Tijuana River Valley Community Assessment for Public Health Emergency Response (CASPER)

October 2024

COUNTY OF SAN DIEGO
HEALTH AND HUMAN SERVICES AGENCY

LIVE WELL SAN DIEGO

CDC

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South Region, San Diego County

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Executive Summary

The Tijuana River Valley has been severely impacted by contamination from untreated sewage, urban runoff, and industrial waste for decades. Over the past five years, over 100 billion gallons of pollutants have been discharged into the Tijuana River, raising major concerns about water quality and public health in the San Diego region. This pollution, primarily from raw sewage flowing into the Tijuana River Valley and nearby beaches, affects both the environment and human health.

The situation worsened with Tropical Storm Hilary in August 2023, which led to a boil water advisory issued by the California-American Water Company and prompted an immediate public health assessment by the County using data from various sources. Further complications arose from severe flooding caused by an atmospheric river in January 2024, which intensified the sewage contamination.

The crisis has drawn significant attention from public health officials and elected representatives, leading to ongoing efforts by federal, state, and local agencies to address the contamination through improved wastewater treatment, regulatory oversight, and international cooperation. However, residents continue to face challenges, including unpleasant odors, perceived poor air quality, increased health concerns, and disruptions to daily activities, impacting their overall quality of life.

In response to the ongoing crisis, the County of San Diego Health and Human Services Agency (HHSA) requested technical assistance from the Centers for Disease Control and Prevention (CDC) to conduct a Community Assessment for Public Health Emergency Response (CASPER). CASPERs are designed to help quickly determine community needs and provides evidence-based information to guide public health actions. The door-to-door data collection process also helps build trust and improve community cooperation.

County of San Diego HHSA, with technical assistance from the CDC, created a two-page survey covering household demographics, health experiences related to sewage contamination, communication preferences, concerns about air and water exposure from the sewage, and health needs and status, including behavioral and mental health. The survey, available in English and Spanish, was designed to take a household approximately 20 minutes to complete.

Interview teams conducted the CASPER over three days (October 17–19, 2024), using both paper and electronic formats. The survey aimed to assess household experiences and perceptions of sewage exposure, identify preferred communication methods, and determine the community's health needs and status.

This report describes weighted findings from the 189 surveys collected. Data analysis was performed in EpiInfo™ 7 to calculate frequences and weighted estimates, percentages, and 95% confidence intervals for all responses.

Based on the findings/analyses and discussion with the County, the following suggestions were considered. A detailed list is available in the Discussion section:

1. Rebuild trust through continued local multiagency coordination to help address concerns.
2. Distribute resources and educational materials in Spanish and English using communication channels preferred by households.
3. Collaborate with partners on further investigating drinking water sources, supplying specific air purifiers to residences, and other data-driven efforts to enact positive change.
4. Supplement behavioral health services to address ongoing needs, including the promotion of hotlines.
5. Consider a follow-up assessment or study to obtain additional insight on issues highlighted in this report.

Background

The Tijuana River Valley, located along the U.S.-Mexico border, has faced a severe environmental and public health crisis because of contamination from untreated sewage, urban runoff, and industrial waste.[1] Over the past five years, more than 100 billion gallons of pollutants have been discharged into the Tijuana River, resulting in significant concerns about water quality and public health in the South region of San Diego County.[2] The pollution primarily originates from raw sewage flowing from the Tijuana River estuary into the Tijuana River Valley and adjacent beach waters, causing potential impacts on both the environment and human health.[3]

The situation was further exacerbated by Tropical Storm Hilary, which struck Southern California on August 20, 2023.[4] On August 24, 2023, the California-American Water Company issued a boil water advisory, alerting the County of San Diego of the ongoing public health concerns related to contamination,[5] prompting the County's Epidemiology Program to conduct an immediate and comprehensive assessment of the contamination's impact on public health. The assessment used a range of data sources, including syndromic surveillance, hospital records, school absenteeism data, and clinic reports.[6] Additionally, retrospective data from the South Bay Urgent Care facility were reviewed by the County to better understand the basis of the community's concerns.

The crisis continued to unfold with further complications from an atmospheric river on January 22, 2024, which caused severe flooding in San Diego County.[7] This flooding widened the spread of the existing sewage contamination in the Tijuana River Valley and surrounding beaches. From February 5–18, 2024, County Public Health Services Epidemiology Program staff were deployed to South Bay Urgent Care to investigate potential increases in gastrointestinal (GI) illnesses, but the investigation did not show an excess rise in acute GI symptoms.[8]

The crisis has drawn considerable attention from the media, public health officials, community members and organizations, and elected representatives in San Diego County's South region and represents a complex, multi-faceted challenge.[9-10] The U.S.-Mexico-Canada Agreement mandates that the U.S. Environmental Protection Agency (EPA) address these environmental issues by identifying pollution sources, improving water quality monitoring, and upgrading infrastructure to reduce contamination.[2] The EPA collaborates with Mexican authorities and other partners to implement effective solutions and ensure compliance with environmental standards. In California, the Regional Water Quality Control Board formulated a comprehensive strategy in 2022 to address the sewage contamination. This strategy focuses on enhancing wastewater treatment facilities, strengthening regulatory oversight, and increasing coordination with Mexican counterparts. Monitoring water quality, mitigating immediate health risks, and planning long-term solutions are central to this strategy.[11] However, these are not short-term solutions, and the potential public health risks remain.

Residents have reported a challenging and uncomfortable experience living in the area, leading to decreased quality of life.[1,12] Many describe unpleasant odors and perceive the air quality as poor because of the contamination. Residents also report increased health concerns (including GI and respiratory issues), although there is limited evidence from syndromic surveillance. Daily activities and routines have been disrupted, with some accounts of avoiding outdoor activities, like swimming or fishing, because of the polluted water. There are also reports of increased stress and anxiety related to health risks and the impact on the environment.

Therefore, in response to the ongoing crisis, the County of San Diego Health and Human Services Agency (HHSA) requested technical expertise and assistance from the Centers for Disease Control and Prevention (CDC) to conduct a Community Assessment for Public Health Emergency Response (CASPER).[13] A CASPER is an epidemiologic technique designed to quickly determine a community's needs. It provides valuable, evidence-based information that can guide public health actions and help address or clarify any rumors. By identifying immediate public health needs, CASPER helps prioritize interventions effectively. It is tailored to the local context, making the findings relevant and actionable for addressing specific community needs. Additionally, going door-to-door in the data collection process can build trust and improve cooperation within the community.

A CASPER is designed to provide information about a community's needs in a timely manner for situational awareness and as a basis for follow-up.

This report presents findings from the CASPER conducted in October 2024. The specific objectives of the CASPER were the following:

- Determine the community's health needs and status, including household behavioral and individual mental health.
- Understand household concerns of air and water exposure from the sewage.
- Describe household health experiences related to the sewage contamination.
- Identify households' preferred methods of communication and resource needs.

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Photo taken by Amy Helene Schnall

Methods

To accomplish these objectives, County of San Diego HHSA and CDC subject matter experts developed a two-page survey that included questions on household demographics, health experiences related to sewage contamination, communication preferences, concerns of air and water exposure from the sewage, and health needs and status, including behavioral health (Appendix A). In addition, the survey included a few questions on mental health at the end of the survey that were specific to the survey respondent rather than the household. It was estimated that the survey would take 20 minutes to complete. Questionnaires were available in both English and Spanish. Eligible respondents were community members (e.g., not tourists) who were 18 years of age or older, lived in the household, and could speak on behalf of the entire household.

The CASPER cluster sampling methodology was applied to select a representative sample of households to be interviewed. This was modified to a three-stage design with one adult randomly selected (by next birthday) for the final individual-level questions. The sampling frame was defined as all households (n=40,911) within the South Tijuana River Valley region of San Diego County according to the 2020 U.S. Census. Using the Geographic Information Systems (GIS) CASPER toolbox, 30 clusters (blocks) were selected with a probability proportional to the number of households within the clusters (Appendix B). In the second stage of sampling, interview teams used systematic random sampling to select seven households from each of the selected clusters, with a goal of completing 210 total interviews (30 clusters of 7 households).

