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Thank you to everyone who submitted to the *Public Health Review*. As always, thanks to our Advisory Board, University of Minnesota Libraries Publishing, our faculty advisor Stuart Grande, and our dedicated and thoughtful reviewers.

Thank you to our authors - Devin Graham, Mark Faries, Race Creeden, Elizabeth Lees, Estefanía Henríquez Luthje, María Fernanda Díaz Soto, Jasmin Garcia, Gabriela Henríquez Luthje, Miguel Mejía Sang, Tanya Pablo González, Angelica Floren, Nola Holness, Luis Castro, Ryan D. Morgan, Rohan S. Pendse, and Courtney M. Queen - for sharing your work with our readers.

The cover features a beautiful and meaningful illustration from Michelle Irish who shared the following background behind the illustration: “Bemidji, MN is a community that is made up of many unique people, including people that are members of our neighboring reservations, which include the White Earth Band of Ojibwe, the Leech Lake Band of Ojibwe, and the Red Lake Band of Chippewa Indians. These tribes are losing their women at the hands of some of our other community members, and outdated laws around the Indian Relocation Act and federal policies have made these women an easy target for human trafficking. In order to have a strong community, we cannot let offenders take advantage of laws that have been brushed under the table by those that don't see the worth of these women's lives. We are all part of our community, and

therefore, our laws should be inclusive and give extra protections for these vulnerable community members. The design includes a quote: ‘A good community doesn't leave anyone behind’ within the distinct symbolic red hand that has been commonly used by the Missing and Murdered Indigenous Women's movement. Although the community of Bemidji has work to do, I have seen beautiful unity in diversity across our community to take action towards solving this heart-breaking problem.”

Thank you to the 2023 Editorial Board for your work to make this issue come together: Taiwo Aremu (Executive Editor), Erin Mann (Managing Editor), Tenzin Yangchen (Section Editor), Annie Olson and Diane Sherwin (Copy Editors), Alyssa Mondelli (Production Editor), Mariah Olinger and Amanda Davis (Podcast Editors), Reham Gaid (Evaluation Editor), and Michelle Crandall (Marketing Editor).

We are now accepting [submissions](#) for our December 2023 issue! Anyone with a [public health](#) perspective—including students, alumni, professionals, and community members—from any discipline or affiliation may submit content to PHR highlighting or focusing on a public health topic or issue.

Stay up-to-date on PHR by following us on [social media](#). Please also check out the [Perspectives podcast](#).

It is my pleasure to introduce you to the June 2023 Public Health Review (PHR) issue. Since its inception in 2018, the PHR journal has borne on its wings the tenets that seek to bolster health equity. As the world evolves, so does the need for new information and the quest for knowledge in response to the inherent public and global health challenges, thus matching the demand for global health security. From time immemorial, science and technology keep evolving. Opportunities continue to meet needs. The ship of innovation keeps sailing into the ocean of endless possibilities. With this background, the PHR continues to thrive and grow as a hub for public health information. The PHR is improving!

To refine our delivery and improve our reach, we started publishing accepted articles online on a rolling basis, which we expect to benefit from early viewing, thereby adding to the body of knowledge and gaining early citations. We hope this update to our process encourages you and others to continue to consider publishing with us as we publish peer-reviewed articles at no cost to the authors.

This June 2023 issue is made possible by astute and diverse authors with valuable contributions, including rich content focusing on COVID-19 vaccinations, drive-through clinics, empowering nurses, and advancing health equity. The selfless service of our reviewers is worthy of note. To appreciate our reviewers' efforts, we will start sending peer review certificates to our reviewers who participate in peer reviews, including the number of reviews submitted at the end of the year. To ensure our reviewers' service is duly recognized, we shall publish their names each year following due consent.

One research article in this issue by Devin Graham, "The role of trust, hesitancy, and personal autonomy on COVID-19 vaccination behavior," explores some factors that may contribute to COVID-19 vaccine behaviors in the United States. While comparing vaccinated to unvaccinated groups, Graham pointed out that being rich in autonomous motivation and trust are essential to accepting the COVID-19 vaccine, thereby calling for more research investigating public health messaging.

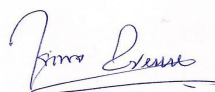
Two opinion pieces focus on advancing health equity. The paper by Race Creeden, "Advancing health equity means banning PFAS...ASAP," examines some determinants of

population health as it relates to human exposure to per- and polyfluoroalkyl substances (PFAS), which disproportionately affects people of color and socioeconomically disadvantaged neighborhoods. Based on the poor health outcomes from environmental exposures to PFAS in the United States, Creeden recommends policy action that prohibits using PFAS. The article by Elizabeth Lees, "Why advancing health equity must include equitable regulations of social media," captures the population disproportionately targeted through social media in the United States. Due to the negative impacts social media has had on vulnerable and minority populations, Lees recommends regulating social media content.

Two papers focusing on public health practice were also included in this June 2023 issue. Estefanía Henríquez Luthje and co-authors, through their article, "Empowering nurses in rural eastern Dominican Republic: a pathway to improved quality care for maternal and neonatal patients through education," highlights the importance of recognizing the unique position of nurses in healthcare. Luthje et al. also underscore the importance of enabling nurses to fulfill their role and efforts toward improving maternal and child health in the Dominican Republic. An article by Luis Castro and co-authors, "Drive-thru clinic: a new model of healthcare delivery and future directions – a Lubbock, Texas experience," describes the essence of setting up drive-thru clinics to improve access and safety for vulnerable patients in underserved and rural communities.

This issue is undoubtedly loaded with relevant information for charting the future of healthcare in our ever-changing world. I congratulate you for reading this article, a testament to your quest for knowledge. I implore you to continue actively seeking to provide answers that we all need to create a world that we, including our contemporaries, our younger and older generations, and generations unborn, would be safe in and proud to be a part of.

Warmly,



Taiwo Aremu, MD, MPH
2023 Executive Editor, Public Health Review

The role of trust, hesitancy, and personal autonomy on COVID-19 vaccination behavior



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Research Article
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Abstract

Since the onset of the COVID-19 pandemic, the successful development and distribution of COVID-19 vaccines has been a primary focus of the United States' pandemic response. However, dissemination has been highly contingent upon public trust and acceptance of the vaccine and of those who promote it. Current public health messaging assumes vaccine hesitancy; however, little is known about if and why hesitancy might occur. Two possibilities are examined in the present research: trust and autonomy. Theoretically, public health messaging can risk undermining personal *autonomy* (Self-Determination Theory), leading to less self-determined motivation and greater distrust. Three forms of motivation for behavioral regulation were considered—identified regulation, introjected regulation, and external regulation. The aims of this study were as follows:

1. Describe the overall levels of vaccine trust and hesitancy within a sample of vaccinated and unvaccinated adults.
2. Evaluate mean differences in vaccine trust and hesitancy, respectively, between vaccinated and unvaccinated groups.
3. Analyze the relationship of autonomous motivation (identified) and other motivation types (external, introjected) with hesitancy and trust, respectively.
4. Evaluate mean differences in autonomous motivation (identified) and other motivation types (external, introjected), respectively, between vaccinated and unvaccinated groups.

The results of this study support concerns that hesitancy and lack of trust are related to poorer vaccination behavior, with the unvaccinated group having significantly higher hesitancy and lower trust than the vaccinated group. Overall, nearly half of all respondents were at least somewhat hesitant towards the COVID-19 vaccine; however, 96% of unvaccinated respondents reported hesitancy, compared to only 37% of vaccinated respondents. Support was also provided for the theoretical conception that more autonomous motivation is related to greater vaccination behavior, as the vaccinated sample reported statistically higher levels of identified and introjected regulation, and slightly lower levels of external regulation than the unvaccinated, underscoring autonomous choice as a relevant component of vaccination decisions. These findings should be utilized to consider how public health messaging can be better crafted to support, rather than undermine, personal autonomy when promoting vaccine uptake.

Introduction

Since the onset of the COVID-19 pandemic, the successful development and distribution of COVID-19 vaccines has been a primary focus of the United States' pandemic response. However, dissemination has been highly contingent upon public trust and acceptance of the vaccine and of those who promote it. Public health authorities encourage COVID-19 vaccination, deeming low vaccination rates a threat to health security, contributing to an inability to combat community spread. Yet, despite continued public health efforts, as of October of 2021, only 64.88% of Americans had been vaccinated against COVID-19 [1].

Hesitancy

Public health professionals often assume vaccine hesitancy to be the primary reason for low vaccination rates. Quinn and colleagues summarize vaccine hesitancy as “the full range of attitudes and behaviors surrounding vaccine delay and refusal” [2]. Defined this way, the authors found hesitancy to be a significant, negative predictor of current season flu vaccine and flu vaccination in the past five years ($b = -0.71$). Another study found that for those with vaccine hesitancy, self-reporting they will “definitely not get a vaccine” was significantly weakly and negatively correlated with COVID-19 vaccine uptake rates ($r = -0.06$) [3]. A current challenge facing researchers is the lack of an agreed upon standard for how hesitancy should be measured and whether hesitancy is directly related to vaccine

acceptance [2]. Overall, given the novelty of COVID-19 and the COVID-19 vaccine, there is still much to learn about the relationship of hesitancy and vaccination and why hesitancy might occur. Two possibilities are examined in the present research: trust and autonomy.

