associated with receiving the funding were too burdensome for such a small amount of funding. This led to a revision of the program in year 3 to fund two awards per cycle, at $40,000 per award for subsequent years.

Initially, the RFP was disseminated to partners at both the research/clinical institutions and the community organizations largely via listservs and were posted on the iTHRIV website. Dissemination was not particularly systematic, as demonstrated by imbalances in submissions across the four partner institutions. Later, the C&C team began to track dissemination avenues more carefully. A key challenge was that as a community-focused program, the working group relied on their own networks to disseminate directly to community partners, meaning that more of the proposals seemed to be clearly initiated by an institutional partner rather than a community partner. In the latter years, press releases were created to feature the RFP on the local news, to help spread the word to community partners.

One challenge of a small grant funding mechanism is knowing how to prepare for a timely review of incoming proposals without knowing how many to anticipate. The C&C team discussed requiring a letter of intent but did not want that to serve as a barrier. Instead, it was decided that interested applicants were required to attend an information session to learn more about the funding mechanism. The goal was to address questions and provide guidance on developing a strong proposal, with emphasis on supporting competitive proposals from organizations even if they had minimal grant writing capacity. This provided the added benefit of giving the working group an advance understanding of how many proposals may come in. Feedback indicated these sessions were appreciated by prospective applicants. The pre-proposal informational call requirement was included in the process for all five years.

Project Selection

In accordance with the efforts to support projects aligned with community priorities, it was critical to engage community members in the proposal review process. Many community members that were approached were nervous about doing so, as they lacked formal grant review experience. They were provided training on the review process, but it was also emphasized to each community reviewer that they bring different expertise, and that their knowledge and understanding of the community was a crucial perspective. Members of the C&C team also served as proposal reviewers.

A review matrix that mirrored the RFP sections was created. Each section was originally rated using the NIH rating scale (1-9), though this proved to be challenging for reviewers who were not familiar with the NIH model. In the final round, the matrix was changed so that each of the sections was broken down into key criteria, which were rated on a 1-3 scale, with qualitative descriptions (appendix 1). In both versions of the matrix, the “Partners” and “Approach” sections were weighted more heavily than “Background” or “Impact”; this reflected the priorities on the authenticity of the partnership and the likelihood of producing meaningful results.

Scores from community reviewers were weighed more heavily than scores from scientific reviewers. This weighting was done by averaging the scores from all the C&C Core reviewers into a single score, which was entered as a single rating alongside two to three (depending on the year and the number of proposals received) community reviewer scores per proposal. After all the proposals were scored, a review meeting was held to discuss all proposals falling within the top half of the score distribution, with both C&C team members and community reviewers present. The purpose of this meeting was to balance top numeric scores with other funding priorities, such as variation across geographic region, partner institution, and proposed health outcomes and social determinants of health. Although the research and community perspectives generally demonstrated relatively high concordance, there were a few times in which large discrepancies arose. For example, one study was evaluated scientifically as having good internal validity, but community reviewers felt it was not aligned with a community priority. In these cases, community perspectives were prioritized.

Post-Award Support and Monitoring

Once the first cycle of awards launched, one person from the C&C team was designated as a “program officer” for each awarded project, for a total of four program officers. The team soon discovered that multiple program officers and the lack of a clear oversight process added an extra layer of complication and reporting for the grantees rather than additional support. Later, with fewer projects to oversee, and a more robust grants management process in place, one person was designated as the program officer for all of each years' awardees. The current management process has much more transparency, with clear expectations for periodic contact and post-study reporting.

The community grants were projects expected to last one year. Initially, as a new CTSA, there was no way to know how much time regulatory approvals, ethical review, sub-contracts, and related procedures would require. It became clear that additional time was need between the notice of award and the start of the funding. Beginning in the third year, the timeline was reconstructed so that the entire application process started earlier, adding several months (post-notification but pre-implementation) to allow funded projects more time to complete the Human Subjects review process; however, this structure requires a substantial amount of planning phase work to be done without grant support. Consultations with the iTHRIV research quality manager helped to facilitate the subaward process. Even so, there was a significant learning curve for the C&C team in terms of ensuring that project teams were prepared to meet all regulatory requirements.

Discussion

The team learned substantial lessons throughout the iterative process, many of which were incorporated in the following iterations of the program. Key lessons are identified below, with practical recommendations:

1) The RFP should have very clear eligibility and expectations; in part, early confusion was due to the C&C team's own lack of clarity regarding the necessary parameters to meet program goals while adhering to broader iTHRIV priorities. Future programs are recommended to co-write or field test a draft RFP with potential grantees to assess necessary improvements for clarity.

2) It is important to be transparent up front about the amount of administrative burden required to receive an NIH grant and carefully assess, in collaboration with potential grantees, a funding amount that would motivate sufficient interest in undertaking the application.

3) Adequate and creative marketing of the RFP, both within the research institutions and with community partners, is of vital importance. Begin conversations early in the process, leveraging existing community engagement efforts and tracking all dissemination strategies, including which worked best to motivate applications.

4) Assigning one member of the C&C team as a program officer for all grantees, with clear expectations, proved to be very helpful to keep track of grantee progress and best assist them throughout their project implementation.

5) One year of funding may not be sufficient to carry out most human subjects research and related preparatory work. As this program was constrained to a 1-year funding cycle, our solution to address this was to standardize an extended length of time between award notification and project start date to accommodate potentially extensive IRB and related compliance procedures. However, expectations of substantial pre-award planning work may be a barrier to applicants, and where funding allows, longer program cycles may be preferable. Alternatively, consider offering a flexible start date within a pre-determined window to provide grantees a level of decision autonomy in how they allocate their pre-award preparations and activities launch.

This lesson was echoed in the work of Tendulkar et al (Tendulkar, 2011), who identified insufficient project time as a key barrier to project implementation. Their suggestion of 1-year long projects still proved to be a challenge for our grantees.

Conclusion

When asked what the most meaningful part of the process was, both community and research institution grantees mentioned the strong partnerships that they had created with each other, and the potential for future collaborative work. This was one of the intended goals of this process. Some grantees have published on their findings and have subsequently applied to larger funding streams to continue the research and the partnership. The next step for the C&C team is to design an evaluation tool that rigorously captures the complexity and variety of outcomes from Community Grants. The goal will be to continue to enhance work with willing community partners to co-create research by focusing on community needs and offering more direct assistance such as access to data, data analysis, and data visualization services. Moving forward, the C&C team will continue to engage the community through this proposed work, with a specific goal of building, strengthening and sustaining relationships.

