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Autoethnographic Examination of Data-Driven, Community-Tailored COVID-19 Response in Brownsville, Texas

Christine Crudo Blackburn[1], Michelle Jones[2], Miryoung Lee[3], Cici Bauer[3], Arturo Rodriguez[2], Roberto Garcia[2], Susan P. Fisher-Hoch[3], Joseph B. McCormick[4], Kehe Zhang[3], Ava Garrett[1], and Johanna Esteves[5]

Abstract

The City of Brownsville was made vulnerable to the COVID-19 pandemic due to high rates of obesity and diabetes, high rates of poverty, and adverse social determinants of health. To address the unique challenges faced by the community, Brownsville's COVID-19 response brought together the skills of academia with the local understanding and health expertise of the city's public health department to craft a pandemic response that addressed the specific needs and unique challenges of the residents. This article explores the response partnerships formed and the data-driven, community-oriented campaigns that were designed by the Brownsville Public Health

[1]Sam Houston State University, Huntsville, TX, USA
[2]City of Brownsville Public Health Department, TX, USA
[3]The University of Texas Health Science Center at Houston, Brownsville, USA
[4]University of Texas, Brownsville, USA
[5]Texas A&M University, College Station, USA

Corresponding Author:
Christine Crudo Blackburn, Sam Houston State University, PO Box 2296, Huntsville, TX 77341, USA.
Email: ccblackburn@shsu.edu

Department. The collaborative partnership of the COVID-19 working group and the innovative dissemination strategies designed by the health department provided an effective method of disease mitigation among the city's most vulnerable residents. The article demonstrates the impact of the response campaigns by including a resident's perspective on the impact of the response, specifically how the health department tailored their efforts to meet the needs of the Brownsville community.

Keywords
community-focused response, cultural competence, pandemic response

Introduction

The COVID-19 pandemic has caused the deaths of more than 1 million people in the United States and 6.3 million people worldwide. Economies have been upended, education has been disrupted, and a percolating mental health crisis has exploded. Each community in the United States faced different and unique challenges in responding to the pandemic. Response challenges were particularly acute for low-income and marginalized communities due to a number of factors including lack of resources, higher rates of comorbidities, and discrimination which hampered access to medical care. The City of Brownsville, Texas, which is the focus of this article, was no exception to the heightened challenges facing low-income communities of color. These challenges and the vulnerability of the community required the City of Brownsville Public Health Department (BPH) staff to build off of and utilize our understanding of the city's culture and our knowledge of previously effective public health campaigns to craft a COVID-19 response that could reach even the most at-risk members of our community. Creating this effective response also required us to partner with academic and private organizations to better address the needs of our community.

In this article, we utilize autoethnography to share the experiences of the BPH staff who are authors of this article, and to use these experiences to inform the broader context of COVID-19 response in United States–Mexico border communities. We also included the perspective of one member of the community, who was impacted by our response. We provide contextual background on the unique health challenges that face the City of Brownsville and similar border communities–challenges that were amplified during the pandemic. Through this autoethnographic analysis, we seek to answer the following question: How did the COVID-19 pandemic impact the way that BPH communicated with the most vulnerable individuals in Brownsville?

To examine this research question, we will first provide background on the social, economic, and cultural context of Brownsville, Texas. We will then discuss health communication literature that is relevant to messaging to marginalized and vulnerable populations. Next, we will discuss autoethnography and our specific methodology for this research. Following the "Method" section, the discussion and analysis section will allow us to address our research question. Finally, we will discuss how these experiences shed light on the broader context of health messaging and pandemic response in southern border communities in the United States.

Brownsville, Texas: "On the Border, By the Sea!"

The City of Brownsville has a population of just over 180,000 residents, though this number does not reflect the true size or nature of the community. The city is located on the southern tip of Texas, just across the United States–Mexico border from Matamoros, Tamaulipas, Mexico which has a population of more than 500,000. The residents of Brownsville and the residents of Matamoros regularly travel back and forth across the international border to form a much larger community than official statistics suggest. For example, in 2021, there were more than 1 million pedestrians who entered Brownsville from Matamoros (Department of Transportation, 2021). Due to the binational nature of the community, addressing health needs in Brownsville requires policies that accommodate culture, language, and the community's unique containment challenges as a border city.

Brownsville is a predominantly Hispanic community. According to the 2020 Census, 94.1% of the population identifies as Hispanic or Latino (United States Census, 2020). In addition, 28% of the population is foreign-born and 85.5% of residents speak a language other than English at home (United States Census, 2020). The predominately Hispanic culture of Brownsville and the prevalence of Spanish-language speakers is an important consideration when developing public health programs and messages for city residents. Importantly, in 2013 it was reported that the Rio Grande Valley (RGV), in which Brownsville is located, has especially low English language literacy rates; ranking last in the State of Texas (Crandall, 2013). Throughout the RGV, English language literacy rates range from a low of 35% in Starr County to a high of 50% in Hidalgo County (Crandall, 2013). This lack of English language literacy is important for our health department when crafting health messages because health literacy tends to be lower than normal literacy rates (Andrulis & Brach, 2007), suggesting that the level of health literacy in Brownsville is far below the state and national average.