Trust

Larson and colleagues define trust as “a relationship that exists between individuals, as well as between individuals and a system, in which one party accepts a vulnerable position, assuming the best interests and competence of the other, in exchange for a reduction in decision complexity” [4]. They go on to illustrate that trust, as it pertains to vaccination, involves several components: trust in the product (the vaccine), trust in the provider (healthcare professionals or staff that are involved in administering vaccination), and trust in the policymaker (the health system, government, vaccine companies, and public health researchers involved in approving and recommending the vaccine) [4]. Recent research has found that concerns regarding these proposed levels of trust and hesitancy have played a role in vaccine uptake. For example, Quinn and colleagues found that self-reported, overall trust in vaccines had a significant, negative correlation with flu vaccine hesitancy ($r = -0.72$), which then predicted vaccination behavior [2]. Additionally, Khairat and colleagues identified that two of the three most reported reasons for vaccine hesitancy involved trust: lack of trust in the COVID-19 vaccine and lack of trust in the government [3].

Autonomy

Another possible explanation of hesitancy is a perceived lack of personal autonomy in the regulation of vaccination behavior. Self-determination theory describes *autonomous motivation* as involving “a sense of choice and volition as a person fully endorses his or her own actions” [5]. The theory posits that autonomy is often more effective at encouraging health behavior change than the use of coercion or extrinsic rewards. However, the perceived level of autonomy that accompanies behaviors where the benefits motivating behavioral regulation are extrinsic to the behavior itself, such as vaccination, varies greatly, and can be undermined by lack of choice, insufficient rationale, use of coercion, and imposition of threats, deadlines, or external rewards [6].

Vaccine messaging can often take a more coercive or threatening tone, fail to recognize personal beliefs or

values, neglect sufficient rationale, and limit or rebuke personal choice in decision making. Theoretically, such health messaging aimed at vaccine uptake can risk undermining personal autonomy, leading to less self-determined motivation to regulate vaccination behavior, greater hesitancy surrounding vaccine compliance, and greater distrust in entities attempting to motivate vaccine behavior in this manner [5, 6].

At the time of this study (October 2021 – January 2022), COVID-19 vaccine options had been available to the public in the United States for nearly a year. The first case of the COVID-19 Omicron Variant (B.1.1.529) was detected in the United States in November 2021 and subsequently became widespread [7]. As a result, there was a continued push for greater vaccination rates from public health agencies, yet mixed messaging was being delivered to the public. Over time, mistrust of public health authorities and their recommendations grew. Anecdotally, through the process of public health and extension education on vaccination, the authors observed a common occurrence of community members expressing their concern with the coercive nature of COVID-19 vaccination messaging. Community members felt the messaging suggested an undermining of their personal autonomy, questioning messenger intentions, and felt the need to counter such messaging to maintain autonomy. Thus, it is possible that perceived level of autonomy is related to hesitancy, trust, and vaccination behavior. However, limited research has attempted to expand upon these theoretical conceptions. Therefore, the aims of this study were as follows:

1. Describe the overall levels of vaccine trust and hesitancy within a sample of vaccinated and unvaccinated adults.
2. Evaluate mean differences in vaccine trust and hesitancy, respectively, between vaccinated and unvaccinated groups.
3. Analyze the relationship of autonomous motivation (identified) and other motivation types (external, introjected) with hesitancy and trust, respectively.
4. Evaluate mean differences in autonomous motivation (identified) and other motivation types (external, introjected), respectively, between vaccinated and unvaccinated groups.

Methods

Design/Procedures

This was a cross-sectional survey study conducted using Qualtrics management software. Participants were invited to complete a brief, anonymous survey, and informed consent was obtained. Participation was voluntary. Data was collected over a year after the COVID-19 pandemic’s onset from October 2021 – January 2022 during the rise of the Omicron variant. Participants were recruited via social media, email, and word of mouth. There were no exclusion criteria other than age (≥ 18 years of age).

Participants

The data set included 144 adult participants (≥ 18 years of age), all of whom were Texas state residents. 81% of respondents were self-reported to be vaccinated against COVID-19. The majority of respondents were white (86.1%), female (72.2%), and of a Christian faith (82.6%). Additional descriptive data are provided in Table 1. Thirty-two participants were excluded due to incomplete data. For specific analyses, two subgroups were created based on current vaccination status: those who had been vaccinated with at least a single dose (VAX, $n = 117$) and those who had not (NOVAX, $n = 27$).

Table 1. Participant characteristics

Variable	Overall (N=144)
Age (years)	40.04 ± 16.67
Sex (%)	
Male	27.3
Female	72.2
Ethnicity (%)	
Hispanic	22.9
Race (%)	
White	86.1
Black/African American	7.6
Asian	6.3
Other	1.5
BMI (kg/m ²)	26.39 ± 5.95
Are you a Christian (% , Yes)	82.6
Religious Denomination (%)	
Protestant	29.2
Catholic/Orthodox	29.2
Non-denominational	24.3
Other	17.4
Prior Positive COVID Test? (%)	
Yes	25.7
No	74.3
Prior COVID Infection (%)	
Yes	17.8
No	82.2
Chronic Disease Risk Factors (%)	
Hypertension	17.5
High Blood Cholesterol	15.5
Obesity	12.8
Arthritis	11.3
Skin Cancer	5.6
Diabetes	4.3
Other types of cancer	4.3
Coronary Heart Disease	3.5
Kidney disease	1.4
Stroke	0.7

Measures

Personal Descriptives & Health Status

Participants were first asked to provide their age, assessed in years, as well as their sex, race, ethnicity, and religious affiliation. Height and weight, recorded in feet/inches and pounds (lbs), respectively, were self-reported and utilized to configure BMI during statistical analysis. Participants were also asked to self-report their health status on a five-point scale (poor to excellent), and if they had ever been informed by a health professional that they have one or more of the following risk factors for COVID-19: hypertension, high blood cholesterol, coronary heart disease, stroke, diabetes (type 2), skin cancer, other types of cancer, arthritis, kidney disease, and obesity. Finally, participants were asked if they had ever tested positive for COVID-19 (yes/no), believed to have been previously infected by the coronavirus that causes COVID-19 (SARS-CoV-2) (yes/no), and if they had received one or more doses of a COVID-19 vaccine (yes/no).

Hesitancy & Trust

For the measurements of hesitancy and trust, we adapted questions from a 2019 flu vaccination study (Quinn et al, 2021), tailoring the language to apply to COVID-19 vaccination [2]. The adapted questions are listed as follows. For hesitancy, participants were asked, *Overall, how hesitant were you about getting the COVID-19 vaccine*, which was measured on a four-point scale ranging from (1) *not at all hesitant* to (4) *very hesitant*. Trust was measured on a five-point scale, ranging from *not at all to completely*, and included: *Do you trust the COVID-19 vaccine; Do you trust the recommendations of public health officials regarding the COVID-19 vaccine; Do you think getting the COVID-19 vaccine is necessary; Do you think getting the COVID-19 vaccine is safe; and Do you think getting the COVID-19 vaccine is effective?*

Motivation

This study analyzes three forms of motivation for behavioral regulation: identified regulation, introjected regulation, and external regulation. *Identified regulation*, the most autonomous of the three, describes regulating a behavior that has been integrated into one's sense of self and/or aligns with personal values [5]. Those exhibiting identified regulation perceive freedom of choice in their behavior (e.g., to get vaccinated) because the behavior aligns with their personal values and beliefs, rather than external pressures to behave or choose in a particular way.

Introjected regulation describes behavior that is driven by contingencies of self-esteem, feeling proud when behaving in accordance with a certain behavior, or guilt and shame when failing to do so [5]. *External regulation*, the least autonomous of the three, describes behavior motivated by external reward, pressure, disapproval, or punishment [5].

To assess motivation, questions from a 2021 flu vaccination study (Moon et al, 2021) were modified for COVID-19 vaccination, using a five-point scale ranging from *strongly disagree* to *strongly agree* [8]. Adapted questions for *identified regulation* included: *I fully support the decision to get vaccinated; I find getting vaccinated personally meaningful; and Getting vaccinated aligns with my personal values* ($\alpha = 0.81$). Adapted *introjected regulation* questions included: *I would have felt bad about myself if I did not get the COVID-19 vaccine; I would feel guilty if I did not get the COVID-19 vaccine; and Others would disapprove of me if I did not get the COVID-19 vaccine* ($\alpha = 0.70$). Finally, adapted *external regulation* questions included: *I felt pressure to get vaccinated; I felt obligated to get vaccinated; and I would be criticized if I did not get vaccinated* ($\alpha = 0.73$).

Statistical Analysis

For Aim 1, mean, standard deviations (SD), and response frequency percentages were used to describe the overall levels of trust and hesitancy. For Aim 2, independent sample t-tests were conducted to determine any statistically significant mean differences in trust and hesitancy, respectively, between VAX and NOVAX groups. Cohen's *d* was used as a measure of effect size. Small, medium, and large effect sizes were interpreted as $d = 0.20, 0.50, 0.80$, respectively. For Aim 3, Pearson correlations were used to examine linear relationships of trust and hesitancy with motivation types. For Aim 4, independent sample t-tests were conducted to determine any statistically significant mean differences in motivation type between VAX and NOVAX groups. The alpha criterion was set at $\alpha = 0.05$ for all analyses.

Results

Hesitancy, Trust, & Vaccination Status

Overall, 51.4% of respondents self-reported that they were 'not at all hesitant' about getting the COVID-19 vaccine,

having mean and SD of approximately ‘somewhat hesitant’ (1.93 ± 1.14)—see Table 2. There was a statistically significant difference in mean hesitancy between VAX and NOVAX ($p < 0.01$; $t = -9.95$; & large effect size, $d = -2.13$), with NOVAX self-reporting higher hesitancy than VAX (3.44 ± 0.89 versus 1.58 ± 0.87 , respectively). Group-based means and frequencies are shown in Table 2.

When asked to describe their level of trust in the COVID-19 vaccine, overall, respondents self-reported that they trust the COVID-19 vaccine between ‘moderately’ and ‘considerably’ (3.66 ± 1.45)—see Table 2. There was a statistically significant difference in mean trust of the vaccine between VAX and NOVAX ($p < 0.01$; $t = 13.04$; & large effect size, $d = 2.79$), with NOVAX self-reporting lower trust than VAX (1.44 ± 0.85 versus 4.17 ± 1.01 , respectively). Group-based means and frequencies are shown in Table 2.