On Thursday, October 3, 2024, households in the selected clusters were notified via door hangers and community flyers that the survey data collection would begin in two weeks.[14] In addition, County of San Diego HHSA developed a webpage with information and promotional videos about CASPER, the purpose of the survey, field dates, and more to help ensure the community was aware.[15]

On Thursday, October 17, 2024, CDC provided a four-hour just-in-time training to the interview team members on the overall purpose of the assessment, field materials (e.g., tracking forms, consent forms, maps, public health information), questionnaire content, household selection, safety, logistics, and their emotional wellbeing during fieldwork. Interview teams collected data on both paper and electronic (tablet) format. Teams were primarily comprised of one volunteer from San Diego State University (SDSU) or the County of San Diego and one CDC staff member. Most teams (~83%) had at least one fluent Spanish speaker.

These two-person interview teams were assigned one to two clusters each day and were provided street level and Google Earth paper and electronic maps of each of the selected clusters to aid them in navigating clusters. Each team discussed specific cluster methodology and potential safety concerns for their specific cluster(s) prior to leaving headquarters. Teams made three attempts at each selected household before substitution.

Twenty-nine (29) teams deployed into the field on October 17, 2024, 26 teams on October 18, 2024, and 14 teams on October 19, 2024. Teams conducted interviews between approximately 2:00 p.m. and 6:30 p.m. on October 17th and 18th, leaving their cluster areas at sundown, and between 10:00 a.m. and roughly 2:00 p.m. on Saturday the 19th.

All potential respondents approached were given a copy of the consent sheet containing a contact email address for County of San Diego HHSA (Appendix C). The survey was voluntary and confidential, with no personally identifiable information collected. Teams were instructed to complete confidential referral forms whenever they encountered urgent needs (Appendix D).

Data Entry, Cleaning, and Analysis

All surveys were reviewed by the interview team members for completeness and accuracy before being uploaded into the database. Paper questionnaires, which were completed in unison with electronic questionnaires, were cross-checked and reviewed by CASPER field leadership upon the teams' return to ensure there was no missing data or inconsistencies.

Once all data were uploaded into the database, the field leadership team added the household and individual weights and cleaned the database. Weighted cluster analysis was conducted to report the estimated number and percent of households with a particular response in the sampling frame. The weight was calculated to account for the probability that the responding household was selected.

To assess mental health, individual respondents were asked the following:

1. CDC's national Behavioral Risk Factor Surveillance System (BRFSS) Quality-of-life questions
2. Patient Health Questionnaire-2 (PHQ-2)
3. Generalized Anxiety Disorder-2 (GAD-2)

Responses for both the PHQ-2 and GAD-2 are scored from zero (not at all) to 3 (nearly every day), and a combined score is calculated by use of the two questions within each module. PHQ-2 scores of ≥3 have a sensitivity of 83% and a specificity of 92% for major depression;[16] GAD-2 scores of ≥3 have a sensitivity of 92% and a specificity of 76% for generalized anxiety disorder, and a sensitivity of 65% and a specificity of 88% for any anxiety disorder.[17] For these questions, we calculated an individual weight to account for the probability that the individual was selected within the household.

All data analysis were conducted in EpiInfo™ 7 to calculate the unweighted frequencies, weighted frequencies, and weighted percentages with 95% confidence intervals. Weighted analysis and confidence intervals were only calculated for cells with ≥5 observations as shown in the tables. All data presented in the text are weighted frequencies and percentages.

Preliminary findings were presented to the County of San Diego HHSA and other leadership the morning of Monday, October 21st to help facilitate immediate action and decision-making. This report serves as a follow-up to that initial presentation. Additional communication materials are also being developed.


Photo taken by Fuyuen Yip

Results

Response Rates and Demographics

A total of 189 surveys (90.0%) were completed from October 17–19, 2024 (Table 1). The field teams completed interviews in 39.4% of the households approached. Of the households with somebody answering the door, 56.8% completed an interview. The response rates are comparable to other CASPERs conducted in non-emergent settings and are understandable given the timing of the data collection. Teams double-checked all surveys prior to uploading via tablet into the database.

A quarter (24.3%, n=46) of the surveys were completed in Spanish. Seven confidential referral forms were submitted to County of San Diego HHSA for immediate follow-up, primarily focused on air quality, water concerns, and behavioral health support requests.

Approximately 45.0% of households (n=19,543) lived in single-family homes and 53.0% (n=22,942) in multiple unit (Table 2). Most households (58.0%, n=24,987) reported renting their homes, with 39.0%, (n=16,944) owning their home. Over three quarters (86.8%, n=37,469) had one or more members aged 18−64 years. Roughly 43% (42.9%, n=18,539) of households had one or more children in the home (aged 17 years or less), and roughly one-third (33.6%, n=14,489) of households had one or more members aged 65 years or older. The mean number of household members was 3.2, with a minimum of 1 and a maximum of 8 people living in a household. Most households spoke English as their primary language within their homes (52.7%, n=22,748) with 44.8% (n=19,329) speaking Spanish. Other languages (2.5%, n=1,093) included Tagalog, Swedish, and Persian. Approximately 56% (n=24,191) of households reported having pets.

Household Experiences

Most households (85.1%, n=36,730) were either somewhat or very aware of the Tijuana River Valley sewage crisis, while only 3.6% (n=1,542) were completely unaware (Table 3). Eight percent (7.7%, n=3,303) reported that at least one household member had come into direct contact with water from the Tijuana River in the past month, and 16.2% (n=6,986) had been in contact with beach water from Imperial Beach, Tijuana Slough, or Silver Strand shorelines during their closures. Several households (44.2%, n=19,072) have taken frequent measures to avoid certain areas because of the sewage contamination, while a smaller portion (21.2%, n=9,143) reported sometimes taking steps to avoid certain areas, and 34.6% (n=14,955) reported not taking any steps at all.

Most households (93.6%, n=40,412) noticed a sewage smell in the past month, with 74.1% (n=31,980) reporting a smell inside their home, 88.6% (n=38,231) outside their home, and approximately 90% (n=38,754) in their neighborhood. Roughly 72% (n=30,896) of households reported noticing a smell in all three locations in the past month. Of the households who noticed a smell inside, outside, or in their neighborhood, 69.2% said the smell was strongest in the evening or night, followed by morning (19%, n=7,670), then afternoon (11.8%, n=4,762).

94% of households noticed a smell in the past month, mostly at night (69%)

The most common action reported to reduce the sewage smell was closing windows (72%, n=31,069), followed by using candles, incense, oil (52.3%, n=22,582), and air freshener or deodorizer (49.2%, n=21,236). Other methods included a portable air purifier, cleaner, or filter

(35.2%, n=15,178), using ammonia or bleach cleaning products (31.7%, n=13,682), and using a humidifier or de-humidifier inside the home (20.4%, n=8,797). Roughly 89% (n=38,406) tried at least one solution to reduce the smell, with a third of households (33.7%, n=14,566) attempting at least three separate actions to reduce the smell; 5.1% of households (n=2,201) reported not using anything. Of those who took any action to reduce the smell in their home, most (66.0%, n=25,360) said it did not help remove the smell (23.2%, n=8,906) or only helped sometimes (42.8%, n=16,454).

Roughly 90% of households (n=37,870) reported being either somewhat or very concerned about the sewage crisis. The biggest concern about the sewage contamination was health of household members (81%, n=34,971). Nine percent (8.5%, n=3,663) of households said they were most concerned about a decrease in property value and 7% (n=3,032) reported something else such as environmental effects, infectious disease, or health of pets. Roughly 4% (n=1,504) of households reported "nothing".

90% of households are somewhat or very concerned about the sewage crisis

The main reported drinking water source for households was bottled water (66.6%, n=28,605), followed by tap or city water (21.4%, n=9,201) (Table 4). Twenty-eight percent (28.2%) of households (n=12,108) reported changing their drinking water source since the crisis began. When asked why, most households (77.2%, n=9,345) reported a concern about the quality and/or safety of the water because of the sewage contamination, stating concerns such as "it smells," "want to be sure we have clean water," "do not want to get sick," and "do not trust the tap water."

A third (32.2%, n=13,879) of households reported that they do not feel safe within their homes. In addition, several households (58.6%, n=25,287) stated making changes to daily activities or routines because of the sewage crisis, with 42.9% (n=10,840) of those households making "many changes" and 57.1% (n=14,447) making "some changes" within the past month during which the survey was given.