The City of Brownsville was also made vulnerable to the COVID-19 pandemic due to high rates of obesity and diabetes, high rates of poverty, and adverse social determinants of health. Overall, Cameron County, home county to Brownsville, ranks among the least healthy counties in the State of Texas (County Health Rankings and Roadmaps, 2021). Thirty-four percent of the population is rated as in poor or fair health, compared with 19% of the Texas population (County Health Rankings and Roadmaps, 2021). Adult obesity in Cameron County is 31% and physical inactivity is 25% (County Health Rankings and Roadmaps, 2021). Finally, approximately 30% of the population is uninsured, and the ratio of primary care physicians-to-residents is half that of the best-served counties in the United States (County Health Rankings and Roadmaps, 2021). These health disparities likely contributed to the disproportionately high morbidity and mortality rates experienced by the city. By the end of 2021, Cameron County had an overall COVID-19 mortality rate of 3.25 per 100 infections, which is almost double the COVID-19 mortality rate in the counties that host Texas' major cities and was markedly higher than the statewide COVID-19 mortality rate (Texas Department of State Health Services, 2022).

In addition to the elevated health risks, the earliest waves of the COVID-19 pandemic had a disproportionately large economic impact on Brownsville. This is because the city has a heavily service-based economy. At the peak of pandemic economic disruption in April 2020, unemployment in Brownsville reached 15.4% (United States Bureau of Labor Statistics, 2022). This was an unemployment rate almost three times as large as the rate in late 2019 (United States Bureau of Labor Statistics, 2022). The leap in unemployment had a large impact on the city, which had been named the poorest city in America in 2013, according to U.S. Census data (Hlavaty, 2013).

The cultural, economic, and health context of Brownsville is, however, the context in which our team members in BPH work daily. We have dedicated large amounts of time and energy into creating public health programs and public health messaging that meets the unique needs of our community. This experience and relationship with our community prepared us as much as is possible for developing COVID-19 messaging and outreach. Even so, we consistently faced issues with health literacy, as well as cultural and language barriers that required reexamining and reconstructing our messaging to be better tailored to the most vulnerable communities in Brownsville. In the next section, we review some of the pertinent literature on health literacy, language and cultural barriers to health messaging, and the effects of tailored messaging to provide background and an academic context for our lived experience responding to COVID-19 in Brownsville.

Developing Effective Health Communication: A Literature Review

The academic literature provides ample research on the impacts of health literacy, culture, and language on health outcomes. Such understanding is necessary to provide framing and context for health messaging in Brownsville during COVID-19 and to provide an academic foundation for the narrative of our pandemic response. Each of the literatures examined in this section speak to the unique challenges that we, in BPH, faced during the pandemic response, but they also provide insight for our autoethnographic discussion later in this article.

Health Literacy

Health literacy, which is "the ability to perform basic reading and numerical tasks required to function in the healthcare environment" (Chew et al., 2004, p. 588) plays a central role in health outcomes because one's ability to understand health information directly impacts that individual's decisions regarding their health. According to the 2003 National Assessment of Adult Literacy, nearly 60 million Americans have limited health literacy (Andrulis & Brach, 2007). While health literacy is an essential skill for functioning within the health care system and environment, it is notoriously hard to measure (Chew et al., 2004) due to shame (Parikh et al., 1996), differences between reading level and health literacy level (Baker et al., 1996), and due to flaws in the instruments used to measure health literacy (Bass et al., 2003; Brez & Taylor, 1997). A systematic literature review of the relationship between general literacy and outcomes found that most studies showed a strong and significant relationship between a patient's reading ability and their health outcomes (DeWalt et al., 2004). Overall, DeWalt et al. (2004) found that "people who read at lower levels are generally 1.5 to 3 times more likely to have an adverse outcome as people who read at higher levels" (p. 1236).

A number of studies have noted that addressing health literacy can be more difficult within immigrant populations. Many immigrants have language and health literacy barriers that can further complicate communication of health information (Kreps & Sparks, 2008). This can increase the chances of misunderstanding about everything from the availability of health care services to the correct use of prescription drugs (Kreps & Sparks, 2008).

On the whole, studies on health literacy show that the average American patient has trouble comprehending health information and that this difficulty is made worse when the individual has low reading ability. In Brownsville, we have always grappled with low health literacy and the COVID-19

pandemic only served to increase the scale of the challenge. The population demographics of Brownsville also means that we did not simply need to address health literacy, but cultural and language barriers to health messaging as well. In the next section, we explore the literature regarding the impact of cultural and language barriers on effective health and communication messaging.

Cultural and Language Barriers

Health literacy and culture are often treated as separate challenges in health messaging, but "it is through the lens of culture that people define health and illness and perceive and respond to health messages" (Andrulis & Brach, 2007, p. S123). Not accounting for various cultural perspectives on health can contribute to negative health outcomes for the patient (Brach & Fraser, 2000). To create health communication that is culturally competent, health care practitioners and public health officials must focus on the individual's concept of health (Andrulis & Brach, 2007).

Developing health communication and messaging that takes culture into account can help to reduce health disparities (Brach & Fraser, 2000). Specifically, developing cultural competency training programs for health care professionals can improve the cultural competency skills of the practitioner (Beach et al., 2005). This is important because knowledge is not enough to improve health outcomes. Practitioners must also have the skills to implement their knowledge in a clinical setting (Brach & Fraser, 2000). In Brownsville, we have regularly used community health workers (CHWs) to address the cultural health barriers in our community. Our CHWs have been effective in addressing the cultural needs of community members and increasing health program participation, particularly in our breastfeeding program. With regards to our COVID-19 response, we used our existing knowledge of the community and of cultural barriers to health in crafting response messages.