When asked, *Do you trust the recommendations of public health officials regarding the COVID-19 vaccine*, respondents reported that they trust public health recommendations between ‘moderately’ and ‘considerably’ (3.50 ± 1.40)—see Table 2. There was a statistically significant difference in mean trust of the public health recommendations between VAX and NOVAX ($p < 0.01$; $t = 6.06$; & large effect size, $d = 1.30$), with NOVAX self-reporting lower trust than VAX (2.19 ± 1.33 versus 3.81 ± 1.24 , respectively). The effect was not as strong as the difference in trust of the vaccine and with more variability of within-group responses. Group-based means and frequencies are shown in Table 2.

Hesitancy, Trust, & Autonomy

Pearson correlations were examined between hesitancy, trust, (in the vaccine and in public health officials) and the three types of self-determined motivation—see Table 3. To highlight, overall hesitancy was significantly, negatively correlated ($p \leq 0.01$) with both trust of the vaccine ($r = -0.86$) and trust of public health officials ($r = -0.75$). The more hesitant respondents were, the less likely they were to self-report more autonomous forms of motivation ($p \leq 0.01$), both identified regulation ($r = -0.65$) and introjected regulation ($r = -0.52$), and more likely to self-report more external regulation ($r = 0.22$), the least autonomous form of motivation.

Autonomy & Vaccination

Overall, the means for the various types of motivational regulation were neutral on the 1 (strongly disagree) to 5 (strongly agree) scale—specifically, identified regulation of vaccination was 3.73 ± 1.36 , introjected regulation was 3.04 ± 1.10 , and external regulation was 2.91 ± 1.06 . As shown in Table 4, the VAX group experienced statistically significantly higher mean levels of more autonomous forms of motivation than the NOVAX group ($p < 0.01$), including identified ($p < 0.01$; $t = 7.78$; & large effect size, $d = 1.66$) and introjected ($p < 0.01$; $t = -0.77$; & small effect size, $d = -0.17$), and lower external regulation ($p < 0.01$; $t = 5.71$; & large effect size, $d = 1.22$).

Discussion

Trust, Hesitancy, & Vaccination Status

Aims 1 and 2 were to examine vaccine trust and hesitancy and to determine if there were differences between those who had been vaccinated (VAX) and those who had not (NOVAX). For hesitancy, the results show that, on average, participants were ‘somewhat hesitant’ to get vaccinated, with the majority (71.4%) either ‘not at all hesitant’ or ‘somewhat hesitant’, leaving 27.8% as being either ‘hesitant’ or ‘very hesitant’. However, upon group analysis, the NOVAX (who were approximately 25% of the sample) had significantly higher hesitancy (between ‘hesitant’ and ‘very hesitant’) than VAX (‘not at all’ to ‘somewhat hesitant’)—see Table 2. It should also be noted that nearly 40% of vaccinated respondents still reported some level of hesitancy, contradicting the assumption that only those who are unvaccinated against COVID-19 are experiencing vaccine hesitancy. These results support concerns that hesitancy is related to vaccination behavior, similar to findings of previous research [2, 3]. However, additional research is warranted to further understand this link and how public health efforts can be improved as a result.

Those who were not vaccinated reported significantly lower trust than the vaccinated group—see Table 2. The same was seen with the means for trust in the vaccine and trust in public health officials; the vaccinated sample was statistically significantly more trusting than the non-vaccinated. On average, the vaccinated sample fell between *considerably* to *completely* trusting, and the non-vaccinated sample fell between *not at all* to *slightly*

Table 2. Overall and group comparisons of hesitancy and trust between vaccinated (VAX) and unvaccinated (NOVAX) groups

	Not At All	Somewhat	Hesitant	Very Hesitant	Mean ± SD	Mean Difference ^a			
						<i>t</i>	<i>p</i>	<i>d</i>	
Hesitancy (%)	51.4	20.8	11.1	16.7	1.93 ± 1.14	-9.95	<0.01	-2.13	
VAX (<i>n</i> = 117)	62.4	22.2	10.3	5.1	1.58 ± 0.87				
NO VAX (<i>n</i> = 27)	3.7	14.8	14.8	66.7	3.44 ± 0.89				
	Not At All	Slightly	Moderately	Considerably	Completely	Mean ± SD	<i>t</i>	<i>p</i>	<i>d</i>
Trust Vaccine (%)	16.2	6.3	11.9	27.3	38.5	3.66 ± 1.45	13.04	<0.01	2.79
VAX	2.6	5.2	12.1	32.8	47.4	4.17 ± 1.01			
NO VAX	74.1	11.1	11.1	3.7	0.0	1.44 ± 0.85			
Trust Public Health (%)	15.4	9.1	15.4	30.1	30.1	3.50 ± 1.40	6.06	<0.01	1.30
VAX	6.9	10.3	14.7	31.0	37.1	3.81 ± 1.24			
NO VAX	51.9	3.7	18.5	25.9	0.0	2.19 ± 1.33			

VAX = Vaccinated group; NOVAX = Unvaccinated group; SD = standard deviation

^aMean differences assessed between VAX and NOVAX groups

trusting. However, 2.6% of the vaccinated sample reported that they were *not at all* trusting of the COVID-19 vaccine, suggesting that public health messaging aimed at vaccine uptake should focus more on improving trust than attempting to completely overcome hesitancy. While an individual who experiences hesitancy may still get vaccinated, it is unlikely that an entirely non-trusting individual would proceed with vaccination. Future research should consider how increased trust may improve hesitancy and what underlying factors may contribute to trust and hesitancy.

The results of this study also confirm a strong relationship between hesitancy and trust, for both trust of the vaccine and public health officials. Those who were more trusting of the COVID-19 vaccine were less hesitant, and vice versa. These findings are consistent with previous research that has shown a relationship between hesitancy and vaccination trust (Khairat et al, 2022) [3]. The correlations were strong enough to consider that interventions that can effectively improve trust in the vaccine and/or public

health officials would be able to reduce vaccine hesitancy. Such a hypothesis is speculative based on the cross-sectional nature of the present data but could be fruitful for future research. Additionally, such a hypothesis might assume trust precedes hesitancy, but it could be possible that hesitancy alters perception of trust, and that other moderating factors could be involved. For example, if one is hesitant to get a vaccination due to a personal health concern, then trust in that vaccine could be reduced because of the risk the vaccine could pose in worsening the health issue.

Hesitancy, Trust, & Autonomy

Aims 3 and 4 were directed at furthering an understanding of the relationship of personal autonomy to hesitancy, trust, and vaccination behavior. Overall, those who experienced more autonomous forms of motivation regarding their vaccination decision were less hesitant and more trusting of the COVID-19 vaccine (Table 3). The most autonomous motivation type, identified regulation,

Table 3. Linear correlations of hesitancy, trust, and self-determined motivation variables

Variables	1	2	3	4	5	6
1. Hesitancy	1.00					
2. Trust Vaccination	-0.86**	1.00				
3. Trust Public Health	-0.75**	0.78**	1.00			
4. Identified Regulation	-0.65**	0.70**	0.59**	1.00		
5. External Regulation	0.22**	-0.19*	-0.21*	-0.07	1.00	
6. Introjected Regulation	-0.52**	0.62**	0.57**	0.48**	0.29**	1.00

* $p \leq 0.05$; ** $p \leq 0.01$

was the strongest, negative correlate to hesitancy and positive correlate to trust. These findings confirm our hypothesis that for those who believe vaccination is integrated into one’s sense of self and/or aligns with personal values, the less hesitant with and more trusting of vaccination they would be. These findings may also suggest that health messaging and interventions that promote more autonomous forms of motivation will more effectively reduce hesitancy and build trust than messaging and interventions that do not do so—or worse, interventions that undermine personal autonomy and enhance external regulation.

Accordingly, external regulation (i.e., motivated by external reward, pressure, disapproval, or punishment) was positively correlated with vaccine hesitancy. Although not often examined in public health, this finding supports suggestions from previous research that emphasizes the benefits of employing autonomous forms of motivation rather than imposing behavioral change through external demands or coercion [5]. This perspective is important to note when considering what communication methods might best encourage health behavior changes, such as vaccination, in a way that supports personal autonomy. The importance of autonomy support is prominently expressed in related health behavior research around topics such as medication adherence, weight loss and maintenance, and hospital readmissions, which find that the more the individual believes their autonomy is being supported, the greater more positive forms of autonomous types of motivation, the greater behavior change and outcomes [10-12].

Autonomy & Vaccination Status

Finally, aim 4 was to evaluate mean differences in motivation types, respectively, between VAX and

NOVAX groups. As shown in Table 4, the VAX sample reported statistically higher levels of identified and introjected regulation and slightly lower levels of external regulation than NOVAX. The strongest effect was with identified regulation, of which VAX had nearly double the mean rating than NOVAX, supporting the theoretical conception that autonomous choice is a relevant component of vaccination decisions. Previous studies have also found violation of choice to be a barrier to vaccination, further emphasizing the role of autonomy in vaccination behavior [9]. Additionally, autonomy can be enhanced by choice, explanation/rationale, and acknowledgment of feelings, and undermined by tangible rewards, threats, deadlines, and imposed goals and control [6]. These characteristics are important when considering how public health messaging can be tailored to enhance autonomy in vaccination decisions. Future research should examine if health messaging can effectively build autonomy and if increased autonomy translates into increased vaccination rates.

