



COVID-19 Testing and Resources for Underserved Communities in Rural Tijuana

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Abstract

Flying Samaritans at the University of California, Los Angeles (UCLA) is a 501(c)(3) nonprofit, undergraduate student-led organization which provides medical and dental care, prescription medications, and health education resources free-of-cost to two underserved, rural communities in Tijuana, Mexico. Free Coronavirus Disease 2019 (COVID-19) testing is not widely accessible in Tijuana. Pandemic-related job loss and high rates of financial instability in the communities create financial barriers which limit COVID-19 test accessibility. The COVID-19 Resources Project was developed to provide free, on-site COVID-19 rapid tests to patients at Flying Samaritans at UCLA's monthly clinics. This project also offers reimbursement for the roundtrip cost of transportation to vaccination sites for patients who lack access to their own method of transportation, in order to eliminate barriers to getting vaccinated. Lastly, partnerships created with non-profit organizations funded this project and allowed for the provision of additional resources to the patient population. Details regarding this program's development are provided in order to assist student-run free clinics which may be looking to start their own rapid testing and/or grant-funded projects. Lastly, COVID-19 testing is planned to continue into the future.

Background

Flying Samaritans at University of California, Los Angeles (UCLA) was established in 2012 to serve the communities of Colonia Margarita Moran and Rancho Escondido in rural Tijuana, Mexico through monthly free clinics. These communities face barriers to healthcare access caused by issues such as limited job opportunities and low rates of health insurance coverage. Additionally, limited access to clean drinking water, clean air, and fresh produce negatively impact health outcomes in the local population. Flying Samaritans at UCLA strives to alleviate these health disparities by providing a consistent source of medical and dental care. All resources, including prescription medications, are free of charge. Through long-term involvement in the community, Flying Samaritans at UCLA has built lasting relationships in order to promote access to preventative care and to help strengthen patients'

agency in their care.

The clinic site is centrally located near patients' homes, thereby increasing the accessibility of care. Flying Samaritans at UCLA is operated by UCLA undergraduates, who serve as volunteers at the clinic site and organize each monthly clinic. United States (US) and Mexico-based physicians, physician's assistants, nurse practitioners, and nurses treat patients on a volunteer basis. All providers are licensed and practice within the scope of their training. Depending on provider availability and the demand for appointments, a typical clinic will offer between 15 to 40 telemedicine and/or in-person appointments. To support patients outside of the monthly clinics, volunteers research locally available health-related resources including laboratories, pharmacies, maternal health, and mental health services to provide this information to the community. Student volunteers are recruited from Flying Samaritans at UCLA's club on the UCLA campus, and they are

required to complete annual Health Insurance Portability and Accountability Act (HIPAA) training and successfully complete a simulated patient intake prior to volunteering at the clinic. On the day of the clinic, student volunteers complete patient intakes by serving as scribes and/or translators. Student volunteers also present health education materials (which are developed with the guidance of a physician), operate the clinic's on-site pharmacy, and assist dentists at the dental clinic. Providers are recruited through outreach efforts to clinics in Southern California (CA) and Mexico.

The COVID-19 Resources Project provides free COVID-19 rapid tests at Flying Samaritans at UCLA's clinic site each month and offers reimbursement for costs associated with patients' transportation to vaccination sites. This initiative is funded by a \$5,000 grant from the humanitarian aid organization This Is About Humanity's fund at the International Community Foundation.

Changes as a Result of the COVID-19 Pandemic

The last in-person clinic prior to the pandemic was held in January 2020. In order to continue offering services, Flying Samaritans at UCLA began offering monthly telemedicine clinics in June 2020. Telemedicine clinics were held via WhatsApp (2020, Meta Platforms, Inc., Menlo Park, California) voice calls. Monthly supply drop-off trips were also held the day of or the day after the telemedicine clinic, during which patients' prescriptions were filled and care packages containing groceries, masks, personal hygiene products, hand sanitizer, and sanitizing wipes were also provided.

At the beginning of the pandemic, Mexico's healthcare system prioritized hospital care for severe COVID-19 cases. Consequently, this limited the portion of resources directed toward other essential health services, including non-communicable disease care, reproductive care, maternal care, and child healthcare.¹ For instance, at Mexican Institute of Social Security (IMSS) clinics, during the "COVID-19 period," from April to December 2020, compared to the "pre-COVID-19 period" from January 2019 to March 2020, the

proportion of patients with controlled diabetes and controlled hypertension decreased by statistically significant margins, from 36% to 26% and 68% to 55%, respectively.¹ The IMSS is one of multiple government-run health insurance plans, which provided full healthcare coverage and social security benefits for 51% of Mexico's population in 2020.² Many of Flying Samaritans at UCLA's patients depend on its clinic to provide consultations and fill their prescriptions for chronic illnesses. This motivated the development of monthly telemedicine clinics at a time when many doctors' offices in the community had stopped seeing patients due to the pandemic.