59% made changes to their activities or routines because of the sewage

Within the past month, more than two-thirds (68.5%, n=29,555) indicated that the sewage crisis has disrupted at least one aspect of their household's life, with 22.5% (n=9,693) reporting five or more disruptions. The most common disruptions noted were exercise (44%, n=18,974), social activities (43.1%, n=18,621), and daily routines (41.1%, n=17,748). Sleep schedule (37.4%, n=16,160), quality time with family (36.8%, n=15,867), and daily community life (33.3%, n=14,363) were also common disruptions noted by households.

Similarly, 75.9% (n=32,775) of households stated that they decreased at least one outdoor activity because of the crisis (Table 5). The most common decrease was visiting beaches (65.9%, n=28,431) followed by time spent outdoors (60.6%, n=26,173).

When asked for their household's greatest need related to the sewage crisis, 64.3% (n=27,778) reported a type of action. Other common responses included requests to improve air quality (38.2%, n=16,509), water quality (27.1%, n=11,709), and quality of life (21.2%, n=9,168) (Table 6).

Household Communications

57% usually get their information via social media

Friends, family, neighbors, and word of mouth (66.9%, n=28,879) were cited as the top way households usually get information about the sewage contamination, followed by television (62.1%, n=26,807), Internet news (58.5%, n=25,254), and Facebook (45.5%, n=19,642) (Table 7). More than half of households (57%, n=24,460) use some type of social media (Facebook, Instagram, X, YouTube, etc.) to get information. When asked about who the households trust the most to give accurate information about the sewage crisis, 55.3% (n=23,865) of households indicated County of San Diego Health Department. This was followed by 43.6% (n=18,834) reporting friends, family, neighbors, and/or coworkers, and 42.8% (n=18,471) reporting a doctor, nurse, and/or health care provider.

Nearly half (47.0%, n=20,280) of households reported at least one member having at least one barrier such as impaired vision (23.4%, n=10,092), difficulty understanding English (22.4%, n=9,652), impaired hearing (18.7%, n=8,062), and difficulty with mobility (18.1%, n=7,808).

Household Opinions & Beliefs

Most households feel that the quality of the Tijuana River water (92.7%, n=40,004), nearby ocean water (90.5%, n=39,079), and air in the area (77.0%, n=33,241) are **not** okay (Table 8).

- **77% believe the air quality is NOT ok**
- **90% believe the crisis is getting worse**
- **80% believe crisis has affected quality of life**

In addition, nearly all households (98.1%, n=41,534) feel like the sewage in the Tijuana River is causing air and water pollution, 96.2% (n=40,960) believe that sewage is causing bad odors in the area, and 89.3% believe that the crisis is getting worse. Few households (12.1%, n=4,949) believe that the cleanup in the area is sufficient.

When it comes to household's quality of life, 80.4% (n=34,318) reported that they believe the sewage has negatively affected their household's quality of life, and 67.3% (n=27,656) reported that the sewage has made their household health worse. Slightly more than half of households (52.8%, n=22,803) feel their community is a safe place to live. Only 22.1% (n=9,551) of households stated that they believe their household tap water is safe to drink.

Household Health

Roughly 49.6% (n=21,415) of households perceive their overall household health to be "good", with 15.2% (n=6,556) reporting "excellent" household health, 29.9% (n=12,920) "fair," and 5.3% (n=2,278) as "poor" (Table 9). In the past month, 44.8% (n=19,337) of households indicated at least one household member had at least one health symptom that they think was caused by the sewage crisis. Of those, the most common symptom stated was headache (80.0%, n=15,452), followed by nausea or upset stomach (71.7%, n=13,873), cough (62.3%, n=12,057), and dry or irritated throat (60.6%, n=11,718). More than three-quarters of households (76%, n=14,700) reported any GI issue (nausea or upset stomach, vomiting, and/or diarrhea) they believe was caused by the crisis in the past month. Of those, several households reported multiple symptoms among household members within the past month, with 19.6% (n = 3,798) reporting 1-3 symptoms, 45.8% (n = 8,853) having 4-7 symptoms, and 34.6% (n = 6,686)

45% reported at least one health symptom in the past month caused by the crisis

reporting eight or more symptoms among members of the household.

More than one-third of households (35.1%, n=15,053) reported having at least one member considered "medically fragile" or had been told by a doctor or healthcare professional they had a chronic medical condition. Approximately 64.5% of households (n=27,701) had at least one member with at least one chronic condition that has worsened in the past month. Excluding households who did not have a member affected by the condition, 75.8% of households with at least one member with allergies reported a worsening of the condition (n=21,943). Similarly, 59.2% of households with migraines (n=12,817), 53.6% of households with chest or lung pain (n=7,759), and 46.4% of households with asthma (n=7,099) reported a worsening of their respective conditions in the past month.

When asked if anyone in the household needed medical care because of the sewage crisis, 18.2% (n=7,819) said "yes." Of those households, 44.7% (n=3,496) went to a clinic, 39.7% (n=3,106) to urgent care, and 25.3% (n=1,979) to the emergency department.

Almost 70% of households (69.0%, n=29,540) have at least one member reporting a sewage-related health issue, and 31% of households (n=13,390) noted that no member of their household has experienced any sewage-related health issue. When asked if health symptoms that any member of the household had from the sewage crisis improved after spending time away from the area, of those who had symptoms, 69.6% of households (n=20,740) reported they got better, while 13.2% (n=3,928) said they did not improve, and 17.2% (n=5,112) stated they did not spend time away from the area.

Household Behavioral Health

Households reported that the sewage crisis has negatively affected their peace of mind (72.6%, n=31,334), health (53.8%, n=23,204), property (35.5%, n=15,320), and finances (21.6%, n=9,309). More than 80% of households (83.5%, n=36,059) reported the crisis negatively affecting at least one of the above, and 15.6% (n=6,751) said yes to all four areas (Table 10). Additionally, 32% of households (n=13,879) reported they felt their home was unsafe in which to live, and an additional 2.8% (n=1,216) did not know.

Of those with pets, 6.5% (n=1,564) experienced a loss or serious illness to their pet because of the sewage crisis. Most households (58.6%, n=25,141) reported the sewage contamination increased the overall stress level of the household either a lot (24.3%, n=10,414) or a little (34.3%, n=14,727). In addition, because of the sewage crisis, 40.3% (n=17,318) of households reported that they are taking a different route to avoid sewage contaminated areas and 38.2% (n=16,413) said they considered moving. Almost 60% of households (57.3%, n=24,758) reported one or more adaptive changes (e.g., life transitions such as changing jobs or schools, missing work, considered moving, lost employment) because of the sewage water issue.

59% report an increase in stress because of the sewage crisis

In addition, 65.9% of households (n=28,443) reported that at least one member experienced one or more signs of emotional distress because of the sewage crisis, including increased anxiety or worry, sadness or depression, lack of energy, physical symptoms (e.g., headache, stomach ache, pain), feelings of isolation, or numbness. The most commonly reported health symptoms included headaches, stomach aches, and body pain (49.0%, n=21,165), followed by anxiety and worry (37.7%, n=16,293), lack of energy (33.5%,

n=14,476), and sadness or depression (23.5%, n=10,130).

Additionally, because of the sewage contamination, 65.3% (n=28,045) of households reported at least one member experiencing at least one of the following indicators of potential acute mental health issues in the past month: trouble sleeping or nightmares, difficulty concentrating, agitated behavior, loss of appetite, increased alcohol use, increased drug use, or witnessed serious injury. Trouble sleeping was the most frequently reported indicator at 56.1% (n=24,083), followed by mood changes (34.7%, n=14,949), and difficulty concentrating (32.5%, n=13,948).

When asked if members of the household received services from a counselor, pastor or clergy member, therapist, social worker, or hotline for behavioral health concerns, 88.9% of households (n=37,948) reported no need for services. Five percent (4.9%, n=2,081) received services, and 6.2% (n=2,660) reported they could not get services.

Individual Mental Health

We asked the individual respondents both the Patient Health Questionnaire (PHQ)-2 and Generalized Anxiety Disorder (GAD)-2 screening questions. Both scales have a cut-off score of 3 indicating the probability of depression or anxiety. Fourteen percent (n=14,822) had a score of 3 or more on the PHQ-2 depression scale, and 11.7% (n=12,420) of respondents had a score of 3 or more on the GAD-2 anxiety scale (Table 11). In addition, 15.1% of respondents (n=15,814) reported that their poor physical or mental health kept them from doing their usual activities, such as self-care, work, or recreation, for 14 or more days in the past month, and 11.7% (n=12,420) indicated their mental health, which includes stress, depression, and problems with emotions, was "not good" for 14 or more days in the past month.