Limitations

Several limitations should be noted. First, the small sample size and the racial, ethnic, and gender distribution impact the generalizability of the study findings. Additionally, the VAX and NOVAX groups were not equally distributed, as the majority of respondents were vaccinated, although the distribution was somewhat similar to public vaccination rates at the time of the study. A larger unvaccinated sample would aid conceptions that were suggested with the present findings. Finally, the time frame in which this study was conducted—over a year into the pandemic, nine months after vaccine options were made readily available in the United States, and during the rise of the new Omicron variant—might have been influential upon

Table 4. Overall and group comparisons of self-determined motivation variables between vaccinated (VAX) and unvaccinated (NOVAX) groups

	Mean ± SD	Mean Difference ^a		
		<i>t</i>	<i>p</i>	<i>d</i>
Identified Regulation	3.73 ± 1.36	7.78	< 0.01	1.66
VAX	4.09 ± 1.19			
NO VAX	2.20 ± 0.88			
Introjected Regulation	3.04 ± 1.10	-0.77	< 0.01	-0.17
VAX	3.26 ± 1.02			
NO VAX	2.05 ± 0.87			
External Regulation	2.91 ± 1.06	5.71	< 0.01	1.22
VAX	2.87 ± 1.05			
NO VAX	3.05 ± 1.12			

^aMean differences assessed between VAX and NOVAX groups

participants. As such, the unique period of data collection should be taken into account when extrapolating these results. Future research should include a larger, more diverse sample, perhaps accounting for trust, hesitancy, and autonomy over time, and allow for subgroup analyses.

Conclusion

The primary goal of the present cross-sectional research study was to assess hesitancy and trust in relation to COVID-19 vaccination and further explore the relationship of varying degrees of autonomous motivation types within vaccinated and unvaccinated groups in the United States. The results of this study support concerns that hesitancy and lack of trust are related to poorer vaccination behavior, with the unvaccinated having significantly higher hesitancy and lower trust than the vaccinated. In addition, support was provided for the theoretical conception that more autonomous motivation is related to greater vaccination behavior. With concerns of the coercive nature of public health messaging and questioning of messenger intentions, future research should consider how public health messaging can be developed and tested to support, rather than undermine, personal autonomy when promoting vaccine uptake.

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Why advancing health equity must include equitable regulation of social media



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Abstract

Social media is pervasive in our society as a means of connecting with others and consuming news. However, social media has also come under scrutiny for its ability to negatively influence social attitudes and behaviors, especially in the United States where political polarization is at an all-time high. Left unregulated, social media has the power to spread dangerous hate rhetoric and even inspire acts of real-life violence. Many Americans are suffering mental health consequences as a result. Equitable regulation of social media is necessary to protect our society and promote public health.

The average person spends 2 hours and 27 minutes [per day](#) on social media. We are more connected than ever before with the advent of apps like Facebook, Instagram, and TikTok. Despite this progress in technological connectivity, the United States is perhaps as [polarized](#) as it has ever been. The rise of these platforms meant to bond people is instead contributing to the issues of division in the United States. Social media platforms are amplifying white supremacy, emboldening hate groups, and curtailing movements toward health equity and justice in the United States. On an individual level, media consumers are left feeling [more disconnected than ever](#). In the United States, our complicated relationship with social media is evolving into a series of public health issues.

Social media deserves public health's attention because it is [widespread, widely unregulated, and influences our attitudes and behaviors](#). Similar to "mob mentality", social media can lead individuals to abandon their established beliefs in lieu of collective beliefs fostered by the feelings [inspired on social media](#). Often, these collective feelings are rooted in hatred and lead to hate-fueled actions toward marginalized groups. In addition to the [real-life violence](#) arising from social media, we also find that hate rhetoric is selectively directed at certain groups, widening disparities already present in the cracks of the U.S. foundation. Amid such broadly circulating hate and violence, large numbers of social media consumers are left feeling overwhelmed, depressed, and anxious.

One such hate-fueled social media movement starting in 2021 was [#whiteboysummer](#) or #WBS. This hashtag started innocuously as a play on rapper Meghan Thee Stallion's song *Hot Girl Summer*. It was meant to ridicule the average white male's clothing and behavior. However,

#WBS was quickly adopted by extreme white supremacists as a hashtag to peddle their racist comments on social media under the guise of irony or jest. Extremist accounts have become skilled at [veiling their messages](#) behind aesthetic images or memes to attract unassuming mainstream traffic. Given the [large volume of youth](#) interacting with social media daily, there is enormous potential for recruitment of naïve followers.

At its worst, white supremacy social media has been implicated in deadly acts such as the [January 6th](#) attack on the U.S. Capitol and the [Buffalo, NY, shooting](#) in May 2022. Experts who study social media largely blame the distorted conspiracy theory turned mainstream philosophy known as "[Replacement Theory](#)" for justifying racist, hate-filled acts against marginalized groups. Like #whiteboysummer, Replacement Theory is easily manipulated into indirect messages about [immigrants replacing American voters](#) or [Jews controlling the media](#). These veiled messages gain momentum with impressionable followers on social media and quickly evolve.

While censorship has been a major issue in curbing the circulation of white supremacist rhetoric on social media, it has been equally problematic as a [roadblock](#) for many Black activists spreading their messages on social media. This is because media [algorithms](#) selectively filter and remove what has been labeled confrontational or incendiary. In many cases this includes direct mention of phrases such as "white supremacy", "Black power", or even "Black success" while overlooking covert mentions of #WBS. So while white extremist hate speech is free to circulate on social media platforms, the voices of [Black minority activists are silenced](#). Since Black content creators are more likely to be moderated, they are also less

likely than their white counterparts to amass [influencer wealth and status](#).

Black Americans are not the only target. Social media hate rhetoric and violence has also disproportionately affected [Asians](#), [Jews](#), [Muslims](#), [LGBTQ+ communities](#), and [immigrants](#) in the United States. At least three-quarters of online hate speech victims are members of [minority groups](#), and [women](#) belonging to all groups are disproportionately targeted. Americans are feeling the emotional toll, with 64% of surveyed Americans reporting they believe social media has had a [negative effect](#) on affairs in our country. A CNN News poll from 2022 found that 90% of adults in the United States say our country is now facing a [mental health crisis](#).

Though minorities experience depression at similar rates to white Americans, minority groups are less likely to have access to mental health resources. Accordingly, people of color bear a [higher burden of disability](#) from their mental health diagnoses, and there has been a steep [rise in suicide rates](#) among people of color in the United States. Adolescent women and LGBTQ+ youth are particularly vulnerable to the intersectional effects of mental health [trauma](#). Mental health disparities contribute to the growing public health problem of deepening health inequities in the United States.

Health inequities in the United States have set us [far behind](#) in healthcare standards compared to other developed countries. Widening race and social divisions only make this worse. Promoting social justice and equality is not just the right thing: it is a necessary thing for [improving the health of all Americans](#). With the pervasiveness of social media, it is important that we [take steps](#) in the United States to regulate social media content that has real-life repercussions on perpetuating inequities. This starts with moderating, and in some cases removing, users who operate with large, influential platforms to spread [discriminatory messages](#). Politicians and public health advocates should lobby to hold big social media corporations accountable for the harm they are [knowingly perpetuating](#). New public health policies can focus on meaningful steps like [changing the way information is shared](#) on social media sites and addressing [biased filtering algorithms](#). Finally, local public health agencies must prioritize providing culturally and linguistically appropriate mental health resources to historically marginalized populations in their communities.

Those who object to social media moderation argue in favor of [upholding the First Amendment](#). This has raised a powerful question about whether private companies like Facebook and Twitter that operate as social networking sites should be able to censor speech. In the context of rising violence, widening health inequities, and an escalating national mental health crisis, there should be no question as to whether increased censorship is warranted. Social media clearly poses a series of threatening public health problems. Left unchecked, social media will continue to propagate dangerous divisions and inequities in the United States that inspire real-life harm. We have seen how ideologies that start behind a screen translate to violence and poor mental health outcomes in the real world, and it must be stopped now.

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Advancing health equity means banning PFAS...ASAP



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Abstract

Perfluoroalkyl and polyfluoroalkyl substances, or PFAS, are substances that are commonly used in thousands of products designed to make modern life possible. Unfortunately, these substances can have profound negative impacts on human health. These impacts are not distributed equally, however, and people of color and those in low-income communities experience more frequent and disproportionate exposure to PFAS. Ensuring health equity and preventing the public from exposure to these dangerous substances will require changes in how PFAS are used, increased regulatory actions, and ultimately phasing out PFAS altogether.

Introduction

Perfluoroalkyl and polyfluoroalkyl substances, commonly called PFAS, present an environmental justice and equity issue. PFAS is a catch-all term that encompasses thousands of different chemicals that are used in products like nonstick cookware, water-repellent clothing, fabrics, cosmetics, and firefighting foams, according to the [Agency for Toxic Substances and Disease Registry](#). The same agency also collects data about the [health effects of PFAS](#) on humans and states there is enough evidence to link them to several adverse health impacts. However, PFAS distribution and the health effects that result from these toxic chemicals do not impact every community equally. [Data show](#) that low-income communities and communities of color are disproportionately impacted by PFAS because of closer proximity to sites contaminated with the harmful substances. PFAS are so [widespread](#), ubiquitous and long lasting in the environment that banning them is not only necessary, but would be a monumental step forward for public health efforts.