Language barriers also play an important role in health outcomes, as they can lead to miscommunication and misinformation (Al Shamsi et al., 2020). One study found that only 22% of Spanish-speaking patients with limited English proficiency correctly understood written medication dosing instructions (Leyva et al., 2005). Another study conducted by Flores et al. (2005) found that limited English proficiency in parents is "associated with triple the odds of a child having fair/poor health status, double the odds of the child spending at least one day in bed for illness in the past year, and significantly greater odds of children not being brought in for needed medical care. . ." (p. 418). Therefore, language barriers can impact an individual's health, but it

can also impact a child's health if the parent has language barriers to understanding health information.

A number of scholars have noted that translation of information, while important, is not enough if the individual has low health literacy levels (Parker & Kreps, 2005). Translation is not sufficient to increase understanding because English medical terms often do not translate well into other languages (Parker & Kreps, 2005). In addition, just as a native English speaker may have low health literacy and, thus, may not understand health information given to them in English, translating information into an individual's primary language can help increase understanding but does not guarantee that they will have high enough health literacy to understand the health messages that they are receiving.

Cultural and language barriers to health messaging have always been a challenge in Brownsville and this remained true for the COVID-19 response. Our team at BPH has several native Spanish-speakers, which reduces the burden of crafting effective Spanish-language messages for residents. Our language proficiency allows us to more effectively craft tailored messages for the most vulnerable members of the community. In the next section, we will review the pertinent literature on the effectiveness of tailored health messaging.

Tailored Health Messaging

There has been a growing interest in developing tailored health messages over the last 20 years. As described by Rimer and Kreuter (2006), "tailoring is a process for creating individualized communications" (p. S184). Tailored messages have demonstrated effectiveness in numerous areas of public health (Kreps & Maibach, 2008). This effectiveness was first demonstrated when the strategy was applied to smoking cessation campaigns (Davis et al., 1992; Keintz et al., 1994; Rimer et al., 1994; Robinson et al., 1992; Strecher, 1999). Tailored messaging is effective because when people find information relevant to them personally, they are more likely to listen to and process that information (Rimer & Kreuter, 2006).

Awareness of the low levels of health literacy in the City of Brownsville, as well as the cultural and language barriers, allowed for our team to develop tailored messages about COVID-19 prevention and treatment during the pandemic. And, despite our deep knowledge of the community before the first cases arrived, we continued to learn and to modify our health communication throughout the response process to better meet community needs. In the following sections, we discuss autoethnography, the method that we use to

address our research question, and describe our lived experiences in responding to COVID-19 in Brownsville's most vulnerable communities.

Method

Autoethnography is "an approach to research and writing that seeks to describe and systematically analyze (graphy) personal experience (auto) in order to understand cultural experience (ethnos)" (Ellis et al., 2011). It is a method that focuses on the lived experience of the author, but also examines that lived experience within the broader cultural meaning (Cooper & Lilyea, 2022). Using this methodology, we examine our experience addressing the specific needs of the Brownsville population during our COVID-19 response in 2020.

For this research, we utilize analytical-interpretive writing (Cooper & Lilyea, 2022; Reilly, 2013). We chose this particular approach to autoethnography because it allows us to discuss how our experience fits into the broader context of the COVID-19 pandemic in southern border communities in the United States. For the remainder of this "Method" section, we outline the formation of the COVID-19 Workgroup, how data was collected for this autoethnographic analysis, and how that data was subsequently analyzed.

Formation of the COVID-19 Workgroup

Academia-community-local government collaborations in the RGV have a long-standing history. In the beginning of the COVID-19 pandemic, we quickly realized that to combat the disease we needed to deliver timely messaging based on hard data. We also realized that the infrastructure and resources were not in place to allow us to combat a novel disease and also maintain other necessary services. Due to these challenges, a COVID-19 Workgroup was vital to fill gaps in infrastructure and resources. The Workgroup provided real-time statistical analysis support, data cleaning, report and map generation, and expert consultation in the social determinants within the community.

To alleviate these obstacles and provide a better picture of the pandemic and its required response, the University of Texas Health Science Center at Houston (UTSPH) and School for Public Health at Brownsville (SPH-B) partnered with us at BPH. The goals of this partnership were to bring together skilled personnel to provide data sharing, data management, and analytical pipelines to develop real-time disease databases and analysis to support COVID-19 surveillance and response. Accordingly, SPH-B and UTSPH mobilized data managers and advanced data processing to streamline the data

management and analysis for surveillance and monitoring. By leveraging the data analytical expertise from UTSPH, we were able to identify local COVID-19 "hotspots," or populations at higher risk for infection, and tailor our response to the needs of that neighborhood.

Additional data sources such as publicly available social determinants of health were also obtained and processed by the UTSPH team. This included individual- or person-level data that were collected as part of the COVID-19 surveillance efforts; area-level data (i.e., Census tract or zip code) which provided information on percent of foreign-born, poverty, and so on; and chronic disease data obtained from the Centers for Disease Control and Prevention or local cohort studies conducted by UTSPH and SPH-B. The data was examined and visualized by creating maps using Geographic Information System (GIS) and R programming. The maps were made interactive so that the user could zoom in on specific areas or regions of interest. This data was combined and linked by census tracts. By linking these data with the COVID-19 reported data, the UTSPH team performed various analyses and generated periodic county- or city-level COVID-19 status reports to inform us on COVID-19 incidence; mortality rates; testing uptake; testing positivity rates; temporal and spatial trends of infection rates; infection rates by age, gender, and race/ethnicity; and local-level social distancing metrics–such as residents' travel behaviors. In addition, the UTSPH team provided analysis to investigate how social determinants of health contribute to COVID-19 infection and testing so that we could determine the best approach for our tailored response campaigns.