Today, telemedicine and/or in-person clinics continue each month. Additionally, the organization continues to provide care packages, and an in-person trip to the clinic site is always conducted monthly, either concurrently with in-person appointments, or following a telemedicine clinic, which takes place if no providers are available for in-person visits.

Goals and Issues Addressed

The COVID-19 Resources Project was developed and operated through the Public Health Committee of Flying Samaritans at UCLA. The objectives of this intervention are to address cost barriers to COVID-19 testing, increase accessibility to testing by offering testing at the clinic site, identify cases of COVID-19 in order to offer treatment to affected patients, and help reduce the transmission of the virus in the community. This project was also established to facilitate a safer return to in-person clinic services by allowing for COVID-19 tests to be offered to patients prior to their in-person appointments, and to offset costs associated with getting vaccinated through the reimbursement of transportation costs.

Free COVID-19 testing is not widely available in Mexico. Additionally, the lack of test accessibility is reflected in the fact that as of December 28, 2021, Mexico's COVID-19 testing rate was one of the lowest in the world.³ From January 22, 2020 to March 10, 2023, Mexico had the world's second-highest case-fatality ratio (which measures the number of deaths divided by the number of confirmed cases) at 4.5 percent.⁴ As such, the low

Table 1. Survey questions asked during the implementation of the COVID-19 Resources Project

Question	Number of responses	Time frame during which question was asked	Responses	Significance
Would you take a COVID-19 test if it were readily available and you had symptoms?	14	February 2021	All patients answered "yes."	The high level of interest in receiving a COVID-19 test confirmed the value of this intervention.
Do you have access to transportation to get to COVID-19 vaccination sites?	47	April 2021 - October 2021	30 "yes" 15 "no" 2 "maybe"	The patients who answered "no" and "maybe" were contacted and offered reimbursement if they were eligible.
Has the COVID-19 pandemic had a negative effect, a positive effect, or no real effect on your social and financial situation?	37	July 2021 - December 2021 (not including November 2021)	24 reported a "negative effect" 12 reported "no real effect" 1 reported a "positive effect"	In a follow-up to this question, most patients reported job loss, reduced hours, and/or difficulty finding work due to the pandemic. This supported the need for the continued provision of care packages and the services provided by the COVID-19 Resources Project.

The first two questions were asked to guide the development of the COVID-19 Resources Project. The last question assessed how patients were impacted by the COVID-19 pandemic in order to provide insight into how the organization's resources could be best used to support the patient population.

COVID-19: Coronavirus disease 2019

COVID-19 testing rate is a possible cause of the high case-fatality ratio.

Furthermore, at Salud Digna, a local laboratory which offers access to relatively affordable COVID-19 testing, a rapid test costs 260 pesos and a polymerase chain reaction (PCR) test costs 950 pesos.⁵ In 2022, the minimum wage in Mexico's Northern Border Zone (which includes Tijuana⁶) was 260.34 pesos per day, approximately 12.15 US dollars (USD).⁷ Throughout the pandemic, COVID-19 testing has been largely inaccessible due to high rates of pandemic-related job loss and overall high rates of financial insecurity. These hardships motivated the development of the COVID-19 Resources Project.

Needs Assessment

Prior to the implementation of the intervention, surveys were conducted in order to investigate whether there was a need for access to low-cost or free COVID-19 testing in the community. All data was collected through monthly clinic surveys, which were conducted by student volunteers in-person or through a phone call, depending on whether in-person or telemedicine services were offered to the patient. Prior to the

development of this project, surveys had always been used to assess patient satisfaction, ask about interest in particular initiatives that were being developed, and provide an open forum for patients to give feedback. Prior to implementing each component of this project, survey questions were used to gauge patients' interest in receiving particular services and to provide insight into the needs of the community. Throughout the project's development, surveys were modified in an effort to adapt to changes caused by the pandemic and to assess the project's effectiveness.