Significance of PFAS

Human exposure to PFAS is significant in many ways. Frequent exposure is known to cause detrimental health effects, exposure is common due to widespread use and contamination in the environment, and perhaps more importantly, there is still a great deal that is unknown about the long-term health consequences of regular PFAS exposure. It is known with [high certainty](#) that PFAS substances can cause reduced response to vaccines, thyroid and liver disease, low birth weight, testicular and kidney cancer, and increased cholesterol levels. Health impacts linked to PFAS with a lesser degree of evidence and

certainty thus far include breast cancer, increased risk of pregnancy loss, decreased sperm count, obesity, and ulcerative colitis, but even without these, the high certainty health effects are frightening enough. Additionally, PFAS is widespread, with one 2022 Government Accountability Office [report](#) showing that in a six-state area, PFAS contamination in the water supply was above the new EPA limit of 4 parts per trillion in 18% of the water systems, which served 29% of the population in those states. Considering that even levels of PFAS below this limit can [cause blood concentrations](#) up to 100 times the level present in the water (due to slow clearance and bioaccumulation), widespread environmental contamination is greatly concerning. Furthermore, while contamination of the environment with PFAS is mostly due to fluorochemical production plants, military facilities, and airports that use aqueous film forming foam (AFFF) for firefighting, PFAS is also present in numerous consumer products, such as paper, packaging products, lubricants, paints, carpets, adhesives, pesticides, cosmetics, surfactants, and semiconductors. Finally, the health effects of PFAS are [challenging to study](#) for many reasons, such as large interspecies differences that make animal models not completely reflective of human exposure, lack of a no-exposure control group due to widespread societal exposure after the introduction of PFAS in the 1950s, and lack of data about the synergistic effects of PFAS mixtures. This indicates that there are probable health effects from PFAS that have not yet been elucidated.

PFAS as an Environmental Justice Issue

There are many determinants of population health that intersect with the issue of environmental PFAS contamination. The first is systemic racism. Communities of color are at [increased risk](#) of PFAS exposure because they live near wastewater treatment plants, industrial sites, and military sites at a higher rate than other communities. Poverty is another factor. A [study](#) done by the Northeastern University Social Science Environmental Health Research Institute found that around 39,000 more low-income households and 295,000 more people of color live within five miles of a PFAS contaminated site than would be expected from U.S. census data (15% and 22% more than expected, respectively). Living in close proximity to PFAS contaminated sites, such as military installations where AFFF has been used for firefighting or PFAS manufacturing and disposal facilities, is significant in that it essentially always [means higher levels of PFAS](#) in drinking water, and in turn more bioaccumulation. People within these communities are potentially under-equipped to deal with the health consequences of constant PFAS exposure due to lack of access to health care, transportation, and work demands. They may also be more susceptible to health impacts as they are sometimes already in poor health because of chronic stress, poor diet, and exercise habits. One study also points out that fast food packaging is an intake source of PFAS and that [fast food chains have been known to market their products disproportionately to Black and Hispanic neighborhoods](#). This issue of environmental justice and equity with regards to PFAS contamination is rooted in the Flint, Michigan, drinking water crisis that started in 2015. The [Michigan Civil Rights Commission](#) found in its investigation that “a complex mix of historical, structural and systemic racism combined with implicit bias led to decisions, actions, and consequences in Flint that would not have been allowed to happen in primarily white communities.” PFAS contamination is likely a continuation of this but on a larger scale. Regulatory authorities and the voting populace are more indifferent to an issue when it does not directly impact them. This is a misguided approach to solving public health issues because it is not only morally wrong, but it is also false in this case. PFAS is so widespread and persistent that it is likely already affecting the majority of the U.S. population, with [one study](#) finding PFAS in the blood of 97% of the participants.

Future Vision

Having a vision for health equity will be an important factor in solving this crisis. My vision is that low-income communities and communities of color are not disproportionately impacted by the threat of PFAS. Ideally, no community should be affected by the threat of PFAS. The only way to achieve this is by phasing out the use of PFAS, as well as its manufacture and any unregulated disposal. This will require a great deal of innovation as several PFAS chemicals are essential for the products used daily by humanity to maintain a functioning society. However, one obvious first step would be to ban the use of PFAS for [non-essential](#) purposes, such as ski waxes, cosmetics, non-stick kitchenware, and water-repellent clothing. Another mitigation strategy would be to increase regulation on PFAS manufacturers, users, and industries in regards to their disposal techniques. Because [PFAS has historically not been regulated under the Safe Water Drinking Act](#), companies have had little incentive to become more scrupulous in their disposal techniques or report contamination incidents. Bringing PFAS under the regulation of the Safe Water Drinking Act and eliminating its use would be exceedingly beneficial to those communities impacted most, due to the decreased cost related to reduced rate of health problems, health care complications, and increased peace of mind that having access to clean drinking water would bring. The Environmental Protection Agency (EPA) has recently released their [plans to do just that](#) and establish the maximum contaminant level (MCL) of two PFAS subtypes, PFOA and PFOS, at 4 parts per trillion, which is certainly a good start. The 2021-2024 EPA [PFAS strategic roadmap](#) also highlights the disproportionate effects of PFAS on disadvantaged communities and pledges to dedicate resources to understand the impact of exposure on these communities, as well as offer solutions that create an equitable benefit. Opponents of a PFAS ban argue that it will cost too much. I would argue that the direct health care costs, [€52-84 billion annually](#) (37-59 billion in U.S. dollars) as estimated in one European study, as well as the indirect social costs like lost wages, lost years of life, and reduced quality of life, outweigh the potential costs of stopping PFAS use. Companies that manufacture PFAS or industries that regularly use them in their products might scoff at a potential ban. This resistance would be short sighted because innovation and development of alternatives to PFAS will likely be needed

for these companies to survive and thrive in the future, and lawmakers, consumers, and the public will likely demand a ban once more data is available and widely publicized that delineates the negative health effects PFAS can cause.

Conclusion

It is critical to act now to begin phasing out and ultimately banning PFAS to reduce its negative health impacts on impoverished communities and communities of color. The longer these substances are allowed to accumulate in our bodies and the environment, the longer they will have devastating health consequences to the Americans that can afford it the least.

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Empowering nurses in rural eastern Dominican Republic: a pathway to improved quality care for maternal and neonatal patients through education



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Abstract

Despite near-universal maternal and neonatal health care coverage, high maternal and neonatal mortality rates remain significant challenges in the Dominican Republic. Therefore, the Ministry of Health has prioritized efforts to improve the quality of reproductive, maternal, and child health services and recognizes nurses' education in obstetrics and perinatal care as a core strategy for this goal. In line with these national priorities, a multidisciplinary team, in collaboration with the Regional Health Service, developed a program to empower 30 obstetric and neonatal nurse leaders from critical facilities through education in the Eastern Dominican Republic, the region with the third-highest concentration of live births.

The program's initial phase, which began in July 2019, consisted of a year-long, five-part workshop that addressed topics ranging from newborn baby care and resuscitation to pregnancy, labor and delivery, and postpartum evaluation and complications. In addition, participants were provided with ongoing support through a video gallery and a web-based chat for sharing questions, successes, and challenges directly with program staff and regional authorities. Feedback from participant nurses was overwhelmingly positive, with many reporting improved clinical knowledge, skills, and confidence and an increased sense of empowerment. Many communicated being able to, for the first time, successfully manage maternal hemorrhages, diagnose hypertensive disorders of pregnancy, counsel breastfeeding mothers facing latch issues, and provide neonatal resuscitation.

Recognizing nurses' value, particularly in settings where their abilities are often underestimated, can increase their sense of empowerment and confidence in serving others, enabling them to fulfill the critical role they play in the health of mothers and infants in the Dominican Republic. As a result, the Dominican Foundation for Mothers and Infants (DOFMI) acknowledged the importance of establishing similar programs on a national level, while also continuing to concentrate their long-term maternal and child health efforts on this specific region, which was particularly impacted by the COVID-19 pandemic.

Background

Substantial efforts have been made to ensure women and their newborns reach their full potential for health and well-being; however, high maternal and neonatal mortality rates (MMR and NMR, respectively) are still significant challenges for the Dominican Republic (DR). Approximately 200,000 babies are born each year, and over 95% of antenatal, perinatal, and neonatal health care is covered by qualified workers [1, 2]. Nevertheless, more than 2,830

newborns and 200 women died during and following pregnancy and childbirth in the DR in 2018 due to preventable or treatable causes [3]. In the same year, the Eastern health region, the region with the third-highest concentration of live births in the country, reported an MMR that exceeded 80 per 100,000 live births and an NMR of 10 per 1,000 live births [3]. The discrepancies between the almost universal maternal and neonatal health care coverage and the high morbidity and mortality rates suggest issues with the quality of services provided [4].

Accordingly, in 2019 the Ministry of Public Health prioritized actions to strengthen human resources competencies in all disciplines and levels of care directly related to reproductive, maternal, and child health services [1].

One such action was the timely engagement of the Dominican Foundation for Mothers and Infants (DOFMI), a non-profit organization established in the 1980s in both the DR and the United States. Initially, DOFMI was focused on identifying the reasons behind the high incidence of meningitis and pneumonia that led to fatalities and disabilities among Dominican children in the 1980s.

They also aimed to accelerate the introduction of vaccines that could prevent those infections. After successfully contributing to the significant control of infectious diseases, the organization redirected its efforts in 2018 toward the pressing needs of premature newborns, as well as mothers with high-risk pregnancies and deliveries. A few years before this shift, the organization addressed maternal and neonatal concerns in Barahona Province, which is in the southern part of the country [5]. In 2019, DOFMI was determined to create positive changes in Eastern DR (see Illustration 1).