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Appendix I. Review Matrix

For each row, choose the statement that is most applicable and enter the score (0-3) in column G.		0 (not addressed, or not addressed appropriately)	1 (addressed, but poorly)	2 (addressed adequately well)	3 (addressed exceptionally well)	**Assign score (0-3) HERE**	Notes
Background and significance	A	Health problem not described	Health problem described, but unclear or not relevant to community	Clearly defined health problem or social determinant of health	Clearly defined and relevant health problem or social determinant of health		
	B	No community involvement in research question	Limited community involvement in research question	Some community involvement in determining research question	Community highly involved in determining research question		
	C	No community health assessment used	Local data used to determine question, but not a community health assessment	Appropriate community health assessment used, but description is lacking	Appropriate community health assessment used, clear description of how it was used		
Partners and previous related work	A	PIs have no community-engaged research experience	PIs have limited community-engaged research experience	PIs have some community-engaged research experience	PIs have extensive community-engaged research experience		
	B	Expertise not relevant, probably cannot implement project	Somewhat relevant expertise, uncertain if team is able to implement project	Relevant expertise, team can probably implement project	Relevant expertise, team is clearly able to implement project		
	C	Partnership very unlikely to be sustainable	Partnership unlikely to be sustainable	Partnership likely to be sustainable	Partnership very likely to be sustainable		
	D	Partnership is not really a community partnership	Partnership is very new or not clearly supported	Genuine partnership with clear support, may be newer	Genuine, established partnership with clear support		
Approach	A	Method or intervention is not appropriate, feasible or realistic	Significant changes required for method or intervention to be appropriate, feasible or realistic	Method or intervention is appropriate, feasible and realistic, a few minor changes suggested	Method or intervention is clearly appropriate feasible and realistic		
	B	Budget and timeline are not justified or realistic, major changes required	Budget and timeline are not justified or realistic, a few changes required	Budget and timeline are justified and realistic, a few minor changes suggested	Budget and timeline are justified and realistic		
	C	Outcome measures are not relevant	Outcome measures are relevant, but some measures may be missing	Outcome measures are relevant and comprehensive	Outcome measures are validated, relevant, and justified		
	D	Possible challenges or barriers to project are not addressed	Possible challenges or barriers to project are partially addressed	Possible challenges or barriers to project are addressed	Possible challenges or barriers to project are well addressed and minimal		
	E	Research question does not address a significant health concern	Research question addresses a significant health concern but does not address a gap in knowledge	Research question addresses a significant health concern and addresses a gap in knowledge	Research question is innovative, addresses a significant health concern and addresses gap in knowledge		
Impact	A	Does not include dissemination plan	Includes dissemination plan, but the plan is not clearly outlined	Includes a clear and appropriate dissemination plan	Includes a very clear, appropriate and comprehensive dissemination plan		
	B	Does not include plans for pursuing future funding, research collaborations, or sustaining the partnership	Includes vague plans for pursuing future funding, research collaborations, or sustaining the partnership	Includes clear future plans for funding, research collaborations, or sustaining the partnership but could be more comprehensive	Includes clear and comprehensive plans for pursuing future funding, research collaborations, or sustaining the partnership		
	C	Benefits for research participant community are not described	Benefits for research participant community are few and not clearly described	Benefits for research participant community are clear and well described	Benefits for research participant community are clear, robust and well described		
					TOTAL	**0**	

Predictors of Lung Cancer Screening Recommendation in Virginia Using the Community Health Assessment Survey

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Abstract

Purpose: The purpose of this analysis was to determine the factors that may influence the probability of being recommended a lung cancer screening by a health professional in Virginia.

Methods: Data were obtained from the Community Health Assessment Survey conducted by the University of Virginia (UVA) Health System and Cancer System in collaboration with Virginia Commonwealth University (VCU) Cancer Center. SAS software was used to conduct a logistic regression with the following variables: age, sex, race, current smoking status, cancer history, education level, income level, insurance, and rurality.

Results: Statistically significant positive predictors included being a current smoker (OR: 3.504, CI: 1.576 - 7.794), having previous cancer history (OR: 2.159, CI: 1.090 - 4.278), and living in an urban environment (OR: 1.939, CI: 1.009 - 3.724).

Conclusion: Smoking, cancer history, and rurality were considered significant predictors of lung cancer screening recommendations by a health professional in Virginia while age, sex, race, education level, income level, and insurance were not considered significant predictors in this model. This study suggests that key mechanisms underlying lung cancer outcome disparities among racial minorities and socioeconomically disadvantaged groups may lie beyond the level of screening recommendations. Further research investigating when along the disease progression these disparities tend to arise could help in creating more targeted public health interventions and improving health equity.

Background

Lung cancer is a significant problem in the U.S., ranking third in prevalence and first in deaths among all forms of cancer (Centers for Disease Control and Prevention [CDC], 2022a). Recommending lung cancer screenings in appropriate situations is an important tool to identify cases of lung cancer and initiate appropriate treatment. The U.S. Preventive Services Task Force (USPSTF) guidelines endorse annual lung cancer screening for individuals who meet all the following criteria: (a) between 50 and

80 years old, (b) smoking history of at least 20-pack years, and (c) currently smoke or have previously smoked within the past 15 years (2021). Three major risk factors arise when considering susceptibility for lung cancer: smoking, radon exposure, and family history.

Smoking

Smoking constitutes the greatest risk factor for lung cancer with up to 90% of lung cancer deaths in the U.S. being attributed to cigarette smoking (CDC, 2022b). A smoker has up to a 30-fold risk of developing or dying from lung cancer compared to a non-smoker (CDC, 2022b). Smoking exerts deleterious effects on non-smokers as well, as a quarter of non-smokers experienced secondhand smoke exposure between 2013 and 2014 (CDC, 2022b). Since smoking rates also vary by various factors such as income status, disability status, sexual orientation, and education level (Jamal et al., 2018), the disproportionate distribution of smoking rates among the U.S. population may be a contributing factor to the disproportionate distribution of lung cancer diagnoses among the same. Due to its direct and severe association with lung cancer, smoking represents a significant public health concern.

Radon exposure

The second most common risk factor of lung cancer in the U.S. after smoking is radon exposure, resulting in roughly 21,000 deaths annually (United States Environmental Protection Agency [EPA], 2023). While current public health recommendations encourage testing in homes, nearly 7% of U.S. homes have radon levels that exceed safe limits (EPA, 2023). While this may not seem like a large portion of U.S. homes, the strong association between radon exposure and lung cancer underlines the need to tackle this problem.