To eliminate duplicate responses from patients who attended multiple clinics during the time a particular survey question was asked, patients' most recent responses were used in the data analysis. In these cases, the patient's previous answers were also removed from the total count of responses. Patients were only eligible to answer surveys if they were age 18 or older and had attended the month's clinic. Data was removed from the analysis when the responses were not traceable to a particular patient, or when a survey was answered by or on behalf of a minor. Surveys were linked to Medical Record Numbers to preserve anonymity. Surveys were conducted from February 2021 to March 2022

(excluding November 2021).

The first survey conducted in February 2021 asked patients whether they would take a COVID-19 test if they had developed symptoms and the test were readily available. All of the 14 respondents answered “yes” (Table 1). Given the limited availability of COVID-19 testing, the high level of community interest confirmed the need for easily accessible COVID-19 tests.

The idea of offering transportation to vaccination sites was considered when vaccines first became available to the general public in Tijuana in Spring 2021. Initially, the possibility of renting vans was explored. However, the dates and times that vaccination sites operated were announced to the general public on the Facebook (2021, Meta Platforms, Inc., Menlo Park, California) page of the Baja California Secretary of Health the day before. Tijuana is located in the state of Baja California. As a result of the constant change in the availability of vaccination sites, reimbursements were offered so that patients could go at their earliest convenience. The information on vaccination sites was shared daily in the clinic’s community WhatsApp chat to help patients obtain these details.

Monthly surveys were conducted from April 2021 to October 2021 to ask patients whether they had access to transportation to travel to a COVID-19 vaccination site. Fifteen of the 47 patients surveyed responded “no,” 30 patients responded “yes”, and two patients responded “maybe” (Table 1). Patients who answered “no” in response to whether they had access to their own method of transportation were asked to provide proof of vaccination in order to qualify for reimbursement. Patients who responded “maybe” were asked to provide clarification, and if these patients stated that they traveled to the vaccination site via public transportation or a taxi and provided proof of vaccination, they were offered reimbursement.

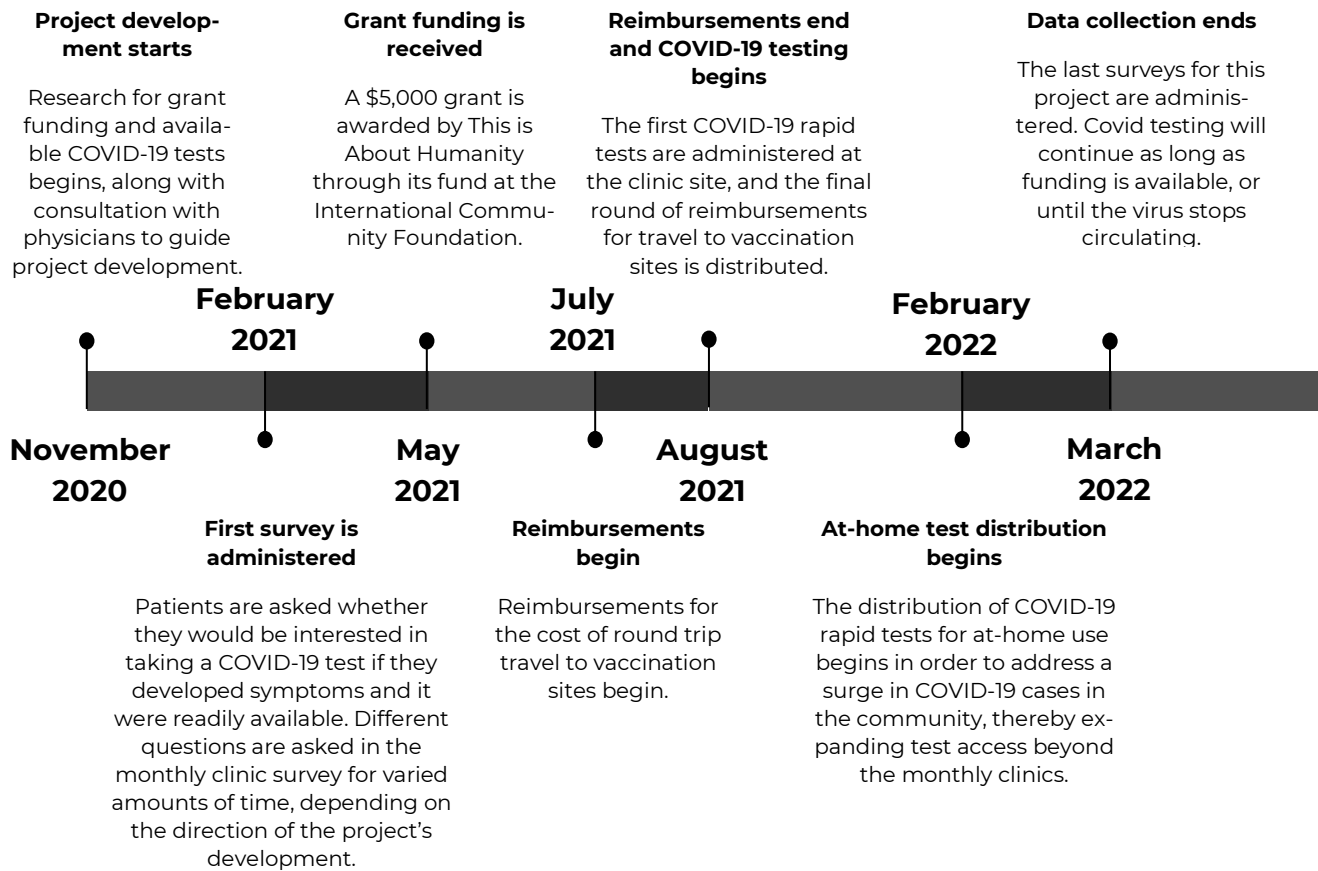
Furthermore, in response to the question asking whether the COVID-19 pandemic had a “negative effect”, a “positive effect”, or “no real effect” on the respondent’s financial and social situation, 24 of the 37 patients surveyed between July 2021 to December 2021 (excluding November 2021) reported that the pandemic had a negative effect on their situation. In response to this question, 12