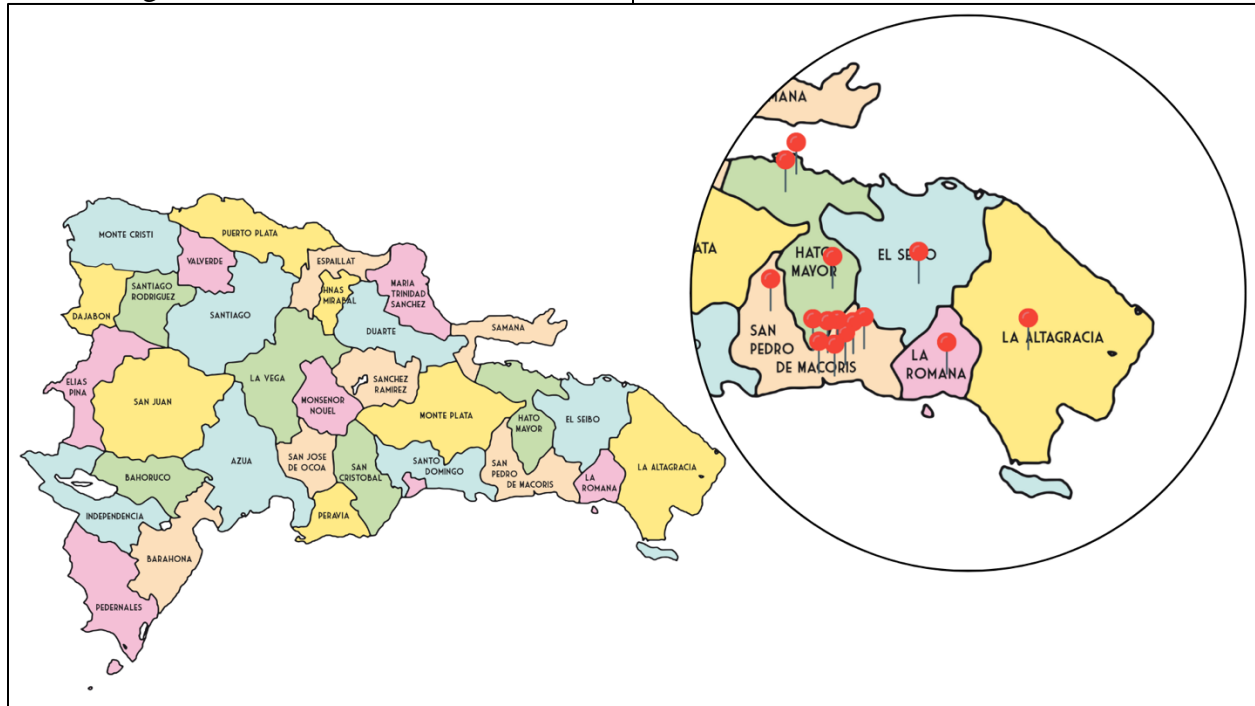


Illustration 1. Map of the Dominican Republic. See magnified: Eastern region and selected facilities (red pin)

Maternal and infant nurses in Latin America have a long-standing history of reducing MMR and NMR. The evidence and experience validated in the region support nurses' education in obstetrics and perinatal care as a core strategy to reduce MMR and NMR [1]. In the DR, nurses are the frontline of care for infants and their mothers, representing an essential component of the healthcare system. In rural communities, nurses also function as leaders and health advocates, serving as liaisons between the patients and the healthcare system.

The Eastern Regional Health Service (known in Spanish as Servicio Regional de Salud Este or SRS Este) oversees five provinces: Hato Mayor, El Seibo, La Altagracia, La Romana, and San Pedro de Macorís. Within these provinces, which are significantly rural or transitioning from rural to urban, ten hospitals and five primary care units

were identified as critical facilities to address maternal and neonatal concerns (see Illustration 1). SRS Este personnel selected 30 nurse leaders (nursing degree: 14 ancillary nurses, 12 bachelor, and 4 technical) from these facilities to initiate an education program on maternal and neonatal care.

Rural Nurse of the Eastern Region Education Program

The main objective of the program was to empower obstetric and neonatal nurses through education in rural Eastern DR. This effort was focused on the long-term goal of improving quality of care and reducing morbidity and mortality rates. The program's initial phase started in July

2019 with the introductory module of a year-long five-part workshop (see Table 1) developed by a multidisciplinary team of a nurse practitioner-midwife and physicians. The workshop contents were continuously tailored to meet the

specific needs and priorities of the nurses' work settings. Upon completing the workshop, the nurses earned a Certificate of Specialization in Maternal and Neonatal Care from DOFMI and the National Health Service.

Table 1. *Maternal and Neonatal Care Workshop*

Module I: Introduction. Held on July 11th, 2019 in San Pedro de Macorís (SPM), DR.

1. Discussion: How do you provide prenatal care?
2. Overview of pregnancy history-taking, abdominal examination, and stages of labor
3. Overview of pregnancy complications
4. Overview of newborn baby care and neonatal resuscitation

Module II: Preserving the Lives of Mothers and Babies. Held on August 15th, 2019 in SPM, DR.

1. Discussion: Maternal and neonatal deaths. Why do mothers and babies die? What can the nurse do to improve maternal and neonatal outcomes?
2. Newborn baby care, including the initial newborn evaluation and follow-up: history-taking and physical examination; neonatal resuscitation or “the golden minute”; risk factors for infections, jaundice, and hypoglycemia; proper handwashing and hygiene; breastfeeding; and local care protocols.

Module III: Pregnancy. Held on December 4th, 2019 in SPM, DR.

1. Overview of reproductive anatomy and physiology
2. Fetal development and circulation
3. Before conception: how to prepare for pregnancy
4. Obstetric evaluation: maternal history-taking, physical examination, and additional tests
5. Common problems during pregnancy
6. Obstetric complications: pre-eclampsia, anemia, and kidney infections
7. Breastfeeding
8. The adolescent mother
9. Local obstetric care protocols
10. Prevention of domestic violence against women
11. Introduction to the S.T.A.B.L.E. program: post-resuscitation/pre-transport stabilization infant care

Module IV: Labor and Delivery*

1. Labor and delivery evaluation: history-taking and physical examination
2. Management of normal labor and delivery: stages of labor
3. Signs of danger during labor and delivery
4. Complications of the third stage of labor: uterine atony and hemorrhage
5. Episiotomy
6. Additional review of pre-eclampsia

Module V: Postpartum*

1. Postpartum evaluation: history-taking and physical examination
2. Postpartum complications
3. Family planning
4. Breastfeeding

*Due to the COVID-19 pandemic restrictions, five two-hour interactive video conferences were held during August and September 2020 to discuss topics and study cases from Modules IV and V.

To provide ongoing support, a web-based chat (WhatsApp group) between the nurses, program staff, and regional healthcare authorities was made available at the beginning of the program. Nurses were motivated to use this channel to share their achievements, questions about patient care, workplace limitations and needs, and any other personal experiences or commentary. Even after completing the workshop's core components, nurses were still encouraged to use the chat to follow up and strengthen the team's relationship.

DOFMI's staff also recorded educational materials to be shared through the web-based chat and uploaded to an education video gallery (YouTube). Currently, the gallery contains videos in Spanish about basic concepts of sexually transmitted infections and TORCH infections, recordings of past modules, and proper procedures for cleaning and disinfecting incubators. Nurses received a work binder with crucial information for each workshop module. The provided information was adapted from the American College of Nurse-Midwives's publication *Life-Saving Skills: Manual for Midwives* [6] and several Ministry of Public Health national clinical practice guidelines for the care of pregnant women and their babies. Each facility also received donations of medical equipment and tools, including a newborn emergency resuscitation kit, Doppler fetal heartbeat monitors, infant stethoscopes, pulse oximeters, measuring tapes, thermometers, and pregnancy wheels.

Key Results

Participants' Perspectives: Workshop Feedback

In order to meet the needs and priorities of the nurses, mid-workshop (December 2019) and end of workshop evaluations (October 2020) were conducted (see Table 2). Most nurses had an excellent opinion of the workshop, had their expectations excellently met, affirmed it was very likely they would practice what they learned, and found the material sent through the chat useful. Nurses also had a very favorable opinion on the workshop's content, length, organization, and educators, and over 90% would recommend this experience to their colleagues.

The three most common new concepts or skills nurses learned during these modules based on the mid-workshop evaluation were taking adequate care of the mother and the newborn, gaining the trust from patients to identify domestic violence, and newborn resuscitation. A substan-

tial number showed interest in having more practical sessions and highlighted the need to learn about umbilical vein catheterization. One nurse suggested inviting their immediate supervisors, most of whom are OB-GYN physicians, to the workshop to confirm that the nurses can safely and correctly perform the procedures commonly done in their facilities and assert that they should be trusted more.

In the final feedback form, nurses were again asked to mention three concepts or skills they newly learned throughout the modules. Most answers included managing the stages of labor, breastfeeding counseling, and hypertensive disorders of pregnancy. The form asked what, if anything, might hinder them from putting into practice what they learned. Approximately 30% mentioned the lack of teamwork (physicians do not allow them or encourage them to participate actively) and lack of tools and equipment. From participants' perspective, the workshop's strengths were the ongoing support and encouragement from the educators and other participants, the constant reminder of the value of their roles, having a safe space to express themselves and be heard, and the educators' willingness to teach. The workshop's weaknesses included the inability to conduct the last two modules in person due to COVID-19, which did not allow for the simulated practice that is critical for the labor and delivery module. Many nurses mentioned their interest in being part of future workshops and suggested conducting learning sessions in their clinical facilities, preferably with patients.