Data Collection

For this research, we used a data collection method that chronologically lists the major events and experiences that take place during a specific time frame and describes the experiences and self-discovery associated with those events (Chang, 2008). To do this, we provided descriptions of our chronological memories, the 2020 response to the COVID-19 pandemic, the development of the COVID-19 Workgroup, and the development and evolution of the Boots on the Ground and the Spray the Message campaigns. The chronological memories used to construct the autoethnography were contributed by three staff members at BPH. Contributions were also provided by other members of the COVID-19 Workgroup, which was vital to providing data and context for campaign development.

Finally, a resident described the impact that the campaigns and our overall COVID-19 response had on them. We chose to include the resident's full comments in the article, as is. Reporting their experiences in this way allows

for their experiences to be shared in their own words and provides an enhanced understanding of response impacts in the social, economic, and cultural context of the City of Brownsville.

Data Analysis

Following the collection of chronological memories among the authors of this article, major events in the development of the campaign were identified to construct the narrative. These themes and major events included the formation of the COVID-19 Workgroup, recognition of the need for demographic data to tailor response, development of the Boots on the Ground campaign, incorporation of feedback from residents contacted during the Boots on the Ground campaign, and the development and evolution of the Spray the Message campaign. Each of these major events resulted from the desire to make sure that our community's most vulnerable residents were getting the information that they needed to stay safe.

Results

Through the interrogation of our own chronological memories of the response and examining how the COVID-19 pandemic changed the way that we communicated with our most vulnerable residents, we identified three themes that regularly recurred and that we have internalized as necessary for future health messaging. These themes were: (a) the need for real-time data, (b) the need for personal contact with the community, and (c) the dedication and teamwork of staff, collaborators, and volunteers. Each of these themes is discussed in this section and expanded upon in the "Discussion" section, utilizing the Boots on the Ground and the Spray the Message campaigns as examples of how these themes were interwoven into all elements of the response.

Need for Real-Time Data

In the earliest months of the pandemic, there was a general lack of data regarding how the virus was spreading, what parts of the community were most at-risk, and who was or was not receiving information about the disease. We first attempted to address this lack of data by combining information from the U.S. Census and the geospatial data that Cameron County provided on positive cases within the city, but found that this method did not provide us adequate data to create targeted messaging strategies in a timely manner. The development of the COVID-19 Workgroup allowed us to get the amount of data that we needed and to analyze it in a way that provided us information at

the census tract level in real-time. Throughout the response, we continued to need data on who was becoming infected, who was getting testing, and who was getting vaccinated to update and adjust our health messaging. Therefore, even after we developed a system for collecting and analyzing the data that we needed, we continued to collaborate with UTSPH and SPH-B to provide us with the data and data analysis central to our targeted response. Without real-time data, we would not have been able to target the portions of the community that most needed information at a given time.

Need for Personal Contact With the Community

The City of Brownsville is a community that emphasizes our cultural heritage and community connectedness. For these reasons, we knew from the beginning of the response that we would need to make personal contact a central element of our messaging. Members of the community needed to see that we were present and responding. They needed to be provided with information in a way that they could understand and, most importantly, we needed to be there to answer questions and meet the members of the community where they were. It was this desire to be present in the community, combined with the unique community needs regarding language, health literacy, and internet access, which provided the catalyst for the Boots on the Ground and Spray the Message campaign.

Dedication and Teamwork

The dedication of our public health staff and volunteers cannot be understated. During the Boots on the Ground campaign, our team would assemble by 5 am at a designated location within the community and much of the work for the Spray the Message campaign took place in the evening, when residents had returned from work. The teamwork and dedication of our staff and volunteers to prioritize the health and specific informational needs of the targeted community meant that we often worked long hours and outside the traditional workweek. This level of commitment to the community, however, was necessary for us to deliver precision public health intervention measures and directly impact the members of our community during the first year of the pandemic.

Discussion

Using Data to Craft Tailored Messages

Prior to the formation of the COVID-19 Workgroup, we worked to address our need for data by analyzing data from the United States Census Bureau