patients also reported “no real effect” and one patient reported a “positive effect” (Table 1). When asked to elaborate on how the pandemic specifically impacted their financial situation, patients most often reported that they had been laid off from their job, were given reduced hours at their job, and/or that work was difficult to find due to the pandemic. Additionally, two patients reported that job loss for themselves or a family member had occurred during the pandemic due to a chronic health condition. Two patients who reported a “negative effect” also stated that prices had increased during the pandemic. Reimbursement for the cost of transportation to vaccination sites was offered to help ensure that getting vaccinated would not worsen patients’ financial struggles.

Budget and Implementation

Due to Flying Samaritans at UCLA’s limited budget, outside grant funding was sought to support this endeavor. PCR tests were initially planned for use in this initiative. Based on the number of patients seen each month, as well as the prevalence of COVID-19 in the community, it was projected that an average of nine COVID-19 PCR tests would be needed each month for 12 months. At the time of project development, a PCR test from Salud Digna cost approximately 47 USD.⁵ However, when grant funding was awarded, COVID-19 rapid tests were becoming more widely available to the public in the United States. Due to their lower cost, offering rapid tests would have allowed for the provision of more tests, while also potentially allowing for the project to run beyond the initially projected 12 months. Following consultation with Flying Samaritans at UCLA’s faculty advisor, a practicing physician, it was determined that rapid tests would be used since the clinic did not have an on-site laboratory to process PCR tests, and encouraging symptomatic patients to travel to a laboratory would risk further spreading COVID-19 in the community. Abbott BinaxNOW and QuickVue rapid COVID-19 tests were used, because both brands were approved for public use under the United States Food and Drug Administration Emergency Use Authorization. Each box cost approximately 25 USD and contained two tests,

Figure 1. Timeline of project development



This timeline demonstrates the development and implementation of the COVID-19 Resources Project. COVID-19: Coronavirus disease 2019

bringing the cost per test to approximately 12.50 USD. Tests were purchased from retailers including CVS, Walmart, Walgreens, and Amazon. Rapid COVID-19 tests were administered at the clinic site for all patients who had in-person appointments, and tests were also offered to community members upon request. With patients' consent, positive test results were reported to the Mexican Secretary of Public Health for case tracking.

The amount of the reimbursement for the cost of transportation to vaccination sites was determined by a calculation of the average roundtrip taxi fare from the clinic site to four local vaccination sites. The amount of reimbursement was 290 pesos, which equated to approximately 14 USD. A uniform amount was used for reimbursement to allow for a more predictable budget. One reimbursement was given per family, since families

typically traveled to vaccination sites together.