Limitations in Maternal and Child Health Services

During module II of the workshop, nurses had a fruitful discussion prompted by the following questions: "Why do mothers and babies die in the DR?" and "What can the nurse do to improve maternal and neonatal outcomes?" Nurses were divided into five teams. Each team was assigned a category to guide their answers to the earlier mentioned questions: organization of care inside the hospital, (lack of) culture of patient safety, referrals and counter-referrals, infrastructure, and conditions of poverty and inequality. These categories were proposed by Castro to encompass the criteria usually associated with maternal mortality [7]. Nurses were asked to answer the aforementioned questions based on their experience during daily work in their facilities, which resulted in a discussion focused on understanding maternal and neonatal deaths in the DR and the role of nurses in the prevention of these deaths (see Table 3). During this module, SRS Este representatives were present to address nurses' concerns

Table 2. *Participants' Perspectives: Workshop Feedback*

Item	Mid- Workshop Dec. 2019 (n=27) n (%)	End of Workshop Oct. 2020 (n=29) n (%)
What is your overall opinion of the workshop?		
Excellent	26 (96.3)	28 (96.6)
Good	1 (3.7)	1 (3.4)
Regular	0 (0)	0 (0)
Bad	0 (0)	0 (0)
My expectations were met.		
Excellent	25 (92.6)	24 (82.8)
Good	2 (7.4)	5 (17.2)
Regular	0 (0)	0 (0)
Bad	0(0)	0 (0)
How likely is it that you can practice what you learned?		
	20 (74.1)	22 (75.9)
Very likely	7 (25.9)	5 (17.2)
Likely	0 (0)	2 (6.9)
Somewhat likely	0(0)	0 (0)
Unlikely		
How helpful was the material sent through the chat?		
	21 (77.8)	28 (96.6)
Very useful	6 (22.2)	0 (0)
Useful	0 (0)	1 (3.4)
Somewhat useful	0(0)	0 (0)
Not useful at all	0 (0)	0 (0)
I did not read it		
The workshop content was appropriate and informative*.		
	23 (85.2)	24 (82.8)
Totally agree	3 (11.1)	5 (17.2)
Agree	0 (0)	0 (0)
Disagree	0(0)	0 (0)
Totally disagree		
What is your opinion on the workshop's length?		
	21 (77.8)	24 (82.8)
Sufficient	6 (22.2)	5 (17.2)
Relatively sufficient	0 (0)	0 (0)
Relatively insufficient	0(0)	0 (0)
Insufficient		
What is your opinion on the workshop's organization?		
	22 (81.5)	25 (86.2)
Excellent	5 (18.5)	4 (13.8)
Good	0 (0)	0 (0)
Regular	0(0)	0 (0)
Bad		

Would you recommend the workshop to your colleagues?	25 (92.6)	26 (89.7)
Totally agree	2 (7.4)	3 (10.3)
Agree	0 (0)	0 (0)
Disagree	0(0)	0 (0)
Totally disagree		
What is your overall opinion on the educators?***		28 (96.6)
Excellent		1 (3.4)
Good		0 (0)
Regular		0 (0)
Bad		

*n=26, **Question not included on the first evaluation.

and reiterate their commitment to improving these circumstances.

Achieving Nurses' Empowerment

The empowerment of nurses was evidenced through discussions during meetings and in the web-based chat group. On multiple occasions, nurses proudly mentioned how, for the first time, they could successfully stop maternal hemorrhages, diagnose hypertensive disorders of pregnancy, counsel breastfeeding mothers facing latch issues, receive and refer preterm newborns, and provide neonatal resuscitation when required. Nurses affirmed that this workshop enriched their knowledge and skill set and increased their motivation to practice their abilities. Nurses mentioned how this experience reaffirmed their skills and increased their confidence in serving mothers and infants. This is of great importance as the abilities of nurses are often underestimated. Nurses also stated their commitment to giving their best for their patients' welfare and staying vigilant in the face of present and possible complications with the same dedication as if these mothers and infants were their close relatives.

Conclusion

After more than a year of interacting with these 30 nurses, their desire for knowledge and working aptitudes, motivation to improve themselves, and willingness to work hard to achieve this goal were continuously made evident. This motivation, driven by their commitment to better serve their patients, was vital to nurturing the close partnership between the nurses, the program staff, and local authorities.

Numerous factors, most of which are beyond nurses' control, prevent them from carrying out their work efficiently. In addition to the organizational, safety, infrastructural, and unequal conditions that threaten the quality of care given to patients, nurses are often undervalued, and their abilities are underestimated by those who should instead encourage them. These nurses have a powerful desire to contribute to decision-making processes, risk assessments, and care plans related to their patients. This dedication is shown in their continuous and active participation through the web-based chat by sharing stories, pictures, and videos of their successes during and after the workshop's conclusion.

In addition to discussing five maternal and neonatal care theory and practice modules, the meetings allowed the nurses to share their victories and hardships. The nurses were able to hone in on important clinical concepts, acknowledge their resilience, and acquire a sense of empowerment, as was highlighted by their feedback throughout the in-person and web-based discussions. Believing in themselves and their knowledge is essential for these nurses to effectively contribute to the health system they work in. Furthermore, they recognized the importance of their daily actions (e.g. home visits, patient counseling, etc.) in increasing mothers' and newborns' survival in the Eastern region of the DR and the need to continue advocating to improve the working conditions that currently threaten the quality of care received by patients.

At the conclusion of the workshop in 2020, amidst the COVID-19 pandemic, the Eastern region of the DR recorded an MMR of 136 per 100,000 live births and an NMR of 11 per 1,000 live births [8]. These rates were higher than the initial rates observed at the start of the

Table 3. *Understanding Maternal and Neonatal Deaths in the DR and Nurses' Role: Discussion Summary*

Categories	Why do mothers and babies die in the DR?	What can nurses do to improve maternal and neonatal outcomes?
Organization of care inside the hospital	Lack of continuous prenatal and newborn care	Local and regional authorities are responsible for addressing most of the reasons cited by the nurses. Nevertheless, nurses affirmed their commitment to advocate for the structural improvement and organization of their facilities.
	Lack of coordinated care across providers	
	Specialists do not know the clinical history of the mother and the newborn and are not always present at the time of delivery	
	Language barriers between patients and providers	
(Lack of) culture of patient safety	Patient perinatal record is not entered into the digital platform	Nurses are aware of the relevance of actions within their daily role that may improve maternal and neonatal outcomes, including:
	Lack of adherence to national clinical practice guidelines	
	Equipment in poor conditions (e.g., incubators, hospital sterilizers)	
	Long wait in requesting and obtaining results from medical testing	
Referrals and counterreferrals	Providers' burnout that impacts patient care and safety	- Conducting home visits, particularly during the postpartum/newborn period
	Lack of ambulances to transfer patients	- Filling out complete and detailed medical histories
	Insufficient communication between referring-transferring facilities	- Discussing national clinical practice guidelines and encouraging care providers to adhere to them
Infrastructure	Receiving hospitals send patients back to original facilities	- Improving patient counseling efforts (e.g., the importance of prenatal visits and tests, the impact of nutrition on health during pregnancy)
	Inadequate blood supply at hospital	
	Limited number of beds and incubators	- Creating patient information materials in multiple languages
	Water leaks in ceilings and walls	
	Lack of structure to room-in mother and infant	
	Lack of elevators to transport patients between floors	
Inappropriate hygiene		
Conditions of poverty and inequality	Patients cannot afford medications or medical tests	
	Malnutrition in women	
	Patients miss appointments for not being able to afford transportation or do not have someone to take care of their children	
	Limited access to quality prenatal education	

program. This prompted DOFMI to concentrate their long-term efforts on this specific region. Nevertheless, through the nurses' feedback, DOFMI also recognized the value of establishing this kind of program on a national level. The knowledge and skills acquired through education could certainly increase the quality of care provided. However, most importantly, the recognition of the nurses' value contributes to increasing their sense of empowerment and confidence in serving others, enabling them to fulfill the critical role they play in the health of mothers and infants in the Dominican Republic.

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Drive-thru clinics: a new model of healthcare delivery and future directions – a Lubbock, Texas experience



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Abstract

The SARS-CoV-2 pandemic infected hundreds of millions of people worldwide and had important ramifications for the way we deliver healthcare. In order to minimize the spread of disease, drive-thru testing lines became commonplace. Out of the drive-thru testing lines, the concept of a fully operational family medicine drive-thru clinic was created. Drive-thru clinics increase patient accessibility and minimize disease transmission among the acutely ill. It also opens the possibility of expanding healthcare access to surrounding rural communities and underserved communities. However, accessibility should be conducted responsibly to avoid jeopardizing patient safety. Public health implications and future directions are discussed.

Introduction

When the COVID-19 pandemic began, daily life was profoundly affected for everyone. Lockdowns were put into place, one could not leave their home without a mask, and even when the lockdowns ended, most people remained working from home. One of the most extreme effects of COVID-19 was the effect it had on the healthcare system. Hospitals all over the country were at full capacity, personal protective equipment was scarce, and lifesaving medical equipment like ventilators and hospital beds were rationed. Further, this meant that healthcare relating to other diseases apart from COVID-19 was also affected, as resources had to be reallocated for pandemic response. Unfortunately, the disease burden disproportionately affected the elderly, minorities, and low-income communities [1].

Before COVID-19 tests became readily available to the public, one had to go to a retail clinic (i.e., CVS MinuteClinic, Walmart Pharmacy, etc.), doctor's office, urgent care, or emergency department for a test [2]. This quickly became a problem as lines to get a COVID-19 test grew more than facilities could reasonably handle. People would wait hours for tests and lines of cars stretched miles, all hoping to get tested before supplies run out [6]. Makeshift drive-through centers were set up with the hopes of getting more people tested in a shorter amount of time. With the burden of COVID-19 tests on the healthcare system, there was an urgent need for facilities with greater abilities to test all those who needed it [7]. University Medical Center (UMC) located in Lubbock, Texas, saw this need and attempted to fill it. While opening a new family medicine and pediatric clinic, UMC also added a

drive-through clinic annex where individuals could get COVID-19, influenza, and Streptococcus tests, as well as care for simple infections without leaving their car. As the pandemic has disproportionately affected the elderly, marginalized, and vulnerable populations, the goal was to increase accessibility to health care by making it an easier, faster, and more convenient process to get tested. The drive-through clinic opened in June of 2022 and is currently seeing patients during traditional clinic hours. As medical and public health students at UMC, the authors of this paper requested to tour the facilities to write an article about the public health implications of this new healthcare delivery method and discuss some of the potential risks associated with it.