Family History

An individual with first-degree relatives who have lung cancer is at a higher risk of developing lung cancer themselves, compared to an individual who does not have any first-degree relatives with lung cancer (CDC, 2022b). Certain genetic regions have been associated with an increased risk of developing lung cancer (Schwartz & Cote, 2015). In addition to genetic factors, socioeconomic determinants of health may also explain some of the association between lung cancer and family history. Numerous models of socioeconomic determinants of health emphasize the role of the family in shaping an individual's health behaviors as they mature (Ramos–Morcillo et al., 2019). For instance, adolescents with parents who smoke are more likely to be smokers compared to adolescents with parents who do not smoke (Alves et al., 2022). The environment a family shares can also be a risk factor. A common factor between an individual and their first-degree relative with lung cancer may be living together in housing with elevated radon levels (CDC, 2022b). In this case, the same risk factor that resulted in lung cancer for the first-degree relative exists for others who live with them.

Lung cancer screening allows healthcare providers to discover lung cancer before it progresses to later stages that are more difficult to treat (CDC, 2022c1). Screening tests for lung cancer include low-dose computed tomography (LDCT), chest x-rays, and sputum cytology (PDQ Screening and Prevention Editorial Board, 2021). The first two screening methods expose patients to radiation, a risk factor for cancer. For low-risk patients, the health risks of radiation outweigh the benefits of lung cancer screening (PDQ Screening and Prevention Editorial Board, 2021).

Treatment options for patients who screen positive include surgery, chemotherapy, and radiation therapy (CDC, 2022c1).

There is much health inequity associated with lung cancer in the U.S., such as racial and socioeconomic disparities (Borondy Kitts, 2019). The lung cancer mortality rate is highest among African Americans, even though smoking rates do not significantly differ between the African American and White populations (Borondy Kitts, 2019). One contributing factor could be that African Americans are "diagnosed at a statistically significant later stage (III/IV versus I/II) than Whites for all insurance types, with the exception of Medicaid" (Efird et al., 2014). Potential reasons for this difference include socioeconomic disparities and lack of trust with healthcare providers (Borondy Kitts, 2019). Distrust of the healthcare system has further been suggested as a barrier to lung cancer screening (Carter-Harris et al., 2015). One study at a safety net hospital demonstrated lower lung cancer screening rates for African Americans compared to other races (Steiling et al., 2020). Thus, healthcare system distrust may contribute to both lower screening rates and later-stage diagnoses for African American populations.

A lower household income level and government-based health insurance is also associated with lower rates of lung cancer screening, with lack of awareness cited as a possible explanation (Carter-Harris et al., 2018; Sosa et al., 2021). Among patients referred for lung cancer screening, a lower education level is associated with decreased understanding of the rationale behind this referral (Hall et al., 2018). This decreased understanding could result in reduced lung cancer screening rates among this population, although further research is needed to clarify the role of education in lung cancer screening (Sosa et al., 2021). While research affirms that lung cancer disproportionately affects racial minorities and socioeconomically disadvantaged individuals, results are mixed when comparing urban, suburban, and rural areas. Residents of urban areas tended to have less awareness of lung cancer screening, but were more likely to have undergone LDCT screening for lung cancer compared to their suburban and rural counterparts (Carter-Harris et al., 2018). Future investigations in this area could help define the association between rurality and lung cancer screening.

The aim of this study is to model the probability of being recommended a lung cancer test by a health professional in Virginia based on the variables of age, sex, race, current smoking status, cancer history, education level, income level, insurance, and rurality. Findings can provide insight into healthcare outcome disparities between racial and socioeconomic groups.

Methods

Data were obtained from the Community Health Assessment Survey conducted by the University of Virginia (UVA) Health System and Cancer System in collaboration with Virginia Commonwealth University (VCU) Cancer Center (UVA Cancer Center, n.d.). Collaboration between these two systems allowed for combining the catchment areas of each institution to cover most of Virginia. Counties that were not included in either catchment area were separately sampled to ensure all of Virginia was represented (Appendix A). The survey results are intended to be analyzed by the UVA Cancer System and Health System to adapt current programs to the specific needs of their patients (UVA Cancer Center, n.d.). IRB approvals were obtained at UVA and VCU and a data use agreement (DUA) was executed to share data between these institutions.

The outcome of interest was receipt of recommendation of lung cancer screening by a health professional. Respondents were queried using a single item: “Has a doctor or other health professional EVER advised you to have a test to check for lung cancer? This would involve a scan of the lungs that produces pictures to look for lung cancer.” Response options included “Yes” or “No”. The target age demographic for this study is individuals aged 50-80, since this is the target age range for lung cancer screenings as recommended by the USTSPF (2021). However, there was no data category to isolate individuals below the age of 80, so individuals aged 50 and up (50+) were included in this study. The 50+ age demographic constituted 960 out of the 1496 survey responses. Variables for age, sex, race, current smoking status, past cancer status, income level, rurality, and being recommended a lung cancer screening were dichotomized. The American Cancer Society reports lung cancer diagnoses occur predominantly among those aged 65 years or older (2023). Accordingly, respondents’ age was categorized as either 50-65 or 65+. Because the dataset did not include smoking history, respondents were classified based on their responses to the survey question, “How often do you now smoke cigarettes?” Participants who responded that they smoked either every day or some days were categorized as current smokers, while those who responded they do not currently smoke at all were categorized as current non-smokers. The past cancer status item asked if respondents had previously been diagnosed with cancer and did not distinguish between types of cancer. Income level was split into two levels with an attempt to categorize each level as above or below the poverty limit. In 2021, the poverty threshold in Virginia was $17,420 for a 2-person household and $21,960 for a 3-person household (Office of the Assistant Secretary for Planning and Evaluation, 2021). The average household size in Virginia between 2017 and 2021 was 2.57 (United States Census Bureau, 2022). An attempt was made to select a value collected in survey responses that fell between the two aforementioned poverty thresholds. The $20,000 threshold was the closest approximation. Those with a household combined annual income below this threshold were considered below the poverty level, while those above were considered above the poverty level.

Education was split into 3 different levels: High school or less, some college or post-high school training, and college graduate or higher. Insurance status also utilized 3 levels: Employer-based or self-purchased plan; Medicare, Medicaid, or another state program, and other (TRICARE, VA, Military, Alaska Native, Indian Health Service, Tribal Health Services, “Some other source,” or no healthcare coverage). SAS software was utilized to create a model using logistic regression.