- **15% reported 14+ days where poor health kept them from doing usual activities**
- **14% scored 3+ on PHQ-2**
- **12% scored 3+ on GAD-2**
- **12% reported 14+ days "not good" in the past month**

SOURCE: Rawpixel.com

OVERVIEW OF KEY FINDINGS

Household Experiences & Concerns

- 66% of households who took steps to reduce the sewage smell said it does *not* help or only helps *sometimes.*
- 87% of households are somewhat or very concerned about the sewage crisis.
- When it comes to the crisis, 81% of households are MOST concerned about the health of a household member.
- 77% believe the quality of the air in the area is not OK.
- 64% requested some type of action as their greatest need.

Household Life

- 70% had one or more disruptions to their household life because of the crisis.
- 71% do not believe their household tap water is safe to drink.
- 91% of households reported having trusted source(s) to receive accurate information.

Household Health & Behavioral Health

- Of the HHs with at least one member with health symptoms from the sewage crisis, 70% believe their symptoms improved when they left the area.
- 65% have one or more worsening health conditions in the past month.
- 18% needed medical care because of the sewage crisis.
- 59% reported overall stress level has increased because of the sewage crisis.
- 63% reported one or more signs of emotional distress.
- 65% experienced one or more behavioral health indicators of potential acute mental health issues.

Individual Mental Health

- 15% of individuals (~16,000 people) reported that poor physical or mental health kept them from doing their usual activities such as self-care, work, or recreation for 14 or more days over the past 30 days.
- 14% of individuals (~15,000 people) scored a three or more on the Patient Health Questionnaire 2 (PHQ-2), indicating a probability of depression.

Discussion

While the CASPER achieved a completion rate of 90.0%, the cooperation rate of less than 60% indicate several refusals to participate from the community. Although the reasons for refusal were not queried, the refusals could stem from various factors such as general time constraints, survey or issue fatigue because of the ongoing situation, lack of trust or skepticism in how responses will be used, or perceived irrelevance (e.g., results will not lead to any real change). This highlights the need for transparency in sharing results and outlining action items to help continue to build trust within the community.

Five themes formed the basis of this CASPER:

1. **Household experiences**
2. **Communications**
3. **Opinions and beliefs**
4. **Perceived household health**
5. **Behavioral and mental health**

Household Demographics

We compared demographic data from CASPER to the most recent U.S. Census American Community Survey (ACS) 2022 5-year estimates for the surveyed zip codes (91932, 92173, 92154, 92118).[18] The average number of persons per household was comparable with ACS ranging from 2.8-4.2 per household, and the current CASPER reporting an average household size of 3.2 persons.

Additionally, persons 65 years and over make up between 13.6%-19.1% of the area according to the ACS, depending on the zip code of residence. Therefore, the results from this survey show a ***likely overrepresentation of older adults*** as 33.6% of households reported at least one resident 65 years of age or older. The residents of the interviewed households may include older, possibly retired residents more likely to be home and willing to participate when the CASPER was conducted.

Specific to housing, in 2022, 41.3% of the housing in southwest San Diego County (Chula Vista, National Cities, Puma) and 48.4% of south San Diego County (Otay/Mesa, South Bay) were occupied by their owners.[19-20] This is comparable to CASPER results of approximately 40%.

The CASPER results confirmed that language diversity is also significant, with almost 45% of households speaking Spanish as the primary language within their home, representing over 19,000 households, and 2.5%, or approximately 1,100 homes, speaking another language such as Tagalog, Swedish, and Persian. This highlights the ***importance of multilingual communication materials and support services to effectively reach all community members.*** Continued partnership with *promotores* (trusted community health workers in Spanish-speaking communities) and the translation of materials into Spanish are essential. However, it is equally important to engage speakers and trusted leaders of other languages beyond just English and Spanish. Continuing to expand language access ensures that messages are effectively communicated and understood by all members of the community, fostering inclusivity, promoting broader trust, and enhancing community engagement to help address diverse needs more effectively.

Additionally, with over half of households reporting pets, it is essential to consider these factors in messaging and actions so that owners receive adequate support and information about how the crisis may or may not impact their pet and actions they may take to help mitigate any potential negative impact.

Household Experiences

The data reveal a notable level of awareness regarding the sewage crisis, with 85% of households being somewhat or very aware of the issue. This high awareness likely reflects the pervasive nature of the crisis and its impact on daily life. However, a number of households (8%) reported direct contact with contaminated water from the Tijuana River, and 16% have had contact with beach water during closures.

The overwhelming presence of sewage smell, as reported by 94% of households, highlights the impact on daily life. Almost three-quarters of households noticed the smell in all three locations: inside, outside, and in their neighborhood. This indicates the community-wide issue affecting the home and broader environment. ***These data can help validate how the community feels*** by providing evidence to their grievances and requests for assistance.

In response to the odor, a majority of households (89%) have attempted at least one method to mitigate the smell. Closing windows, using air fresheners, and employing cleaning products were common strategies; however, approximately 65% reported that the actions do not, or only sometimes, reduce the smell. This suggests that ***the persistence of the sewage smell, despite individual household mitigation measures, underscores the broader challenges posed by the crisis***. In addition, some actions households are taking to help reduce the smell, such as the use of candles or incense, can pose health risks from the potential for fires or release of harmful pollutants into the air. These substances can exacerbate respiratory issues and negatively impact indoor air quality, ***making it important to message on fire safety as well as safer alternatives for odor management***, such as air purifiers that contain specific filter media (e.g., active carbon impregnated with potassium permanganate).

That households indicated the smell is most potent during evening and night hours could impact quality of life, leading to disruptions in daily routines, such as sleep. These disruptions to daily life are significant, with almost half of households indicating that the sewage crisis has affected at least one aspect of their routine(s). Commonly reported disruptions include decreased physical activity, social engagements, and family time, all of which can have detrimental effects on mental and physical health. The reduction in outdoor activities, especially beach visits, points to a broader social impact, as recreational spaces become less accessible or desirable because of safety, environmental, or nuisance (e.g., odor) concerns. Additionally, anecdotal reports from interview teams and some notes in the "other" field, reported that households responded "no changes" because they had already made changes prior to the last month, indicating that this crisis has had an impact on households for a prolonged period of time.

The community's response to the sewage crisis illustrates a mix of proactive and reactive measures. While 44% of households frequently avoid contaminated areas, 35% reported not taking any precautions at all. This disparity indicates a possible gap between awareness and action, which could stem from various factors such as complacency, perceived urgency, or lack of resources to implement avoidance strategies or precautionary measures.[21-24] However, when considering those who sometimes take steps to avoid certain areas, the impact of the crisis on daily actions is significant, with approximately 65% altering their routines because of the sewage crisis.

When asked about their greatest needs related to the crisis, the demand for action stood out as a clear message from the community. Additionally, improvements in air and water

quality, along with better communication regarding the crisis, were highlighted as important needs. ***This illustrates a community ready to seek solutions and emphasizes the necessity for clear, consistent information to inform households of actions they may take as well as steps being taken by the County to address the crisis.***

Household Communications

With regard to receiving information about the sewage contamination, relying on word of mouth was the most common source, cited by over 67% of households. Other top sources included television, internet news, Facebook, Instagram, and work. These modes underscore the importance of community-based communications methods (e.g., word of mouth, social media, places of employment) that should be leveraged for future messaging to ensure that information reaches as many people as possible. An example could be to leverage partnerships with the Department of Education to empower schools to reach the community as a trusted source. While slightly less than 20% of households reported schools as the usual source of information, among households with children 2-17 years of age, the number increases to almost half (45%).

Almost 60% of households engaged in any form of social media to receive their information, which can play an important role in message sharing, including Facebook advertisements, NextDoor posts, and Instagram infographics. This, along with the high percentage reported using internet news, shows that, while traditional methods remain relevant, there is also a shift to digital platforms of information. ***Integrating word-of-mouth strategies with formal communication methods can help create a more robust and comprehensive approach to communication and outreach plans.*** This may include not only written digital messages, but also video shorts potentially featuring local *promotores*, community health workers, and others as trusted sources. Development of these video shorts in multiple languages, combined with tailored algorithms, can help broaden the reach of messages using trusted sources and multi-method modes.