Clinic Layout and Operations

The clinic is open on weekdays from eight in the morning to five in the afternoon and does not open on the weekends. From the outside, the family medicine area of the clinic takes over a person's field of view. Upon further inspection on the side of the building, a familiar aspect of fast-food architecture comes into view: there is a two-lane passageway that leads up to a garage-like structure, with gates that open and slide upwards like a garage door.

Upon entering the garage, the space opens to a larger room outfitted with items you would find in an emergency department triage room with one significant difference: there is ample room for a car and space to move around the car for providers. There is an exit on the end farthest away from the entrance and a doorway that leads to the provider

area on the side. There is also a mobile cart with triage tools and a computer on wheels.

Once a patient drives into the space, they are within the clinical area. There is no further exertion required on the part of the patient and exiting the vehicle is not required. The space is staffed with a nurse practitioner, a receptionist, and a medical assistant during all operating hours. The nurse practitioner comes out to the car bay and assesses the patient. All measurements are taken in this manner, and any further examination will be done with the patient still inside their vehicle. In some cases, the patient may be asked to recline their seat all the way back for an abdominal exam. In that same space is a mobile cart with equipment to take vital signs.

Patients who present with complex medical diagnoses are referred to the main clinic inside the building so they may be properly evaluated. These patients may also be referred to the main UMC hospital as appropriate. Blood can be drawn in the drive-through, but this is not typically done. Monday and Friday afternoons are typically the busiest for the clinic, often causing the line to reach five to six cars at a time. As the day moves toward closing hours, the entrance is closed off ahead of time to prevent excess patients from waiting and not getting treatment. Those in the lane are seen and treated before clinic staff go home for the day, while the family medicine side of the clinic may remain open.

Discussion

Accessibility and Patient Safety

Anyone that has ever been to a pediatric office has observed busy parents struggling to carry their sick children to the examination room. Furthermore, overbooked pediatric and family medicine clinics make it difficult for people to seek care when dealing with an acute infectious illness. One thing that became clear during our visit to the drive-through clinic is that history taking, physical examination, and point-of-care testing for infectious conditions can be done with the patient still in the vehicle. Like urgent care clinics, this drive-through clinic operates without the need to schedule appointments, thereby facilitating greater access to medical care. Drive-through clinics can also improve accessibility for elderly with mobility impairments, wheelchair users, and patients with physical disabilities.

Drive-through clinics could also allow patients suffering from infectious illnesses to be assessed, examined, and treated within the confines of their car, thus reducing the risk of disease transmission in a waiting area. At the height of the COVID-19 pandemic, emergency rooms struggled to isolate those infected with the virus from other vulnerable patients sitting in the same waiting room. Hospitals tried putting as much distance between patients as possible by sending them to different areas of the waiting rooms, building separate waiting rooms, and offering drive-through testing for the virus [3]. A drive-through clinic for infections also means reduced disease transmission in primary care office waiting rooms. This protects children, pregnant people, the elderly, and immunocompromised individuals from inadvertently getting ill while waiting for care.

Assessment

Innovative ideas can often carry unintended consequences. Accessibility is undoubtedly a benefit but should be done carefully so as to not jeopardize patient safety. Take for instance a driver that pulls into the drive-through because their child recently started complaining of abdominal pain and nausea. In a traditional clinic, it may be easier to adequately assess a patient for acute abdomen concerns by doing a thorough abdominal examination. However, in this case, the child is still strapped into the car seat, making it more difficult for a thorough assessment. Therefore, clear limitations need to be established for the proper use of the drive-through clinics as compared to alternatives like telehealth or traditional clinics.

Except for conditions requiring more privacy to diagnose, like urinary tract infections, the drive-through clinic is well-equipped to handle minor infectious illnesses and point-of-care testing, such as respiratory, ear, eye, and sinus infections, and vaccinations. Routine annual visits including well-child checks that require significant time for education and counseling are better done in the traditional clinic setting. Clinic visits that require the use of imaging, laboratory blood draws, or electrocardiograms are also better done in the traditional clinic setting. As the business model for drive-through clinics continues to expand in the healthcare industry, a word of caution is needed. Greater accessibility should not be confused with convenience. Corporations will undoubtedly be driven by competition and capitalism to expand drive-through services for convenience. Expanding services to provide a drive-through bay dedicated for annual visits,

electrocardiogram stations, or other medical complaints that require a significantly higher level of care is dangerous. Therefore, we caution against the “McDonaldization” of the healthcare industry for

convenience at the expense of patient safety [4]. Table 1 summarizes our recommendations for good and poor candidates for drive-through clinics.

Table 1: Summary of good and poor candidates for drive-through clinic use and the recommended alternatives. This table is not an exhaustive list of potential reasons for patient visits.

Good Candidates	Poor Candidates	Clinic Alternative for Poor Candidate
Minor infections (respiratory, eye, sinus, ear)	Urinary Tract Infection, Sexually Transmitted Infections	Primary Care Clinic, Retail Clinic, Urgent Care
Vaccinations	Well Child Exam, Adult annual visits	Primary Care Clinic
COVID-19 testing	Mental health screening	Primary Care Clinic, Telemedicine visit
Small injuries	Head and neck injuries Laceration repairs, major injuries requiring imaging	Primary Care Clinic, Urgent Care, Emergency Center

Future Directions and Public Health

Currently, we foresee the idea of a drive-through clinic annex spreading into other regions. Drive-through testing and treatment of common minor ailments and vaccinations without needing to set up an appointment is appealing to consumers, and the business model is promising. We also believe that drive-through clinics can potentially provide another step-down option to emergency rooms and urgent care clinics and can treat conditions that telehealth services cannot. This could possibly reduce the oversaturation of emergency centers, urgent care clinics, and primary care clinics. Primary care clinics could then use the additional time and resources for higher acuity cases, routine annual visits, and management of chronic conditions. Another interesting application of this innovative model is its

implications for improving accessibility to medically underserved areas and rural communities.

During our time at the UMC Family Medicine clinic, we were surprised to discover that many of the patients drove from surrounding rural communities. Many of them suffering from acute infectious illnesses were turned away from fully booked primary care offices and decided to seek care at the drive-through clinic. Lubbock is a medium-sized city surrounded by small rural communities throughout West Texas, and from a public health standpoint, a drive-through clinic could improve access to healthcare services for surrounding rural communities. One of the most successful methods for improving healthcare delivery to medically underserved rural communities has been through telemedicine, specifically, for mental health complaints [5]. However, this too

requires the patient to have access to a computer or tablet, have reliable high-speed internet and bandwidth, and have some degree of computer knowledge. Drive-through clinics could expand services to those who rely on telehealth by treating infectious illnesses that may otherwise require in-person point-of-care testing, such as Streptococcus, ear infections, and influenza testing. Therefore, we believe that drive-through clinics placed in strategic locations in suburban areas close to major highways could improve accessibility to surrounding rural communities. Expanding services to self-pay, uninsured, and Medicaid patients could further allow patients in disadvantaged communities to receive the care they need

without the long wait times and insurance obstacles. The larger hospital systems in the area, such as the UMC main hospital and the other urgent care clinics, are often busy throughout the day with few open spots for walk-ins. This drive-through clinic in Lubbock can help alleviate that issue provided that it can cater to those with other forms of insurance or no insurance. Expanded business hours outside of traditional clinic hours could also improve accessibility to those traveling from surrounding rural communities. Figure 1 summarizes our recommendations for improved access to medically underserved populations and areas.

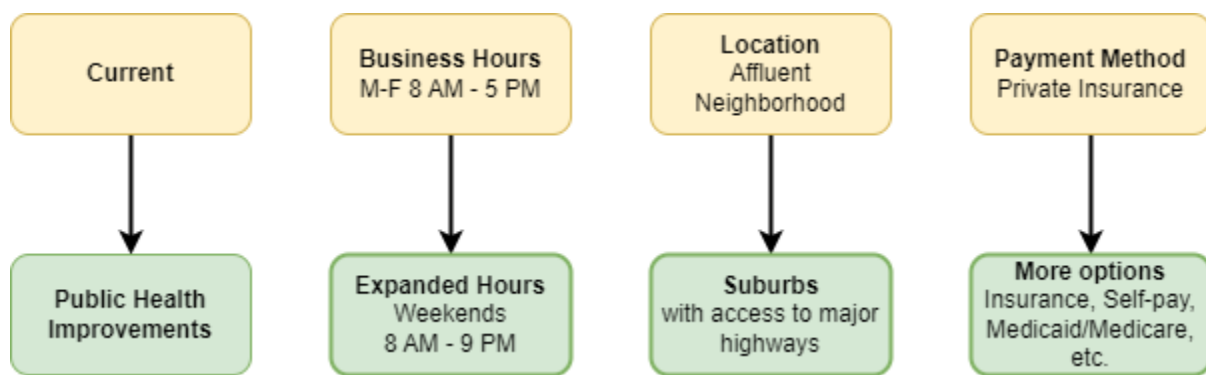


Figure 1: Summary of recommended changes to clinic location, hours, and payment options to improve access to medically underserved populations and areas.

With increased accessibility to medically underserved areas comes the added benefit of allowing these patients to know when a higher level of care is needed. Urgent care is most often the first point of contact for patients who have the initial symptoms of something more serious. In affluent areas with easy access to clinics, this is not an issue. For those living in disadvantaged areas, it is difficult to get to a clinic and be referred if something more serious is found. The UMC drive-through clinic fills this gap in care. Patients can be examined by this clinic and referred to the main UMC hospital for imaging and further treatment, providing a stronger connection between underserved areas and the main campus. As drive-through clinics expand beyond the Lubbock area, this is an added potential benefit for patients located in surrounding rural communities. Preliminary numbers show the clinic model is sustainable and clinic management predicts expansion, but they will not release data until the clinic's first anniversary.

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