Results

Table 1. Demographic Characteristics of Study Participants

Characteristic	Percent	95% Confidence Interval
Age (n = 960)		
50-65	49.69%	46.48% - 52.90%
65+	50.31%	47.10% - 53.52%
Sex (n = 960)		

Male	50.21%	47.00% - 53.42%
Female	49.79%	46.58% - 53.00%
Race (n = 960)		
Black	10.83%	8.94% - 12.97%
Non-black	89.17%	87.03% - 91.06%
Current smoking status (n = 442)		
Smoker	19.68%	16.08% - 23.70%
Non-smoker	80.32%	76.30% - 83.92%
Ever had cancer (n = 943)		
Yes	27.15%	24.33% - 30.11%
No	72.85%	69.89% - 75.67%
Education level (n = 924)		
College Graduate or Higher	50.22%	46.94% - 53.49%
Some College or Post-High School Training	26.30%	23.49% - 29.96%
High School or Less	23.48%	20.79% - 26.35%
Income Level (n = 769)		
$<20,000	12.22%	9.99% - 14.75%
$≥20,000	87.78%	85.25% - 90.01%
Insurance Status (n = 877)		
Employer/Self	43.10%	39.79% - 46.45%
Medicare/Medicaid/State Program	47.89%	44.54% - 51.26%
Other	9.01%	7.20% - 11.10%
Rurality (n = 960)		
Urban	36.88%	33.82% - 40.02%
Non-urban	63.13%	59.98% - 66.18%
Been Recommended Lung Cancer Screening (n = 919)		
Yes	12.73%	10.64% - 15.06%
No	87.27%	84.94% - 89.36%

Table 1 shows the distribution of demographic characteristics of study participants. Because of the substantial number of respondents, confidence intervals estimating the corresponding population proportion could be calculated for each parameter (Boston University School of Public Health, 2017). Among those over the age of 50, 49.69% were in the 50-65 age range, while 50.31% were in the 65+ age range. Sex distribution in the study population did not significantly differ, with 50.21% being male and 49.79% being female. As for race, 10.83% of the study population was classified as "Black" and 89.17% was classified as "Non-Black." Current smokers constituted 19.68% of the study population while current non-smokers constituted 80.32%. In addition, 27.15% of the participants in the study had previously been diagnosed with cancer. With regard to education level, the majority of participants (50.22%) were college graduates or higher. The amount with some college/post-high school training (26.30%) or high school education or less (23.48%) were similar. In terms of income level, 12.22% of participants fell in the $0 - $19,999 range while 87.78% were in the $20,000+ group. Lastly, employer-based and self-purchased insurance comprised 43.10% of the study population. Medicare, Medicaid, and other state programs made up 47.89%, while "Other" made up the remaining 9.01%. Rurality was designated based on the 2013 U.S. Department of Agriculture Rural-Urban Continuum Codes (2020). Of the study participants, 36.88% live in an urban environment while 63.13% live in a non-urban environment. 919 individuals reported if they had been recommended a lung cancer test by a health professional, with 12.73% reporting they had and 87.27% reporting they had not.

All variance inflation factors of the tested variables were less than 5, indicating no multicollinearity between independent variables (Kim, 2019). A correlation matrix shows the highest correlation exists between education and income with a Pearson Correlation Coefficient of 0.51395 (Appendix B). When education was excluded in the regression model, goodness-of-fit only changed from an AIC of 299.411 to 300.831. However, when income was excluded, goodness-of-fit was worsened with an AIC increase to 360.493. Thus, a regression model excluding education was chosen to increase model parsimoniousness while preserving goodness-of-fit (Portet, 2020).

Table 2. Logistic Regression Model of Being Recommended a Lung Cancer Test Based on Age, Sex, Race, Current Smoking Status, Cancer History, Education, Income, and Insurance, and Rurality (n = 288)

	Model 1: Including Education		**Model 2: Excluding Education**	
Parameter	**Estimate**	**Odds Ratio**	**Estimate**	**Odds Ratio**
Intercept	**-2.0408 **** (0.7200)		**-1.9846 **** (0.6939)	
Age 50-65 Ref = 65+	-0.6489 (0.4646)	0.523 (0.209 – 1.304)	-0.6716 (0.4684)	0.511 (0.203 – 1.284)

Female	-0.5314 (0.3471)	0.588 (0.297 - 1.164)	-0.5525 (0.3372)	0.575 (0.296 – 1.117)
Ref = Male				
Black	0.4333 (0.4663)	1.542 (0.616 – 3.861)	0.4216 (0.4557)	1.524 (0.622 – 3.738)
Ref = Non-black				
Current smoker	**1.2540** ** (0.4061)	3.504 (1.576 – 7.794)	**1.2493** ** (0.3988)	3.488 (1.591 - 7.646)
Ref = No				
Ever Had Cancer	**0.7882** * (0.3606)	2.199 (1.082 - 4.472)	**0.7699** * (0.3473)	2.159 (1.090- 4.278)
Ref = No				
Education				
College Graduate or Higher	0.1399 (0.4109)	1.150 (0.512 - 2.582)		
Some College or Post-High School Training	-0.0546 (0.4430)	0.947 (0.396 - 2.265)		
Ref = High School or Less				
Income				
≥$20,000	-0.0391 (0.4358)	0.962 (0.408 – 2.267)	-0.0130 (0.4129)	0.987 (0.438 – 2.225)
Ref = <$20,000				
Insurance				
Medicare/Medicaid/State Program	0.4356 (0.4830)	1.546 (0.597 – 4.000)	0.4054 (0.4835)	1.500 (0.579 - 3.885)
Other	0.8656 (0.5616)	2.376 (0.787 – 7.178)	0.7785 (0.5481)	2.178 (0.741 - 6.406)
Ref = Employer-based or self-purchased				
Rurality				
Urban	0.6491 (0.3370)	1.914 (0.986 - 3.715)	**0.6620** * (0.3317)	1.939 (1.009 - 3.724)
Ref = Non-urban				

* = statistically significant result at $p < 0.05$, ** = statistically significant result at $p < 0.01$

Table 2 shows the results of a logistic regression modeling the probability of participants being recommended a lung cancer test based on the variables of sex, race, current smoking status, previous cancer status, education level, income level, insurance status, and rurality. While there were 919 responses for being recommended a lung cancer test or not, 288 data points were used for the logistic regression as all variables were not answered for all individuals. Specifically, many individuals did not disclose their current smoking status, as only 415 of the aforementioned 919 individuals provided this information. Statistically significant positive predictors included being a current smoker (OR: 3.504, CI: 1.576 – 7.794), having previous cancer history (OR: 2.159, CI: 1.090- 4.278), and living in an urban environment (OR: 1.939, CI: 1.009 - 3.724).

Discussion

The logistic regression suggests there are numerous factors that influence how likely one is to be recommended a lung cancer test. While differences in healthcare experiences are expected due to the unique circumstances of each patient, some differences could be indicative of certain disparities that may pervade the medical field. Age, sex, race, education, and income were not considered significant predictors in this model while current smoking status, previous cancer history, and rurality were considered significant predictors.