Trust in information sources also plays a critical role in how communities respond to messages. The County of San Diego HHSA is regarded as the most trusted source by over half (55%) of the households. This highlights the importance of official health communications; notably, nearly as many households (43%) trust informal networks of friends, family, and other forms of word of mouth. Also, a number of households trust only themselves, or nobody at all, when it comes to obtaining accurate information about the crisis. This further emphasizes the continued importance of both formal and informal sources to help influence perceptions and behaviors as well as building trust and credibility through the facilitation of two-way communications.

The presence of barriers to communication in nearly half of the households (47%) is important to note, as impaired vision, language difficulties, hearing impairments, and mobility challenges can significantly hinder effective communication. For instance, with almost a quarter of households reporting impaired vision, and 10% reporting difficulty understanding written material, this reinforces the need for accessible information formats. Additionally, with more than 20% of households reporting having difficulty understanding English, this indicates a demand for continued multilingual communication strategies.

Household Opinions & Beliefs

With 93% of households expressing concerns about the quality of the Tijuana River water, and similar levels of apprehension regarding the ocean water and air quality in the area, it is evident that households are deeply concerned by the ongoing crisis. This widespread discontent is compounded by the perception that the situation is worsening, as noted by almost 90% of the households.

The overwhelming consensus among 98% of households that the Tijuana River contributes to air and water pollution, along with 96% reporting that sewage is causing unpleasant odors, reflects the strong concerns and feelings of the community. ***These data can serve to validate their concerns by providing tangible evidence to support their feelings.*** Two-thirds of households believe that their health has worsened because of the crisis, and just under half feel their community is not a safe place to live. This, combined with the perception of inadequate clean-up efforts, emphasizes the strong feelings and desire for action among the community. Given the impact on household daily lives, lack of trust, and desire for action, this is an opportunity to potentially implement new and leverage existing science, technology, engineering, and mathematics (STEM) investments in multiple avenues (e.g., schools, faith-based organizations) to empower the community with air monitoring, local interventions, and broader science education of youth to expand environmental health literacy as previous research has shown positive outcomes.[25]

Importantly, only 22% of households believe their tap water is safe to drink, and 67% of households reported using bottled water as their primary source of drinking water. Tap water consumption among adults in the U.S. from 2007-2014 was approximately 62%.[26] Thus, the percentage of households reporting only drinking bottled water is well above the estimated national average. This survey finding, however, is consistent with some literature suggesting that there is increased intake of bottled water over tap water in certain populations, such as Hispanics, owing to a variety of factors, including distrust in the public water utilities because of pollutants, waterborne diseases, and groundwater contamination.[27] Despite the absence of evidence indicating that the water is unsafe based on previous water quality testing,[28-29] this perception presents a critical opportunity for community engagement in collaboration with the State Water Resource Board. Effective communication continues to be essential in addressing these concerns and building trust. Using video shorts and town halls as a platform and further engaging *promotores* and community health workers, for example, could allow community members to ask questions, share experiences and observations, receive accurate information, and engage directly with local officials. This approach could not only inform residents but foster a sense of community and transparency regarding water safety.

Household Physical Health

While most households (~65%) report their overall household health is either good or excellent, a third of households reported their health as only "fair," and 5% (~2,200 households) said their household health was "poor." The presence of health symptoms perceived to be attributed to the sewage issue is important to note. Almost half of households (~45%) reported that at least one member experienced symptoms they believed were caused by the crisis within the last month, with headaches being the most common. Other prevalent symptoms included gastrointestinal issues, respiratory symptoms, and throat irritation. More than a third of

households (35%) reported eight or more symptoms within the past month they attribute to the sewage crisis, indicating the perceived widespread impact on their household health.

At the same time***, few households reported seeking medical care because of the crisis, with the majority (82%) not seeking care within the healthcare system.*** This may be one possible explanation on why hospital and other surveillance systems have not previously recorded increases in these symptoms. However, these data show that the crisis has profoundly impacted perceptions of household health, with many households attributing their symptoms to the crisis. Therefore, a potential course of action could involve collaborating with insurance companies to encourage residents of the South Bay region have access to care when needed, while also promoting key health messages from the County of San Diego HHSA related to the sewage crisis.

Importantly, of the 69% of households who have had at least one member experiencing health issues they attributed to the sewage crisis at any time, the majority (70%) reported that their symptoms improved when they spent time away from the area; less than 15% reported no improvement.

More than a third of households reported having members who are medically fragile or suffer from a chronic condition(s), and nearly two-thirds of those indicated that at least one such chronic condition has worsened in the past month. This highlights the importance for continued support to ensure that those who are at higher risk are aware of and able to access health care services.

Household Behavioral Health

The assessments revealed substantial impacts of the sewage crisis on the behavioral health of households. ***More than 83% of households (~36,000 households) reported negative effects in at least one area between peace of mind, health, property, and finances, with 16% experiencing challenges across all four dimensions.*** In addition, 59% of households reported an increase in stress level because of the sewage crisis. This aligns with existing literature that links environmental crises to psychological distress and further suggest that such crises may have a major impact on overall health, as stress, including financial stress, can adversely affect sleep, self-esteem, energy, and emotional stability.[30-31]

SOURCE: Openclipart

Indicators of potential acute mental health issues were prevalent, with over 65% of households reporting at least one member experiencing issues such as trouble sleeping, mood changes, difficulty concentrating, and agitated behavior. A loss of appetite was noted in more than a quarter of households. ***These data are similar to those captured in CASPERs conducted to support response and recovery efforts related to major natural disasters, such as category 5 hurricanes, and are also comparable to household experiences during the Flint Water Crisis***.[32-33]

These data, along with the previous reported disruptions to daily activities and routines, ***shows that the crisis has created a pervasive sense of distress among the community that extends beyond potential physical health concerns***. The high prevalence of sleep disturbances and mood changes indicates that the sewage crisis is not just a temporary inconvenience, but a source of ongoing anxiety and emotional turmoil among household members. Difficulty concentrating and increased agitation can hinder daily

functioning, affecting work, school performance, and interpersonal relationships.

The link between experiencing environmental crises and altered behavioral health was supported by the reported signs of emotional distress experienced because of the sewage crisis, which were prominent among surveyed households. ***Two-thirds of households had at least one member report experiencing signs of emotional distress such as physical complaints, increased anxiety or worry, lack of energy, and more.*** A third of households reported one member experiencing increased anxiety or worry (~38%), lack of energy (~33%), or spending less time with friends and family (~30%).

However, when asked about recent attempts to access counseling services, almost 90% of households overall reported no need for such services. This may suggest some resiliency within the community, poor awareness of the benefits of behavioral health resources, or a potential stigma associated with receiving behavioral health services.[33-36] Some households (~6%) wanted to get services but were not able to; this indicates a need to increase access or awareness of available services. More in-depth data regarding the status of behavioral health in the community, potential barriers to receiving services, and promotion of the benefits of receiving services would be valuable.

These combined behavioral findings emphasize an ***important need for support and community resources to address the psychological and behavioral impacts of the crisis on the community***. Actions could include providing and promoting accessible behavioral health services, including hotlines and support groups, to help households cope with increased anxiety, depression, and other behavioral health concerns. Establishing or enhancing community support systems and outreach programs could also aid in addressing disruptions to daily routines and social connections. Connection to programs offered by partners, such as the Department of Education's Project SERV, could also assist with the potential impact of the crisis on school-aged children.

Regardless, tailored communication efforts continue to be needed to ensure the community is well-informed of resources and services. Promoting community resilience and recovery through support for affected households will also be crucial.