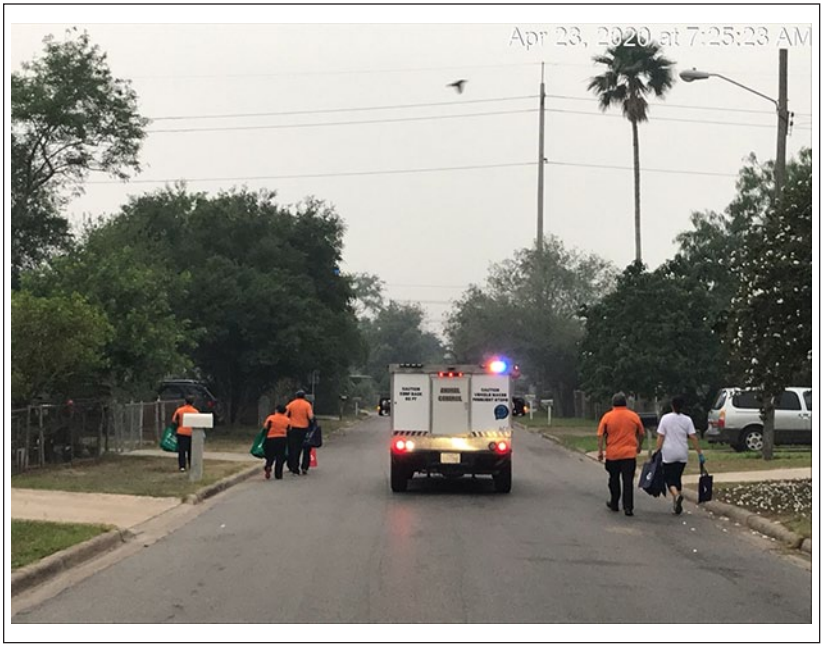

Figure 1. Members of the Brownsville Public Health Department Walking Through a Brownsville Neighborhood as Part of the Boots on the Ground Campaign.
Note. This campaign distributed information about COVID-19 to individuals who might not have access to electronic information.

American Community Survey. Our goal with this analysis was to gain increased awareness of the most at-risk communities in Brownsville and then craft response messaging that would target those communities. We then took the data on age distribution and poverty from the survey and combined it with data from the City Health Dashboard of 2018. Although this was time-intensive, we sought to gather important demographic information on the percentage of Brownsville residents who were foreign-born, the percentage of the population aged 5 and older who speak a language other than English at home, and statistics related to poverty and health. This information helped us outline not only the communities that were most at-risk but also begin to identify what type of messaging might be most effective in these at-risk communities [Figure 1 shows targeted neighborhood campaign].

These initial efforts to gather adequate data to create a tailored response for our most vulnerable community members were not sufficient to identify and target messaging at the neighborhood level. This greater need for data analysis and consultative experts is the primary reason for the formation of

the COVID-19 Workgroup. It allowed us to rely on the data collection and management expertise of our academic collaborators, UTSPH and SPH-B, to obtain the more granular level data that we needed.

The Boots on the Ground campaign started before we had begun receiving data through the COVID-19 Workgroup. During the first 2 weeks, we distributed packets across the city to spread information on the virus, what community members could do to protect themselves, and available testing options and locations. Once the data from the COVID-19 Workgroup started to arrive, we were able to better target communities and adjust our messaging. It is our belief that the data from the COVID-19 Workgroup allowed us to better serve the members of the community.

Boots on the Ground and Spray the Message Campaigns

The Boots on the Ground campaign ran throughout 2020 and consisted of a team of five-to-eight public health employees and at least one animal control officer. The Director of Public Health, along with other members of BPH's management team regularly participated in the Boots on the Ground campaign. We designed the team in this way because we had a deep understanding of our strengths and weaknesses and those of our COVID-19 Workgroup members. We brought in partners that had the capacity and resources to fill the gaps that we lacked and, in turn, we were able to fill in the gaps of our partners. The utilization of animal control, for example, provided us access to large vehicles that could store supplies during the Boots on the Ground campaign.

The Monday before campaign messaging would take place, the team would assemble informational packages. These packages included a letter from the Mayor, COVID-19 symptom log, information on the locations of test sites, and information on the testing process an individual could expect to undergo once they entered the city's drive-thru testing site. Information was added or subtracted as it evolved. In addition, new materials were developed when guidance was updated, a testing site was changed, new resources became available among BPH's community partners, such as Brownsville Wellness Coalition, United Way, and Breastfeeding for a Health Brownsville, or new city services were being offered. Examples of other important information included in the campaign were: information on BTXCares, a city website that was created to be a one-stop website for providing information to Brownsville residents; information on food drives in the city to help those residents that were having difficulty affording food; and Census information, so that city residents could participate in the Census [Figure 2 shows Boots on the Ground volunteers with their packets canvasing neighborhoods].

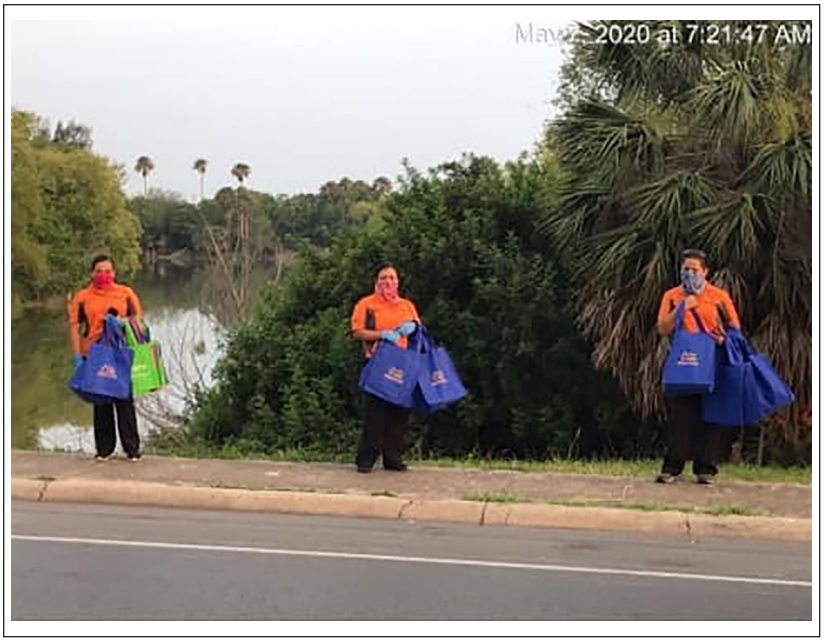

Figure 2. Brownsville Public Health Department Volunteers Working as Part of the Boots on the Ground Campaign.
Note. Each blue bag contained information on COVID-19 prevention, symptoms, testing, and treatment.