Current Smoking Status

The odds that an individual who had been recommended a lung cancer test was a current smoker was 3.488 (CI: 1.591 - 7.646) times greater than the odds that the individual was not a current smoker. Smoking is a well-defined risk factor for lung cancer, so it is appropriate that it is associated with being recommended a lung cancer test (CDC, 2022b). This study could only assess current smoking status and not history of smoking. However, smoking history is a significant criterion for being recommended a lung cancer test (USPSTF, 2021), so individuals who were recommended a lung cancer test and were not current smokers likely have smoking history. Nonetheless, smoking history in pack-years was not collected in the survey and would be a valuable addition to future analyses. Including medical record data on smoking history is one avenue to accomplish this. Notably, less than half of patient visits are accompanied by adequate documentation of smoking history (Volk et al., 2020). Respondents' self-reported smoking status in this survey might not correspond with the smoking status listed in their medical records. In turn, healthcare providers that rely on medical records may not have complete patient data when assessing lung cancer risk. Analyzing smoking history from patient medical records as well as self-reported smoking status could bridge this disconnect. Furthermore, only 415 out of 919 respondents chose to disclose their current smoking status, indicating many people could be uncomfortable providing this information. Patients who smoke frequently face stigma, especially when they are concurrently diagnosed with lung cancer (Williamson et al., 2020). In fact, one study of lung cancer patients reports that patients "who currently smoked reported significantly higher total, internalized, and perceived lung cancer stigma compared to those who formerly or never smoked" (Williamson et al., 2020). Such stigma could be a contributing factor why some respondents feel uncomfortable disclosing their smoking history, although this may be mitigated by the confidential nature of the survey. Non-response bias is a concern and those who responded to this survey item might not be a fully representative sample for smoking status.

Previous Cancer History

The odds that an individual who had been recommended a lung cancer test had previously had cancer was 2.159 (CI: 1.090-4.278) times greater than the odds that the individual had not previously had cancer. Presumably, healthcare providers who learn of a patient's history of cancer are more likely to consider the potential for cancer and recommend a lung cancer test. This is clinically advantageous as multiple studies of cancer survivors indicate lung cancer screening is beneficial for these patients (O'Dwyer et al., 2021). Therefore, a patient's cancer history should not deter healthcare providers from recommending lung cancer screening when appropriate as this recommendation can appreciably promote patient health. It is important to note that survey responses in this dataset did not distinguish between types of cancer. History of certain types of cancer may influence health professionals to be concerned for lung cancer more so than others.

Rurality

The odds that an individual who had been recommended a lung cancer test lived in an urban environment was 1.939 (CI: 1.009 – 3.724) times the odds that the individual lived in a non-urban environment. As previously noted, urban residents may be less aware of lung cancer screening compared to non-urban residents but are more likely to have completed such screenings (Carter-Harris et al., 2018). These results indicate that one reason urban residents may be more likely to have completed a lung cancer screening is that they are recommended them at higher rates. In urban environments, emphasis should be placed on raising awareness of lung cancer screenings. On the other hand, non-urban environments may benefit more from efforts aimed towards health professionals and departments to recommend lung cancer screenings when appropriate. Importantly, rurality was only considered a significant predictor when education was excluded in the regression model. Conclusions regarding this variable should be drawn with caution. Still, these results should encourage future studies to consider how lung cancer recommendations may differ between urban and non-urban areas.

Non-Significant Predictors

The non-significance of certain predictors should also be discussed, as they represent interesting findings in terms of health equity. While it would be tempting to conclude that healthcare disparities in lung cancer screening do not exist in the spheres of age, race, and socioeconomic status, that is unfortunately not the case. These results provide insight into how these disparities may manifest in our healthcare system.

Although groups such as African Americans experience a disproportionately high rate of lung cancer mortality (Borondy Kitts, 2019), these results reveal such differences may not predominate at the step of lung cancer screening recommendations. The mechanism advancing these disparities may lie further in the pathway of disease progression. Indeed, these results should be analyzed in the context of existing literature which has demonstrated that the rate of lung cancer screening is lower among African Americans (Steiling et al., 2020) but does not examine lung cancer screening recommendation rates. Rather than these health inequities arising at the screening recommendation step, it seems they become significant at the actual screening step or even later steps such as diagnosis, treatment, or recovery. Investigating the specific barriers of undergoing a lung cancer screening after being recommended one can help address this inequity. Moreover, identifying the steps in disease progression that are affected most deeply by racial biases could help elucidate additional reasons explaining these health disparities.

Lower income levels, as well as Medicare/Medicaid/State Program or Other insurance, were not significant predictors of lung cancer screening recommendations, even though these populations tend to be associated with lower lung cancer screening rates (Carter-Harris et al., 2018; Sosa et al., 2021). As with the aforementioned racial disparities, an explanation is that lung cancer screening recommendations do not always translate to the patient undergoing the screening. Socioeconomically disadvantaged individuals face a myriad of healthcare barriers, such as lack of transportation, funds, or social support, that can prevent them from completing lung cancer screening even if recommended at rates comparable to the rest of the population (Sosa et al., 2021).

Additional limitations of this study include uneven distribution of participants with regard to income level, education status, and insurance status. The majority of participants had a household combined annual income of more than $20,000 and a college degree or higher. Thus, this study may not accurately capture the situations of those living in lower socioeconomic strata. Many study participants chose not to answer all survey questions, such as current smoking status. Incorporating medical record data for smoking status could mitigate this non-response bias while concurrently acknowledging that health professionals base much of their clinical decision-making regarding smoking history on patients' medical records (Volk et al., 2020). Lastly, another avenue for expanding on this research is assessing other strong risk factors of lung cancer, such as radon exposure and family history of lung cancer (CDC, 2022b).

Conclusion

This study identified that being an active smoker, having a personal cancer history, and living in an urban environment are associated with higher odds of being recommended a lung cancer screening by a health professional in Virginia. The non-significance of racial and socioeconomic predictors suggests that key mechanisms underlying lung cancer outcome disparities for these populations may lie beyond the level of screening recommendations. Future studies should investigate where healthcare disparities predominantly arise along the continuum of disease progression, such as during treatment or recovery. Such information could guide public health officials in designing targeted interventions to improve health equity.