Results

COVID-19 tests were offered at the clinic site beginning in August 2021. COVID-19 testing is planned to continue, provided that grant funding is available and that the need for COVID-19 testing remains. Additionally, 9 families were reimbursed for the cost of transportation to vaccination sites from July 2021 to August 2021, which supported the transportation costs for a total of 22 people. Reimbursements were offered to other eligible families as well; however, some families declined the reimbursement. Lastly, reimbursements did not continue beyond August 2021 because funds were conserved for COVID-19 testing in order to prepare for future surges. A timeline of the project's development is shown in

Table 2. Survey question regarding the frequency of COVID-19 testing

Question	Number of responses	Time frame during which question was asked	Responses	Significance
Given that Flying Samaritans offers COVID tests once per month, do you feel that this is frequent enough for your needs?	16	January 2022 - March 2022	12 patients answered “yes” 3 patients answered “no” 1 patient answered “undecided”	In a follow-up question, 4 patients (3 of whom answered “no” and 1 who answered “yes”) stated that more frequent access to testing would better support the community’s needs. This motivated the development of the at-home testing program.

This question was asked in the midst of a COVID-19 surge to evaluate whether offering COVID-19 testing once per month at the clinic site was sufficient to meet patients’ needs. Although the majority of patients indicated that the once-monthly testing met their needs, the portion of patients who expressed an interest in access to more frequent testing prompted the development of the at-home testing program.

COVID-19: Coronavirus disease 2019

Figure 1.

COVID-19 testing allowed for Flying Samaritans at UCLA to offer a safer return to in-person appointments beginning in November 2021, since all patients were tested for COVID-19 prior to their in-person appointments. Due to the pandemic, in-person appointments had previously not been offered since January 2020. Currently, telemedicine and/or in-person appointments are offered each month, and the supply drop off trips occur every month. COVID-19 tests are also offered monthly.

To assess the effectiveness of the COVID-19 testing intervention, surveys were conducted from January 2022 to March 2022 to ask patients whether they felt access to monthly COVID-19 testing was sufficient to meet their needs. Of the 16 patients surveyed, 12 answered “yes” when asked whether monthly testing met their needs. However, of these 12 individuals, one patient stated that more frequent testing was needed due to an increase in the number of community members experiencing symptoms. Additionally, three patients answered “no” to this question, and followed up by stating that more frequent access to COVID-19 testing would be helpful to meet the community’s needs. Lastly, one patient was undecided with regards to whether the monthly testing was sufficient (Table 2). To address patients’ interest in receiving more frequent COVID-19 testing, a program was developed to offer patients with COVID-19 rapid tests to use at home, thereby allowing for tests to be accessible outside of Flying Samaritans at UCLA’s

monthly clinics.

Patients were also provided with flyers and videos on COVID-19 safety and vaccines throughout the duration of the pandemic. These materials were produced by the Health Education and Public Health committees of Flying Samaritans at UCLA, and they were approved by the faculty mentor prior to their distribution. A seminar on COVID-19 vaccine safety was also presented by a volunteer physician in Spring 2021. Partnerships were also established with non-profit organizations based in San Diego, CA to help meet patients’ needs outside of the realm of COVID-19 testing and transportation to vaccination sites. The American Friends Service Committee of San Diego provided Flying Samaritans at UCLA with hundreds of high quality, reusable masks for patients, and Brother Benno’s supplied hundreds of canned food items to Flying Samaritans at UCLA in two food drives in April 2021 and April 2022 to supplement the groceries that Flying Samaritans at UCLA provides to the patient population.

Discussion

This project supports the feasibility of implementing rapid COVID-19 tests and offering financial support for patients’ transportation needs in student-run free clinics operating in rural, underserved areas. Although implemented with participants from rural Mexico, the model established from this intervention can be adapted to fit the unique needs of student-run free clinics serving low-income/rural communities in the United

States. For instance, telemedicine appointments could be offered to patients who live far from a student-run clinic site and/or have transportation issues. In line with this project's focus on transportation reimbursement, student-run clinics could offer partial or full reimbursement for patients' transportation costs. Additionally, many student-run clinics are affiliated with universities, and some universities offer reduced-cost public transportation passes for students. These universities may be able to help patients of student-run clinics obtain these passes as well. Suggestions for accessing grant funding are offered later in this paper.