The information packets, once assembled, were placed in reusable bags provided by the city and later, by private companies, such as Walmart, Cigna, and Charlie Clark Nissan, who partnered in the effort to get the important information out to Brownsville residents. Each deployment of the Boots on the Ground campaign lasted approximately 3 days. The designated Census tracts for each campaign were determined by the data provided to us from the COVID-19 Workgroup analysis. Team members wore masks and socially distanced themselves while they walked the Census tract and placed the outreach material on a fence, gate, or other areas easily accessible [Figure 3 shows volunteers with assembled packets]. On occasion residents would greet the Boots on the Ground team and ask health-related questions. This engagement allowed residents to speak with us directly and solidified trust among the residents that we were providing information that they needed. It also demonstrated that we were committed to protecting their health and that we were actively working to contain the spread of the virus.

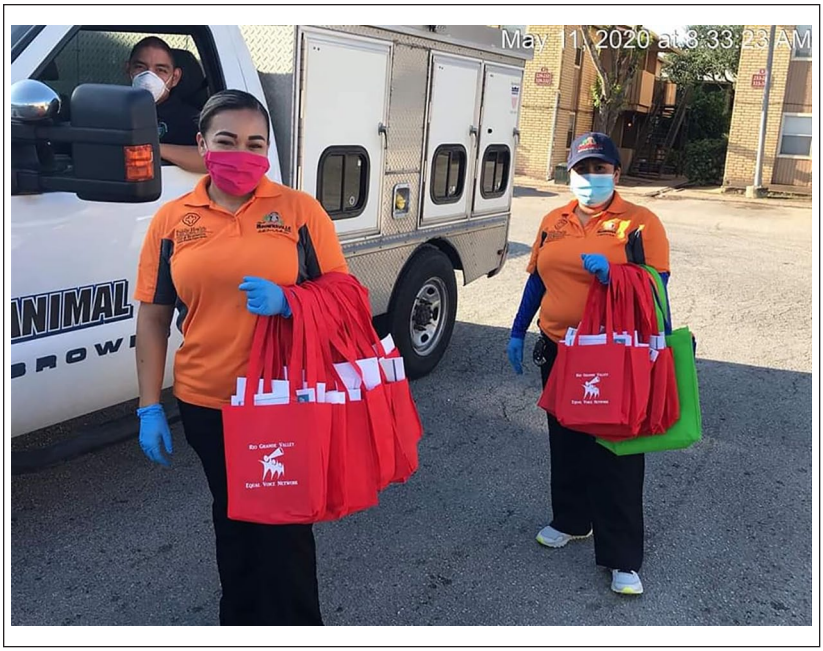

Figure 3. Brownsville Public Health and Brownsville Animal Control Personnel With COVID-19 Information Packets.
Note. These packets were distributed to the most vulnerable communities in Brownsville who may not have access to COVID-19 information online.

Conversations with residents during the Boots on the Ground campaign days also contributed to the adaptive messaging for each neighborhood. The personal contact with the community provided information for us on what the community was most concerned about, what information or misinformation they may have, and other relevant issues and challenges. We could then adjust our information and messaging to better address the questions and concerns we were hearing from the community during our campaigns. Examples of some of these messaging changes include social media messaging that targeted Brownsville's youth population with information about testing, social distancing, and mask wearing; print campaigns that provided guidance for safe celebrations during spring break, Halloween, and Christmas; and television campaigns promoting safe practices during the Labor Day weekend and Thanksgiving holiday.

Each time the Boots on the Ground campaign was implemented, the messaging was fine-tuned to adjust to the fluidity of the pandemic and to more

effectively meet the information needs of residents throughout the community. This continual adjustment in messaging was a change from the way we had communicated with residents in the past because it required a continual give and take of information between us and affected residents.

One primary obstacle to effective communication during the Boots on the Ground campaigns was the residents who did not know how to read or did not have adequate levels of literacy for the materials contained in the Boots on the Ground campaigns; those who did not have access to the internet; and those who lacked the knowledge to gain information effectively through technology platforms.

We were concerned that these barriers to information were leaving entire parts of the city more vulnerable to COVID-19, so we launched a campaign titled, "Spray the Message." This campaign was designed to get information to the residents that fell within the aforementioned categories. The Spray the Message campaign consisted of putting loudspeakers on two BPH vehicles to broadcast information to residents in both English and Spanish, each message lasting approximately 30 s. Previous public health campaigns around the globe have shown that the use of loudspeakers for health messaging can be highly effective (Aung et al., 2019; Chen, 2020; Webb et al., 2021). Specifically in the context of the COVID-19 pandemic, one study found that the use COVID-19-related health messages broadcast in indigenous languages in Taiwan was an effective way to address the health needs of minority populations (Chen, 2020). Our experience with the Spray the Message campaign is that it provided our most vulnerable residents, particularly those who are unable to read, with vital COVID-19 information.