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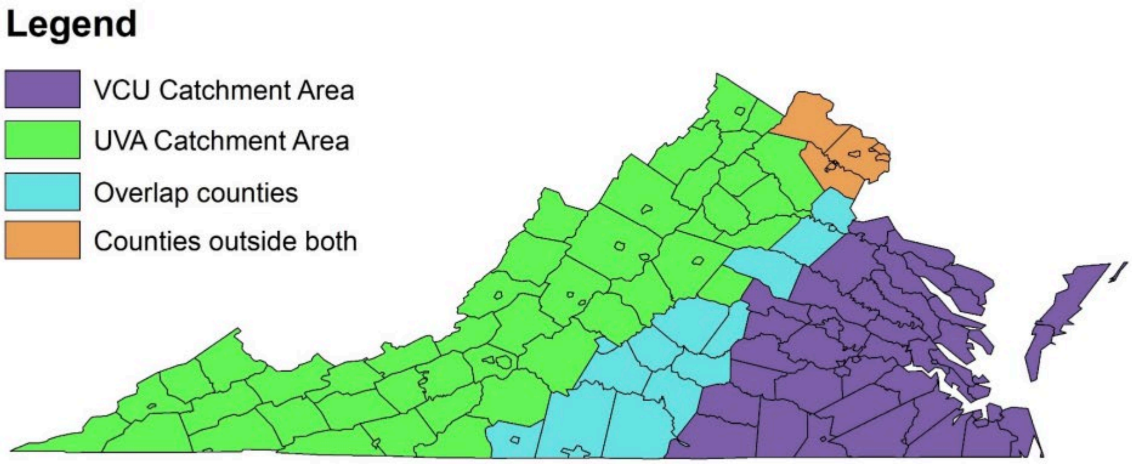
Appendix A: Catchment Areas by University



Appendix B. Correlation Matrix

	Age	Sex	Race	Smoking Status	Cancer History	Education	Income	Insurance	Rurality
Age		-0.06039	-0.07591	0.15913	0.20492	-0.02124	-0.15947	0.27841	0.02545
Sex	0.06039		0.06178	0.00214	-0.02797	-0.05512	-0.23882	-0.01834	0.08955
Race	-0.07591	0.06178		-0.15088	-0.04558	-0.14091		0.02146	-0.13442
Smoking Status	0.15913	0.00214	-0.15088		-0.05332	0.20124	0.22685	-0.05866	0.12630
Cancer History	0.20492	-0.02797	-0.04558	-0.05332		0.00514	-0.00916	0.04224	0.04214
Education	-0.02124	-0.05512	-0.14091	0.20124	0.00514		0.51395	-0.17482	0.05304
Income	-0.15947	-0.23882	-0.20883	0.22685	-0.00916	0.51395		-0.30633	0.02344
Insurance	0.27841	-0.01834	0.02146	-0.05866	0.04224	-0.17482	-0.30633		0.03158
Rurality	0.02545	0.08955	-0.13442	0.12630	0.04214	0.05304	0.02344	0.03158	

Virginia Refugee's Access to COVID-19 Health Information

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Abstract

Background: This study examined how refugees in central Virginia, United States were able to access public health information about COVID-19 and any barriers to following COVID-19 prevention guidelines.

Methods: Individual interviews were conducted with refugees (n = 40) attending a family medicine clinic serving refugees and immigrants. Participants answered questions about their primary methods of obtaining COVID-19 and COVID-19 vaccine information, how they prefer to receive this information, information given by employers, precautions taken at their place of work, and current vaccination status.

Results: We found that television and social media played a large role for refugees in obtaining COVID-19 information. Participants noted they preferred in-person visits and phone calls to communicate with their healthcare providers, who were important for disseminating vaccine information.

Discussion: This is one of the first studies to explore how refugees obtain health information related to COVID-19 and the vaccine, and provides valuable information as vaccination outreach continues in light of new viral strains and increased need for booster vaccinations. Conclusion: The results of this study can guide development of health communication materials to engage refugee communities as the COVID-19 pandemic evolves and responses to it.

Introduction

The severe acute respiratory syndrome 2 virus (SARS-CoV-2) has caused a global pandemic, as recognized by the World Health Organization (WHO) in March 2020 (World Health Organization, 2020). As of January 10, 2022, the COVID-19 virus had infected over 300 million people and caused nearly 5.5 million deaths globally (World Health Organization, 2022). Refugees, in particular, are vulnerable to health and economic problems during the pandemic due to their living and working conditions (Kluge et al., 2020). Additionally, they face financial, linguistic, administrative, and legal barriers in accessing the host country's health system (Hintermeier et al., 2021). If communities are to be kept safe and healthy, the refugee population must be considered in the response measures undertaken to fight the pandemic.

The general population appears to have good knowledge about the mode of transmission and general symptoms of COVID-19, but there are some misconceptions about how to prevent infection (Geldsetzer, 2020). These misconceptions could be exaggerated in refugee populations given their cultural and linguistic barriers. Furthermore, a global study revealed that there is a significant number of individuals who question accepting the COVID-19 vaccines (Mannan and Farhana, 2020). While some studies have investigated vaccine attitudes among migrant groups, literature is lacking about refugee perceptions on the COVID-19 vaccines (Crawshaw et al., 2021).

Given the widescale impact of the

COVID-19 pandemic, the hardships faced by refugees and the lack of information surrounding their experience during the pandemic, the goal of this study is to understand how refugees access health information, what kind of barriers they face in following COVID-19 prevention protocols, and to understand vaccination efforts in the refugee population. This information will help us to better engage the refugee community with public health efforts and fight the pandemic.

Methods

Potential study participants were recruited through the University of Virginia International Family Medicine Clinic (IFMC), which provides healthcare to the refugee and special immigrant visa (SIV) populations in the central Virginia region (Elmore et al., 2019). Criteria for study participation included refugee or SIV status (hereafter called refugee) and age of 18 years and older. Purposive sampling was used to diversify participant demographics across gender and country of origin to ensure that a variety of experiences were incorporated. This information was obtained by reviewing charts of patients on the clinic schedule each day. We aimed for a sample of 40 patients based on the average number of patients seen each week during the data collection period, and assuming a 50% participation rate. A medical student (KP) attended the IFMC sessions during June 2021 and approached potential study participants while they waited for their appointment or at the conclusion of their appointment. The potential study participants were informed about the overall nature of the study, that no identifiable information would be documented, and that they would receive $25 in the form of a grocery store gift card for completing the study. If interested, the participants could complete the interview in the clinic or schedule a phone call for a later time. Professional interpreters through a telephone interpreting system were used to communicate with participants with limited English proficiency.

The interviews were conducted using a script partially based on a guide provided by the Society of Refugee Healthcare Providers (Society of Refugee Healthcare Providers, 2020). Each interview lasted approximately 20 minutes and elicited how participants accessed information about COVID-19, barriers to following COVID-19 protocols, COVID-19 vaccination status, and demographic information such as age, gender, country of origin, language in which the interview was conducted, level of education, number of years in the US, and employment status. No identifying information was collected.

Descriptive analysis, including frequencies, was performed on the responses from the closed-ended questions using SPSS. Responses to open-ended questions were grouped into thematic categories based on similarities as determined by the primary author. Categories were then confirmed or adjusted based on the remaining authors' suggestions. Frequencies for each category were obtained. This study was approved by the Institutional Review Board for Health Sciences Research (IRB-HSR) at the University of Virginia (UVA).