In the United States, rapid tests are also available over the counter for many conditions, including human immunodeficiency virus (HIV), hepatitis, strep throat, influenza, and pregnancy. Therefore, the framework from this project could be used by student-run clinics to provide rapid testing for a variety of health conditions. Depending on the shelf life of the test and/or the number of patients served by the clinic, some tests may be able to be purchased in bulk to lower costs. The use of rapid tests in clinics saves patients the cost of purchasing a test or from receiving a bill for laboratory testing. Additionally, rapid tests for the COVID-19 Resources Project were provided prior to all in-person appointments, as well as upon request for patients who weren't seen at the clinic that month. For a clinic with a limited budget and/or a large patient population, tests could be provided only to symptomatic and/or exposed patients in order to conserve resources.

Flying Samaritans at UCLA is a registered 501(c)(3) nonprofit organization, which allows it to be eligible for a wider range of grants. The International Community Foundation accepted unsolicited grant proposals for this funding opportunity, meaning that any organization which met the eligibility requirements was welcome to apply for funding. If a student-run free clinic does not have a current relationship with an organization which offers grant funding, the clinic will likely have more success by searching for organizations that accept unsolicited grant proposals. Many organizations which offer grants also have one or more areas of focus that align with their overall mission. As such, it is helpful to look for organizations with missions closely aligned with

that of the student-run free clinic. The number of US-based organizations which offer grant funding to nonprofits conducting international work is relatively limited, which prolonged the time it took to receive funding for this intervention.

A limitation of this project is Flying Samaritans at UCLA's inability to conduct clinic trips more often than once per month. The frequency of the clinic trips is limited by budget constraints associated with the following: the purchase of patients' medications and food; the cost of renting vans to travel from Los Angeles, CA to Tijuana, Mexico, which is 300 miles roundtrip; and the purchase of Mexican auto insurance. These finance-related challenges are managed through careful budgeting. Additional complications associated with clinic operations include: the need for volunteers to have a passport; wait times at the border line to re-enter the United States, which can take four hours or more.

Moving forward, Flying Samaritans at UCLA will continue to provide COVID-19 testing as long as the need exists and funds remain available. A consistent supply of COVID-19 tests is maintained in order to ensure that test availability meets patients' needs. This project also serves as a framework for other rapid test interventions, which supports preparedness for a potential future pandemic and for the provision of other rapid tests for other conditions.

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Disclosures

The author has no conflicts of interest to disclose.

References

1. Doubova SV, Leslie HH, Kruk ME, Pérez-Cuevas R, Arsenault C. Disruption in essential health services in Mexico during COVID-19: An interrupted time series analysis of Health Information System Data. *BMJ Global Health*. 2021 Sep;6(9):e006204. <https://doi.org/10.1136/bmjgh-2021-006204>. [LINK](#)
2. Sanchez-Talanquer M, Gonzalez-Pier E, Abascal-Miguel L, et al. Mexico's Response to COVID-19: A Case Study [Internet]. San Francisco (CA): UCSF Institute for Global Health Sciences; [accessed 2023 Mar 26]. Available from: <https://globalhealthsciences.ucsf.edu/sites/globalhealthsciences.ucsf.edu/files/mexico-covid-19-case-study-english.pdf>. [LINK](#)
3. Doubova SV, Robledo-Aburto ZA, Duque-Molina C, et al. Overcoming disruptions in essential health services during the COVID-19 pandemic in Mexico. *BMJ Global Health*. 2022 Mar;7(3):e008099. <https://doi.org/10.1136/bmjgh-2021-008099>. [LINK](#)
4. Johns Hopkins Coronavirus Resource Center. Mortality analyses [Internet]. Baltimore (MD): Johns Hopkins University; [accessed 2023 Mar 26]. Available from: <https://coronavirus.jhu.edu/data/mortality> [LINK](#)
5. Salud Digna. Laboratorio clínico + Imagenología + Lentes [Internet]. Culiacán (MX): Salud Digna. 8 2022 [accessed 2022 Aug 19]. Available from: <https://salud-digna.org> [LINK](#)
6. Nikolewski R. New president of Mexico creates 'free zone' along U.S. border in hopes of boosting economy, reducing migration [Internet]. San Diego (CA): San Diego Union-Tribune. 2022 [accessed 2022 Aug 19]. Available from: <https://www.sandiegouniontribune.com/business/economy/sd-fi-mexico-freezone-20181231-story.html> [LINK](#)
7. Reuters. Mexico agrees to 22% increase in minimum wage for 2022 [Internet]. Mexico City (MX): Reuters. 2021 Dec 1 [accessed 2022 Aug 19]. Available from: <https://www.reuters.com/world/americas/mexico-agrees-22-minimum-wage-hike-2022-industry-groups-say-2021-12-01/> [LINK](#)