The messaging for the Spray the Message campaign was direct and focused on the most pertinent information. Examples of messaging include the implementation of curfews; the locations of testing sites; information about the elevation of the city's color-coded Threat Matrix for COVID-19; and the general mitigation strategies of social distancing, hand hygiene, and mask-wearing. The vehicles were deployed at the end of the day, when most residents were likely to be home, and the message was played while the vehicles traversed the targeted neighborhoods at slow speeds. As new information became available or new mitigation strategies were implemented, the Spray the Message campaign was updated to ensure that residents received the most timely and accurate health information. The Spray the Message campaign ran from April 2020 to June 2020 and utilized two vehicles that were outfitted with loudspeakers. The campaign was able to reach 50% of households, totaling 256 hr of message broadcasting per vehicle.

Both the Boots on the Ground and the Spray the Message campaigns were developed and updated with the needs of Brownsville residents in mind. The

collaborative COVID-19 Workgroup allowed us to tailor and individualize the messaging beyond what would have been possible without the advanced data analysis and real-time infection and testing data provided by UTSPH. Discussions with residents themselves during the Boots on the Ground campaign also provided valuable feedback from the community and in-depth knowledge of their questions and anxiety, which informed later iterations of the messaging campaign. In this way, the Boots on the Ground and Spray the Message campaigns were the product of both a collaborative government-academic partnership, but also of a partnership with the community itself.

Response Impact: Residents Perspective

The following paragraphs were written by a lifelong Brownsville resident who had been away at college but returned to the city from March 2020 to August 2020 and experienced the height of our response. In the paragraphs below she describes her firsthand experience with our COVID-19 response:

> Despite Brownsville being known as one of the poorest cities in Texas, the health department used all the resources they had to provide the residents with support and care they needed. Drive thru testing, virtual classes, telework, and sanitizing protocols were all put in place following the COVID-19 outbreak in early 2020. One of the first and most impactful things the Brownsville Health Department pushed forward to keep the city calm and give hope for an end to the devastation happening was the Boots on the Ground Campaign. Health officials walked door-to-door to safely drop off information about COVID, how it presents itself, and the response we should take as citizens. It was essential for us to stay updated as it gave us a crystal-clear guide on how to handle the situation and not panic. Many people in Brownsville lack the resources to stay updated through social media and the news on television, especially in certain areas of the city. This campaign allowed people that didn't have the privilege of logging onto Facebook and seeing daily updates or protocols, the opportunity to stay up-to-date. To see the city put their lives at risk to spread awareness gave people the assurance they needed that they were being looked out for and taken care of.
>
> Food insecurity is a continuous battle in the Rio Grande Valley and brought to its peak when COVID caused many people to lose or put their jobs on hold. Stores were wiped clean and food was running out in homes across the city. Brownsville immediately put a stop to this by launching United Against Hunger. Thousands of bags of food were handed out (safely and at a distance) to those who were in need and opened up several job opportunities. Among the many concerns COVID brought, food was one less worry for thousands of families. There was no more worry from children who depended on school

lunch to have their only meal, like my siblings and I used to do, and surely thousands of children in Brownsville do as well.

There were many more efforts made by the city health department and the people of the city to continue thriving amidst one of the hardest times in history. From enforcement of limited occupancy in buildings to mask mandates to free food and resources, the Brownsville Health Department has always made the citizens and their health their main priority. As the pandemic continues into 2022 and the chaos dies down, they continue to implement safety protocols and have the people in their best interest.

Our Lived Experience in the Broader Context

The COVID-19 pandemic forced us to innovate and diversify our messaging strategies. We knew the demographics of our community. We knew the barriers that existed in health literacy, language and reading proficiency, and technological limitations. We also knew that to get ahead of the virus and to help our community we had to have a targeted response because the consequences were too great. The introduction of real-time data analysis to create targeted messaging was essential and incorporating the data into our strategy helped us more effectively meet the needs of our community. Throughout the response, we addressed each obstacle, developed a solution, and then applied it out in the community. For example, if we knew that a population could not read English, then we ensure messaging was conducted in Spanish. If we knew that the residents from particular streets or census blocks that we were targeting could not read and did not have access to the internet or other forms of technology, we deployed the Spray the Message campaign in that area so residents would have access to the information. As each new census block was targeted, we delved into the barriers and adjusted to fit that census block so uptake of the information would be highest. The personal experiences we had with our community developed trust and demonstrated our commitment to the residents of Brownsville. The pandemic also fundamentally changed the foundation of our Public Health Department as it pertains to crisis communications and outreach communications.

Our experience responding to the COVID-19 pandemic in Brownsville provides valuable insight into the needs and challenges of addressing health crises in U.S. southern border communities as a whole, as well. There are approximately 15 million people who live in the 44 U.S. counties that share a border with Mexico (Health and Human Services, 2017). In addition to the numerous small towns, there are 15 sets of sister cities along the U.S–Mexico border, of which Brownsville and Matamoros is one. Each of these other U.S.

sister cities has similar socio-economic demographics and similar challenges regarding health literacy, language barriers, and high rates of chronic disease. The targeted campaigns that we developed in Brownsville could be an effective blueprint for health crisis response in similar southern border communities throughout the United States.

Conclusion

The COVID-19 pandemic presented an unprecedented challenge for public health departments and communities alike. To address this challenge, we assembled a COVID-19 Workgroup with UTSPH and SPH-B to leverage demographic, census tract, infection, and testing data in creating tailored and effective pandemic messaging. Feedback from community members and resources from local businesses and private companies helped us continuously refine our messaging and approach to information dissemination so that they could accommodate the fluid needs of the community. As the resident anecdote helps to demonstrate, this community-tailored approach helped residents Brownsville to more effectively cope with the uncertainty of the pandemic and helped assure that even those with low literacy and/or a lack of access to the internet were able to receive the most important COVID-19 information.