Results

Of the 48 patients asked to participate in the study, 40 patients consented and completed the study (83% participation rate). The remaining 8 patients either declined to participate in the study or failed to complete the interview. A majority of the study participants were female (62%) and born in the Middle East (52%), South/Southeast Asia (30%), and Africa (10%). The social and demographic characteristics of the 40 participants are displayed in Table 1.

Table 1. Social Demographics of Participants

Demographic Variable	*N*	*%*
Age		
18-24	2	5.00
25-49	26	65.00
50+	12	30.00
Gender		
Male	15	38.00
Female	25	62.00
Birth Country		
Afghanistan	10	25.00
Bhutan	5	12.50
Burma	3	7.50
Colombia	1	2.50
Democratic Republic of Congo	3	7.50
Iran	1	2.50
Iraq	4	10.00
Nepal	2	5.00
Pakistan	1	2.50
Palestine	1	2.50
Russia	2	5.00
Somalia	1	2.50
Syria	5	12.50
Tibet	1	2.50
Years in the US		
2-4	12	30.00
5-9	16	40.00
10+	12	30.00
Level of Education		
None/Elementary School	6	15.00
Middle School	3	7.50
High School	20	50.00
College	11	27.50
Employment Status		
Employed	20	50.00
Unemployed	20	50.00
Language Used for Interview		
English	15	38.00
Non-English	25	62.00

Health Information

Before the pandemic, 90% of participants communicated with their healthcare providers through in-person clinic visits and approximately 40% used the phone. Less than 15% of respondents used the electronic patient portal or email, or did not communicate with their provider at all (Table 2). TV played an important role for refugees in acquiring information during the pandemic, with 68% of refugees using it to learn about COVID-19 and 56% using it to learn about the COVID-19 vaccines. Other major avenues for accessing information about COVID-19 included social media platforms (44%) such as Facebook, WhatsApp, Instagram, or YouTube, the Internet (34%), healthcare providers (32%) and friends (24%). Healthcare providers (46%) were the second major source for acquiring COVID-19 vaccine information; the majority (56%) of respondents preferred receiving this information in person at the clinic and 44% preferred a phone call (Table 2).

Workplace and COVID-19 Information

Of all the participants who were working during the pandemic (n=33), more than 95% were informed by their employers about masks, handwashing, social distancing, and when to quarantine; 82% of participants stated their workplaces provided vaccine information and 76% said they were provided with COVID-19 testing information (Table 2). More than 90% of participants' workplaces implemented prevention measures such as requiring and providing masks, enforcing disinfection policies, and contact tracing to keep workers safe. Over half (59%) of workplaces required temperature checks and 47% required their employees to quarantine if they were exposed to COVID-19 or were sick. Approximately half (52%) of participants stated they had paid time off if they needed to quarantine. The rest of the participants did not have paid time off or were unsure about their employer's policy regarding paid time off (Table 2).

Table 2. Methods and preferences for receiving information about COVID-19

Before COVID-19 pandemic, how did you communicate with healthcare provider?		
Clinic Visits	37	90.0
Phone	16	39.0
Electronic patient portal	5	12.0
No Communication	1	2.4
How did participants access COVID-19 information?		
TV	28	68.0
Social Media	18	44.0
Internet	14	34.0
Healthcare Providers	13	32.0
Friends	10	24.0
Family	7	17.0
Work	7	17.0
Health Department	3	7.3
How did participants access COVID-19 vaccine information?		
TV	23	56.0
Healthcare Providers	19	46.0
Internet	5	12.0
Family	6	15.0
Social Media	6	14.4
Friends	5	12.0
Work	5	12.0
How do participants prefer to receive COVID-19 vaccination information from their providers?		
Clinic	23	56.0
Phone	18	44.0
Electronic patient portal	5	12.0
Letter	4	9.8
Email	1	2.4
What information did participants' workplaces provide?		
Masks	34	100.0
Social Distancing	34	100.0
When to Quarantine/Isolate	34	100.0
Handwashing	33	97.1
Vaccine Information	28	82.4
How to Get Tested	26	76.5
What measures did workplaces take to keep employees safe?		
Requiring Masks	33	97.1
Enforcing Disinfecting/Cleaning Policies	33	97.1
Contact Tracing	32	94.2
Providing Masks	31	91.2
PTO if Quarantine/Isolation Needed	18	52.9
Temperature Checks	20	58.8
Mandatory Quarantine if Exposed/Sick	16	47.1

Vaccination Status and Perception

Vaccination rates were high among study participants (85%) and of the six unvaccinated participants, four patients stated they were planning on getting vaccinated soon. One participant said she did not plan on getting vaccinated because a previous procedure had an unfavorable outcome and made her feel uncomfortable about getting the vaccine. She also cited allergies as a reason for not getting the vaccine. The other participant who was not planning on getting vaccinated stated that neither she nor anyone she knew had been infected with COVID-19, so she did not feel an immediate need to get the vaccine. Of the patients who were vaccinated, safety was cited as the major reason for getting vaccinated in most cases. Almost three-quarters (71%) of participants chose to get vaccinated for personal safety reasons and 18% decided to get vaccinated out of concern for family and/or friends (Table 3).

Table 3. Reasons why participants received the COVID-19 vaccine

	N	%
Personal Safety	24	70.59
Others' Safety	6	17.65
Healthcare Provider Recommendation	4	11.76
Social Norm	4	11.76
Return to Normalcy	3	8.82
Work Requirement	2	5.88

Discussion

To our knowledge, this is the first study that investigated refugees' experiences in gaining COVID-19 information during the COVID-19 pandemic. In addition, we examined refugees' communication channels with healthcare providers, the role of their workplaces during the pandemic, and their vaccination rates and perceptions. We discuss all of these factors since they impact how refugees will act on the information they gain about COVID-19.

TV was a major source of information about COVID-19 and the COVID-19 vaccines among study participants. Previous challenges with television communication were identified during the H1N1 pandemic, including inconsistent messaging. Additionally, audio communication did not match the video footage and key messages about preventative measures were lost (Luth et al., 2013). For many refugees who use local and national news to gather information, there could be more confusion added due to language and cultural barriers when compared to the general population. Many refugees come from a collectivistic culture that differs starkly from general Western culture which places emphasis on individuality. Differences in culture also stem from factors such as religion, economic values, communication styles, importance of family, etc. Refugees usually find themselves attempting to balance their life according to both cultures, which can be difficult since sometimes the two cultures stand in opposition. Without considering these differences in cultures, important information can be lost or miscommunicated to refugees since these factors shape how they see the world and act in it.