Individual Mental Health

We asked individual respondents both the PHQ-2 and GAD-2 screening questions. Both tools are not meant to establish final diagnosis or to monitor depression or anxiety but serve as a "first step" screening approach. The PHQ-2 is a commonly used and validated depression screening tool for adults and inquiries about the frequency of depressed mood and anhedonia (i.e., the inability to feel pleasure) over the past two weeks. The GAD-2 is a brief screening tool for generalized anxiety and possibly for panic disorder. Around 14% of respondents (~15,000 individuals) scored 3 or more on the PHQ-2 depression scale, indicating a positive predictive value (PPV) of 75.0 for detecting any depressive disorder. Approximately 12% of respondents (~12,500 individuals) scored 3 or more on the GAD-2 anxiety scale, indicating a likelihood ratio of 5.1 for generalized anxiety disorder.[14-15]

We also asked respondents two Behavioral Risk Factor Surveillance System mental health questions. Approximately 15% (~16,000 individuals) reported their mental health prevented them from doing usual activities, and 12% (~12,000 individuals) indicated that their mental health, which includes stress, depression, and problems with emotions, was "not good" for 14 or more days in the past month. As with the household behavioral health results, these data

indicate the continued need for, and promotion of, behavioral health services.

Considerations for Action

Based on the analysis of the rapid needs assessment data, the following are considerations for action:

1. **Continue to rebuild trust through local multiagency and multidisciplinary coordination with trusted sources.** While 55% of households trust the health department to give accurate information on the sewage crisis, 38% trust themselves or their household most, and 9% do not trust anyone. Nearly 43% of households trust doctors or nurses. Roughly 13% of households cited communication as their greatest need. Therefore, there is a need to develop protocols for when air and water concerns arise, especially among groups at higher risk, including those with chronic conditions. Trust could also be built through Live Well San Diego collaboratives and healthcare providers to ensure consistency of communication from leadership and parity of resources and support given to communities affected by environmental hazards. Additionally, trust could be built by acknowledging the disruption the sewage crisis has had to daily life.
2. **Distribute resources and education on health concerns, sewage crisis updates, and water and air exposure in Spanish and English using preferred communication channels, as well as additional languages such as Tagalog**. Consider diverse channels, both formal and informal (e.g., town hall), to reach households within the South region of San Diego County. Roughly 47% of households have one or more barriers to communication, and nearly 60% of households use any form of social media as their usual source of information about the sewage crisis. While Spanish and English are the primary languages, it is important to consider the households (2.5%, n=1.093) who reported speaking another language.
3. **Collaborate with CDC National Center for Environmental Health (NCEH) and California Environmental Protection Agency (CalEPA) on further investigating drinking water sources used by South region households and on developing safety messaging for drinking water quality.** Just over 70% of households do not believe their household tap water is safe to drink, and 67% of households use bottled water as their primary source of drinking water. These findings suggest that there are household concerns within the community that could potentially be addressed through customized communication and active involvement. By understanding the unique needs of the community, targeted messaging can be developed that resonates with affected households. This approach could help alleviate household concerns and foster a sense of trust between the organization and the community.
4. **Collaborate with San Diego Air Pollution Control District on supplying air purifiers that contain filter media (e.g., activated carbon impregnated with potassium permanganate) to reduce hydrogen sulfide in the air of affected households and local community centers.** Roughly 38% of households identified improving air quality as their greatest need. Among the households with one or more health symptoms they attributed to the sewage crisis, most households reported that their health symptoms improved when they spent time away from the area. Therefore, utilizing air purifiers with appropriate filter media may help alleviate health symptoms, reduce the reliance on unsafe mitigation methods that only mask odors (e.g., candles, incense), and foster community trust and partnership.

5. **Promote available hotlines, such as 211 and 988, to connect households to needed services.** The 211 hotline is a free, confidential service available 24/7 that offers information and referrals to essential community resources, including food, housing, utilities, health services, and family support. Also, 988, while known as the suicide prevention hotline, can provide immediate help and connect individuals to relevant services. While many households reported not needing assistance, they also exhibited signs of behavioral health needs; thus, online or phone crisis hotlines may help to bridge the gap in accessing support.
6. **Supplement behavioral health services to address ongoing needs.** A high number of households reported experiencing worry, stress, behavioral health issues, and disruptions to their daily lives. Many also felt that their homes were unsafe and that their quality of life was negatively impacted. In addition, individuals scored high on scales which indicate a likelihood of anxiety and depression. These indicators highlight a need for ongoing availability and promotion of behavioral health services through trusted channels, including the 988 hotline.
7. **Share results with relevant partners and community leaders to promote data-driven efforts and positive change.** Sharing results with partners is important for effective response to this crisis as it ensures that decisions are based on accurate, evidence-based data. This data-driven approach allows for tailored resource allocation, enhances collaboration among organizations, and increases transparency and accountability. Additionally, it helps leverage limited resources, ultimately leading to more efficient and coordinated efforts.
8. **Engage South region veterinarians, County of San Diego One Health Epidemiology Program, and Project Wildlife partners to address ongoing pet and livestock needs and health concerns.** Roughly 7% of households with pets reported a loss or serious illness of their pet they attributed to the sewage crisis. This represents approximately 1,500 homes and highlights an important public health concern. Addressing this issue is crucial not only for the well-being of pets (and livestock) but also for enhancing community trust and ensuring that residents feel supported during this crisis.
9. **Consider a follow-up assessment or study on crisis-related needs to identify and characterize ongoing and long-term health and behavioral health effects in more detail**. An overwhelming consensus of households believe the quality of the Tijuana River water, nearby ocean water, and air in the area are not ok, and nearly 90% of households do not believe the area cleanup is sufficient. While CASPER data provides a high-level outlook and can help determine priorities and needs, a more in-depth approach can provide valuable insight for addressing these concerns.

These suggestions are for County of San Diego HHSA consideration and should continue to be discussed locally for feasibility and prioritization. In addition, they are not all-inclusive; more potential action items are suggested throughout the Discussion section. A key component of all suggestions is to continue to strengthen communications. Effective and tailored communications is essential for building trust, ensuring community engagement, and keeping the community informed about ongoing efforts and resources available to address the crisis. By fostering a diverse range of communication strategies, County of San Diego HHSA can better understand community needs, enhance collaboration among partners, foster inclusivity, and reach a broad audience. Leveraging existing partnerships and platforms

(e.g., *promotores*, Facebook ads, websites), along with developing new materials and venues (e.g., video shorts, additional languages, town halls), can help enhance such outreach efforts and improve community engagement. This comprehensive approach will help build trust and facilitate meaningful dialogue about ongoing issues and solutions, as every action necessitates some form of communication efforts for promotion, information sharing, and/or transparency.

These general considerations are based on data from the CASPER conducted between October 17-19, 2024, and it is important to note that this is just the beginning. Specific courses of action for each consideration should be developed, and some considerations may have more than one course of action. Meeting with partners to determine roles and responsibilities for carrying out activities is the next step in turning data into action. Tailored interventions could be developed based on demographic and household data, addressing the needs of different groups such as families with children, older adults, persons with English as a second language, and those with pets. These insights will guide strategic planning and enhance efforts in the continued response to the Tijuana River Valley sewage contamination issue. Therefore, the above suggested actions should be developed locally, with input and support from relevant partners, into specific activities to help ensure the needs of the community identified in this report are met. A follow-up survey can also be conducted yearly to monitor changing needs and gauge potential improvement from any implemented actions.

Limitations

The data generated by the CASPER represent a snapshot in time, which should be considered when interpreting the results. The results are self-reported by one (or more) individual(s) representing an entire household; therefore, bias may occur as the interviewee may not know everything about all household members they are representing. The age distribution of the sample population may be skewed, with a greater proportion of individuals aged 65 years and older represented in the sample than estimated within the 2022 American Community Survey for the area.

Conclusion

The information gathered from households revealed a profound awareness of the Tijuana River sewage crisis, highlighting the pervasive impact on daily life, health concerns, and well-being. While most households are aware of the situation, many continue to risk exposure. The widespread reporting of health symptoms and disruptions to routines underscore the potential impact of the crisis on both physical and behavioral health, particularly among groups more at risk such as those with pre-existing chronic conditions. Community concerns about water and air quality are also compounded by a reported lack of trust in information sources, emphasizing the need for continued transparent and tailored communication and outreach. To address these challenges, a coordinated response involving health education and communication, behavioral health support, and resource distribution is critical. Moving forward, continued engagement with the community in a participatory approach could help foster the rebuilding of trust and strengthening resilience.