The COVID-19 pandemic will not be the last pandemic that the United States faces and the ability of local public health departments to respond effectively to the needs of their community will be vitally important in protecting residents. Our approach to accommodating the language, literacy, and informational needs could be applied in numerous border communities throughout the United States. In addition, the experiences we had during the COVID-19 response have changed the way that we communicated with our most vulnerable residents. As demonstrated by our experience with COVID-19, real-time, collaborative relationships between local officials, academia, and community residents can create an effective, flexible response that best meets the needs of each unique community.

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ORCID iD

Christine Crudo Blackburn https://orcid.org/0000-0001-9893-6058

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Author Biographies

Christine Crudo Blackburn is an assistant professor of Security Studies in the College of Criminal Justice at Sam Houston State University. Her research focuses on physical and financial barriers to health access, well as pandemic preparedness and response. Prior to her position at SHSU, she was the deputy director of the Pandemic and Biosecurity Policy Program in the Scowcroft Institute for International Affairs at the Bush School of Government and Public Service at Texas A&M University. Dr. Blackburn received her PhD from Washington State University in 2015.

Michelle Jones is the Epidemiology and Surveillance Program Manager at the City of Brownsville Public Health Department. In this position, she established the Epidemiology and Surveillance Division and coordinates with state and county partners. She also established the Maternal and Child Health Division for the City of Brownsville and implemented and led a Community Health Coalition. Ms. Jones received her MPH from Texas A&M University in 2018.

Miryoung Lee is an associate professor of Epidemiology, Human Genetics, & Environmental Sciences at the University of Texas Health Science Center–Brownsville. Her research focuses on examining epigenetic biomarkers, environmental risk factors, including social determinants of health in relation to cardiometabolic disease in children and adults. Dr. Lee has a PhD in Epidemiology from the University of Pittsburgh.

Cici Bauer is an assistant professor of Biostatistics and Data Science at the University of Texas Health Science Center in Houston. Her research focuses on Bayesian spatial-temporal modeling, small area estimation, health disparities, and the impact of social determinants of health. She received her PhD in Statistics from the University of Washington–Seattle.

Arturo Rodriguez currently works for the City of Brownsville as Health and Wellness Director. Under his leadership, he has undertaken major projects as leading the city to earn the 2014 All-American City Award focus on community health. In addition, he was a key community partner leading to the prize winning "Culture of Health" community prize by the Robert Wood Johnson Foundation (RWJF). Dr. Rodriguez is nationally recognized as a RWJF Public Health Nurse leader. He received the distinguished I.E. Scott Award for outstanding contributions to the Environmental Health profession. Dr. Rodriguez also serves on the Texas Department of State Health Services Task Force of Border Health officials, working to improve the health of all Texas border residents. Dr. Rodriguez holds a Doctor of Nursing Practice, Executive Leadership from Texas Tech University Health Sciences Center. He is a Registered Nurse, Registered Sanitarian, Respiratory Care Practitioner, and a Certified Public Manager.

Roberto Garcia is the assistant director of Public Health & Wellness for the City of Brownsville Public Health Department. In this position, he helps to oversee and implement numerous public health programs for the city and works with federal as well as local partners. Prior to his position in public health, Mr. Garcia served in the United States Marine Corps.

Susan P. Fisher-Hoch is a professor of Epidemiology, Human Genetics, & Environmental Sciences at the University of Texas Health Science Center–Brownsville (SPH-B). In this position, she founded the Cameron County Hispanic Cohort, which is a randomly selected community-based cohort of health disparity Mexican Americans. Prior to her position at SPH-B, she had a long career at the CDC working on viral hemorrhagic fevers. She designed and directed the French Biosafety Level 4 principally for studies of Ebola and Lassa fever. Dr. Fisher-Hoch was trained as a physician and received her doctoral degree in epidemiology from London University with Membership of the Royal College of Pathology in virology.

Joseph B. McCormick, MD, is the James H. Steele Professor of Epidemiology and was the founding Dean of the Brownsville Campus of UT Health Houston School of Public Health. He holds an MS in Tropical Public Health from Harvard School of Public Health and an MD from Duke University School of Medicine. He completed pediatric residency at Children's Hospital of Philadelphia. He was at the CDC for 23 years where he worked on viral hemorrhagic fevers and HIV in Africa. His work there is described in Level 4: Virus Hunters of the CDC, and in The Coming Plague by Laurie Garrett. He has been at the Brownsville Campus for 21 years and has a large population-based research program on Hispanic Health focusing on chronic diseases.

Kehe Zhang is a biostatistician in the Department of Biostatistics and Data Science at the University of Texas Health Science Center (UTHealth). Beginning this fall, she will be pursuing a PhD in Biostatistics at UTHealth. Her research interests include multilevel modeling, spatial-temporal modeling, Bayesian inference, and their applications in health disparities and social determinants of health.

Ava Garrett is an undergraduate student at Sam Houston State University. She is working toward her Bachelor's degree in Homeland Security. She is also a member of the Elliott T. Bowers Honors College. Upon graduation, she is interested in pursuing a career with the National Security Agency, or another area of homeland security where she can focus on counter-terrorism.

Johanna Esteves recently graduated from Texas A&M University with a Bachelor of Applied Science (BASc) in Biomedical Sciences. She also received a minor in Spanish. She is interested in working in the area of infectious disease epidemiology and public health. She hopes to work at the CDC in the future.