While not explored in this study, other types of TV programming may offer better COVID-19 education for refugees. For example, a large literature supports the utility of telenovelas to provide health education in Spanish-speaking communities for a variety of health topics. Wilkin et al. (Wilkin et al., 2007)) demonstrated that following a breast cancer storyline in a telenovela, calls to national cancer hotlines increased, Spanish speaking viewers indicated they gained specific knowledge from the program, and Spanish speaking males were more likely to recommend women have a mammogram. Sharing information via short TV and film clips can particularly benefit those who have literacy barriers (Lee et al., 2013). This type of education, called entertainment education, (Singhal and Rogers, 2004)) is more common in low and middle income countries where media markets are less saturated; however, U.S. soap operas and drama series have included storylines about specific health conditions (e.g., HIV, HPV), which may be linked with short-term increases in health knowledge (Beck, 2004; Morgan et al., 2014; Wilkin et al., 2007). A key limitation of current entertainment education in the U.S. is that storylines are often not targeted to specific minority groups, limiting the diversity of viewership (Beacom and Newman, 2010)). Developing culturally appropriate entertainment education about COVID-19 and COVID-19 vaccines may be worth exploring in refugee communities.

Another major source of information for COVID-19 was social media, including Facebook, Instagram, WhatsApp, YouTube, Twitter, etc. Advantages of social media include immediate access and wide availability of information. For refugees, content can be more culturally and linguistically appropriate since the information generally comes through their social connections. However, the limitation is that the information may not be reliable (Gabarron et al., 2021). Over the last several years, credible organizations and medical journals have taken to social media platforms, allowing for the dissemination of reliable scientific information (Goel and Gupta, 2020). Connecting refugees to the appropriate social media platforms and catering this content in a culturally and linguistically appropriate manner can pave the way forward for readily providing valid information to this target audience.

Healthcare providers played an important role in delivering vaccine information to study participants. Studies have found that physicians are the most important influencers of vaccine decision-making (Schaffer DeRoo et al., 2020). Specifically, primary care providers (PCPs) are generally trusted by their patients due to the nature of their long-term relationship. PCPs could counsel patients on their behavioral choices by helping them decipher if the information acquired through other sources such as TV or social media is reliable.

Study participants stated they preferred communicating with their healthcare providers in-person or over the phone to receive vaccine information rather than receiving a letter in the mail or an email. There could be a few reasons to explain this. For one, many refugees are not fluent in English and letters/emails are likely sent to patients in English. Patients may also not be literate in their native language. For this study, interviews were conducted in a total of thirteen different languages, including English. Translating written information, which possibly includes medical vocabulary, in so many different languages might not be feasible. However, national agencies such as the CDC have COVID-19 materials available in multiple languages and could be used as an adjunct for patient education in face-to-face encounters. Professional interpreter services can be used during in-person visits or by phone. In-person visits also allow for other communication avenues between the patient and the provider, such as body language or facial expressions, that are otherwise not possible. Second, in-person visits and phone calls allow for questions and quicker back-and-forth interaction which is not permissible through the other avenues of communication. However, phone calls or in-person visits where family members attend clinic together make privacy difficult which might be more available through a platform such as email (Brickhill-Atkinson and Hauck, 2021). Another limitation of in-person visits and phone calls is the limited time of providers. Having other healthcare workers such as nurses or social workers give COVID-19 information during clinic visits or by phone would limit the burden on PCPs. Additionally, peer educators are shown to be effective in several studies for communicating health information to refugees. Sievert et al. (Sievert et al., 2018)) described a peer education technique to provide information on chronic Hepatitis B infection that was accepted in Afghan and Rohingyan refugee populations. The peer educators communicated health information in a participatory style by incorporating story-telling, community member questions, and commentary throughout the educational program. Peer education has also been successfully implemented in refugee populations to communicate information about HIV prevention (Woodward et al., 2014) and sexual and reproductive health (McMichael and Gifford, 2009). Participants' preference for in-person and/or telephone communication highlight an opportunity to reach refugee populations; engaging peer educators could reduce burden on providers and clinic staff, who are typically providing COVID-19 health information. Additionally, peer education allows for expansion beyond clinical populations, as refugees may not be established with a primary care doctor or may be awaiting their initial visit. For instance, Lee et al. (Lee et al., 2013) found that refugee women perceived community talks/information sessions or talks given during English classes to be the most useful mechanisms of receiving health information. Faith-based groups can also be instrumental in sharing heath information (Lloyd, 2014). The primary challenge to this type of information dissemination during the pandemic was the restrictions on in-person gatherings, limiting opportunities for visiting places of worship. However, with the availability of the vaccine and reduction in restrictions, attendance in places of worship is increasing, which presents an opportunity to educate refugees about the current state of the pandemic and vaccine updates as boosters and vaccines for younger children become available. Additionally, many religious organizations have adapted by offering virtual options in which this information could be provided.

Limitations

This study had several limitations. The sampling was nonrandom, and all study participants were recruited at a single academic hospital. This potentially limits the generalizability of the results to a larger refugee population. Additionally, recruiting patients at a hospital means we did not include any refugees who do not have access to care. However, we did sample refugees from a variety of world regions to ensure there was a diverse representation of voices. Collectively the study contains a diverse viewpoint, but the small sample size limits the ability to establish any significant patterns between country of origin and various responses. Despite using professional interpreter services, language and cultural barriers could have resulted in a misinterpretation of the participants' responses. Because most of the interviews were performed in the clinic setting and all of them were conducted by a UVA medical student, participants may have felt obligated to report that they have understood public health safety protocols and have been following those protocols. Finally, almost all participants either had been vaccinated or were planning to receive their vaccine. As such, we were not able to learn about the experiences of refugees who were hesitant to receive the vaccine, which may have influenced the results. Prior to this study, there was extensive outreach in the refugee community through a collaborative effort by the IFMC, hospital, refugee resettlement agency, and local public health district to provide information about COVID-19 and assist with vaccination scheduling. This likely had an impact on vaccine uptake and could be why study participants had high vaccination rates. Despite this, the results still offer valuable insight for health communication channels with refugee patients.

Conclusions

As the COVID-19 pandemic continues to wax and wane in its intensity, it will be important to continue communicating effectively with refugee communities. This study identified how refugees have accessed public health information during the COVID-19 pandemic and how healthcare providers can play a role in providing them with information. The results suggest that previously used health communication techniques, such as entertainment education and peer educators, may also be useful channels for COVID-19 communication with refugees. While the present study did not examine this specifically, participants' preference for in-person or telephone interactions and high prevalence of TV as a source of information support leveraging these previously successful efforts. Future research is needed to elucidate how these means of communication could be adapted for COVID-19 education in refugee communities.

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