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Tables

Contents

Table 1. Survey response rates – Tijuana River Valley, 2024

	CASPER (n=189)	
	Rate	%
Response rates		
Completion[1]	189/210	90.0
Cooperation[2]	189/333	56.8
Contact[3]	189/480	39.4

[1]Percent of surveys completed compared to the goal

[2]Percent of surveys completed compared to total number of households that teams made contact with

[3]Percent of surveys completed compared to all randomly selected households

Table 2. Household (HH) demographics – Tijuana River Valley, 2024

	Tijuana River Valley CASPER (n=189)			
	Frequency	Estimate	% of HH	95% CI
Type of structure				
Multiple unit	94	22,942	53.1	39.1–67.2
Single family home	92	19,543	45.3	30.8–59.7
Mobile home	3	–	–	–
Number of HHs with members in each age category				
Less than 2 years	15	3,294	7.6	3.4–11.8
2-17 years	67	15,245	35.3	26.7–43.9
18-64 years	162	37,469	86.8	81.2–92.2
65 years or older	67	14,489	33.6	25.5–41.6
Household ownership status				
Rent	104	24,987	57.9	46.0–69.9
Own	80	16,944	39.3	27.5–60.0
Occupied w/o ownership/rent	5	1,239	2.9	0.3–5.4
Household animals[1]				
Pets	109	24,191	56.0	49.1–62.9
Livestock	4	–	–	–
Primary language spoken				
English	100	22,748	52.7	40.5–64.8
Spanish	84	19,329	44.8	32.4–57.0
Other[2]	5	1,093	2.5	0.3–4.7

[1]Households could choose more than one response
[2]Other includes Tagalog, Swedish, and Persian

Table 3. Household (HH) awareness, exposures, and concerns – Tijuana River Valley, 2024

	Tijuana River Valley CASPER (n=189)			
	Frequency	Estimate	% of HH	95% CI
Awareness of sewage contamination				
Very aware	123	27,048	62.7	53.1–72.3
Somewhat aware	38	9,682	22.4	14.1–30.8
A little aware	21	4,998	11.3	6.9–15.8
Not at all aware	7	1,542	3.6	0.6–6.5
Been in contact with water from the river in past month				
No	174	39,867	92.3	88.0–96.7
Yes	15	3,303	7.7	3.3–12.0
Been in contact with beach water while closed in past month				
No	156	36,184	83.8	76.9–90.8
Yes	33	6,986	16.2	9.2–23.1
Taken steps to avoid certain areas				
Frequently	89	19,072	44.2	35.1-53.2
Sometimes	35	9,143	21.2	13.4–29.0
No	65	14,955	34.6	26.0–43.3
Noticed a sewage smell in past month[1]				
In the neighborhood	170	38,754	89.8	84.3–95.3
Outside home	167	38,231	88.6	83.1–94
Inside home	146	31,980	74.1	64.5–83.6
No smell anywhere	11	2,563	5.9	1.9–9.9
Noticed in all three locations	141	30,896	71.6	81.2–61.9
Time of day smell worse (n=177)				
Morning	28	7670	19.0	9.3–28.6
Afternoon	21	4,762	11.8	5.5–18.1
Evening/Night	128	27,980	69.2	59.8–78.7
Products used to reduce sewage smell[1]				
Closed windows	142	31,069	72.0	63.4–80.5
Candles, incense, oil	99	22,582	52.3	41.5–63.2
Air freshener/deodorizer	96	21,236	49.2	39.9–58.5
Portable air purifier, cleaner, or filter	70	15,178	35.2	28.5–41.8
Ammonia/bleach cleaning products	62	13,682	31.7	22.4–41.0
Humidifier/De-humidifier inside the home	34	8,797	20.4	13.1–27.7
Other[2]	31	6,455	15.0	7.2–22.7
Did not use anything	9	2,201	5.1	2.0–8.2
No sewage smell in the home	11	2,563	5.9	2.0–9.9
Actions helped to reduce smell (n=169)				
Yes	54	13,045	34.0	24.7–43.3
Depends/sometimes	75	16,454	42.8	33.8–51.9
No	40	8,906	23.2	16.2–30.2
Concern about sewage contamination				
Very concerned	143	31187	72.2	64.7–79.7
Somewhat concerned	29	6683	15.5	11.4–19.6
A little concerned	10	3,745	8.7	1.5–15.8
Not at all concerned	7	1,555	3.6	0.7–6.5
Biggest concern about sewage contamination				
Health of HH members	158	34,971	81.0	73.4–88.6
Property	17	3,663	8.5	4.8–12.2
Other[3]	8	3,032	7.0	0.0–14.2
Nothing	6	1,504	3.5	0.8–6.2

[1]Households could choose more than one response
[2]Other includes using/purchasing air conditioning, fans, mopping, covering drains, and taping/sealing windows
[3]Other includes environmental affects, infectious disease, health of pets, going to the beach, the smell, impact on Navy Seals, etc.

Table 4. Household (HH) disruptions – Tijuana River Valley, 2024

	Tijuana River Valley CASPER (n=189)			
	Frequency	Estimate	% of HH	95% CI
Usual drinking water source				
Bottle	127	28,605	66.6	57.5–75.8
Tap/city	37	9,201	21.4	13.2–29.7
Other[2]	24	5,124	11.9	6.5–17.4
Changed drinking water source since crisis began				
Yes	53	12,108	28.2	20.1–36.3
No	135	30,822	71.8	63.7–79.9
Household changed daily activities/routines				
Yes	110	25,287	58.6	49.0–68.1
Many changes	*52*	*10,840*	*42.9*	*29.2–56.5*
Some changes	*58*	*14,447*	*57.1*	*43.5–70.8*
No	79	17,833	41.4	31.2–60.0
Disrupted HH live in past month[1]				
Exercise	85	18,974	44.0	34.0–54.0
Social activities	85	18,621	43.1	33.9–52.4
Daily routines	76	17,748	41.1	31.5–50.7
Sleep schedule	74	16,160	37.4	29.3–45.6
Quality time with family	72	15,867	36.8	27.6–45.9
Daily community life	67	14,363	33.3	23.9–42.6
School/work	35	8,862	20.5	12.9–28.1
Eating behaviors/schedules	41	8,819	20.4	14.1–26.7
Childcare/daycare	15	3,371	7.8	3.6–12.0
Church/Place of worship	8	1,881	4.4	1.5–7.2
Other[3]	20	4,317	10.0	5.7–14.3
Number of HH disruptions in past month				
No disruptions	61	13,375	31.5	29.9–37.3
1-4 disruptions	83	19,862	46.0	37.8–54.2
5 or more disruptions	45	9,693	22.5	15.6–29.3

[1]Households could choose more than one response
[2]Other includes entire house filtration systems, filtered water, water fill locations, spring water, and wells
[3]Other includes closing windows (especially at night), gardening, time spent outdoors, surfing, etc.

Table 5. Household (HH) changes in outdoor activities – Tijuana River Valley, 2024

	Tijuana River Valley CASPER (n=189)			
	Frequency	Estimate	% of HH	95% CI
Visiting beaches				
Increased	4	–	–	–
Decreased	128	28,431	65.9	55.0–76.7
No change	57	13,883	32.2	22.4–42.0
Time spent outdoors				
Increased	4	–	–	–
Decreased	119	26,173	60.6	51.5–69.8
No change	66	16,107	37.3	28.3–46.3
Going to parks/playgrounds				
Increased	3	–	–	–
Decreased	96	21,328	49.4	40.2–58.6
No change	90	21,191	49.1	40.6–57.6
Gardening				
Increased	3	–	–	–
Decreased	55	12,110	28.1	20.0–36.1
No change	131	30,409	70.4	62.4–78.5
Other outdoor activitiy[2]				
Increased	2	–	–	–
Decreased	13	2,784	6.4	2.3–10.6
No change	174	39,975	92.6	88.2–97.6
Number of outdoor activities DECREASED				
None	42	10,395	24.1	14.1–34.0
1	27	6,496	15.0	10.4–19.7
2	29	6,155	14.2	8.4–20.2
3	51	11,260	26.1	18.4–33.8
4	40	8,864	20.5	13.9–27.1

[1]Households could choose more than one response
[2]Other includes exercise, kids participation in sports, outdoor dining and entertaining, etc.

Table 6. Household (HH) greatest need – Tijuana River Valley, 2024

	Tijuana River Valley CASPER (n=189)			
	Frequency	Estimate	% of HH	95% CI
Greatest need because of the crisis[1]				
Actions requested[2]	124	27,778	64.3	55.1–73.6
Improve air quality[3]	76	16,509	38.2	30.5–46.0
Improve water quality[4]	54	11,709	27.1	19.9–34.4
Quality of life[5]	42	9,168	21.2	15.0–27.5
Nothing[6]	24	6,583	15.3	7.1–23.4
Communication needs[7]	25	5,640	13.1	8.7–17.4
Health and safety[8]	26	5,600	13.0	6.7–19.3

[1]Households could indicate more than one response
[2]Actions requested includes air purifiers, filters, clean up, general fixing the problem, fixing the treatment plant and pump station, etc.
[3]Improve air quality includes quality of air, addressing odor/smell concerns, etc.
[4]Improve water quality includes quality of river and beach water, beaches, drinking water concerns, etc.
[5]Quality of life includes needing to adjust normal activities/routines, moving away, housing rates, etc.
[6]Nothing includes refused, nothing
[7]Communication needs includes request more information, etc.
[8]Health and safety includes health symptoms, dangers to health, breathing needs, safety, health effect concerns, mental health, etc.

Table 7. Household (HH) communications – Tijuana River Valley, 2024

	Tijuana River Valley CASPER (n=189)			
	Frequency	Estimate	% of HH	95% CI
Usual source of information[1]				
Friends, family, neighbor, word of mouth	128	28,879	66.9	56.4–77.4
TV	120	26,807	62.1	52.7–71.4
Internet news	114	25,254	58.5	49.6–67.4
Facebook	83	19,642	45.5	37.8–53.1
Instagram	47	10,059	23.3	17.1–29.5
Work	39	9,809	22.7	13.5–31.9
Public health department	37	8,101	18.8	12.1–25.5
Schools	35	8,081	18.7	12.6–24.8
Radio	38	8,050	18.6	12.3–25.0
Tik Tok	29	7,767	18.0	10.3–25.7
Newspaper	33	6,815	15.8	9.1–22.4
X	20	5,586	12.9	5.9–20.0
Other social media	21	4,660	10.8	5.5–16.1
Church/place of worship	11	2,671	6.2	9.9–2.4
Other[2]	22	4,911	11.4	6.2–16.5
Have not heard any information	2	–	–	–
Most trusted source for accurate information[1]				
County of San Diego HD	103	23,865	55.3	47.0–63.7
Friends, family, neighbor, coworker	80	18,834	43.6	34.5–52.7
Doctor, nurse, healthcare provider	82	18,471	42.8	33.1–52.5
Self/Household	69	16,393	38.0	26.9–49.1
County of San Diego Officials (non-HD)	54	13,020	30.2	20.1–40.2
Mayor	59	13,210	30.6	22.9–38.3
City Officials	57	12,502	29.0	37.6–20.3
Governor	43	9,914	23.0	15.8–30.2
Pastor, priest, spiritual leader	18	4,166	9.7	4.8–14.5
Other[3]	29	7,488	17.3	9.5–25.2
Do not trust anyone	17	3,851	8.9	3.7–14.1
Barriers to communication[1]				
Impaired vision	44	10,092	23.4	16.4–30.4
Difficulty understanding English	43	9,652	22.4	15.2–29.5
Impaired hearing	36	8,062	18.7	13.2–24.7
Difficulty with mobility	36	7,808	18.1	11.8–24.4
Developmental/cognitive disability	20	4,610	10.7	4.6–16.8
Difficulty w/written material	18	4,224	9.8	4.6–15.0
No barriers	98	22,890	53.0	44.8–61.3
1 or more barriers	91	20,280	47.0	38.7–55.2

[1]Households could choose more than one response

[2]Other includes flyers, door hangers, public meetings, lived experiences, mail notices, etc.

[3]Other includes news, CDC, community activist groups for sewage crisis, lifeguards, scientists/environmentalists, professors, etc.

Table 8. Household (HH) opinions and beliefs about the crisis – Tijuana River Valley, 2024

	Tijuana River Valley CASPER (n=189)			
	Frequency	Estimate	% of HH	95% CI
Quality of the Tijuana River water				
Not Ok	175	40,004	92.7	88.4–96.9
Ok	1	–	–	–
Quality of the nearby ocean water				
Not Ok	171	39,079	90.5	85.3–95.8
Ok	4	–	–	–
Quality of air in the area				
Not Ok	145	33,241	77.0	68.8–85.2
Ok	36	8,242	19.1	12.1–26.1
Sewage in Tijuana River causing air and water pollution				
True	182	41,534	98.1	95.8–100.0
False	4	–	–	–
Sewage issue is causing bad odors in area				
True	180	40,960	96.2	92.0–100.0
False	7	1,610	3.8	0.0–8.0
Sewage crisis is getting worse				
True	168	38,553	89.3	85.0–93.6
False	14	2,989	6.9	3.5–10.4
Don't know	7	1,627	3.8	0.7–6.8
Sewage has negatively affected HHs quality of life				
True	156	34,418	80.4	72.3–88.5
False	32	8,392	19.6	11.5–27.7
Sewage made HHs health worse				
True	128	27,656	67.3	57.8–76.8
False	53	13,444	32.7	23.2–42.2
Community feels like a safe place to live				
True	97	22,803	52.8	44.4–61.3
False	87	19,151	44.4	35.9–52.8
Don't know	5	1,216	2.8	0.3–5.3
HH tap water is safe to drink				
False	138	30,753	71.2	62.4–80.1
True	39	9,551	22.1	13.0–31.3
Don't know	12	2,866	6.6	3.1–10.2
Sewage cleanup in area is sufficient				
False	157	35,942	87.9	82.6–93.2
True	22	4,949	12.1	6.8–17.4

Table 9. Household (HH) health status – Tijuana River Valley, 2024

	Tijuana River Valley CASPER (n=189)			
	Frequency	Estimate	% of HH	95% CI
Perceived overall health of HH				
Poor	11	2,278	5.3	2.4–8.2
Fair	58	12,920	29.9	24.3–35.5
Good	90	21,415	49.6	42.0–57.2
Excellent	30	6,556	15.2	9.5–20.9
Experienced symptoms caused by sewage crisis in past month[1]				
Yes	87	19,337	44.8	34.9–54.7
Headache	*68*	*15,452*	*80.0*	*67.9–92.0*
Nausea/upset stomach	*63*	*13,873*	*71.7*	*60.4–83.1*
Cough	*54*	*12,057*	*62.3*	*50.7–73.8*
Dry/irritated throat	*52*	*11,718*	*60.6*	*48.2–72.9*
Dizziness/light-headedness	*45*	*9,917*	*51.3*	*38.9–63.6*
Shortness of breath	*45*	*9,737*	*50.4*	*39.7–61.0*
Fatigue	*43*	*9,497*	*49.1*	*36.3–61.9*
Migraine	*40*	*8,701*	*45.0*	*32.0–58.1*
Diarrhea	*28*	*6,440*	*33.3*	*23.2–43.4*
Vomiting	*27*	*5,929*	*30.7*	*22.0–39.3*
Rash	*26*	*5,794*	*30.0*	*19.3–40.6*
Chest tightness/heaviness	*25*	*5,604*	*29.0*	*20.4–37.5*
Fever	*14*	*3,368*	*17.4*	*4.2–8.8*
Other[2]	*25*	*5,376*	*27.8*	*16.5–39.1*
No	97	22,830	52.9	42.9–62.8
Don't know	5	1,002	2.3	0.3–4.3
Number of symptoms experienced caused by sewage crisis in past month				
1-3 symptoms	17	3,798	19.6	9.9–29.3
4-7 symptoms	40	8,853	45.8	37.3–54.2
8 or more symptoms	30	6,686	34.6	22.9–46.2
Member of HH considered "medically fragile"				
Yes	68	15,053	35.1	26.5–43.6
No	120	27,877	64.9	56.4–73.5
Worsening chronic health in the past month[1]				
Allergies	100	21,943	51.1	41.0–61.2
Migraines	57	12,817	30.0	24.3–35.7
Chest/lung pain	35	7,759	18.1	12.4–23.8
Asthma	33	7,099	16.5	10.7–22.4
Diabetes	18	4,094	9.6	4.1–15.0
Hypertension/heart disease	19	4,077	9.5	5.3–13.7
Previous mental health condition	18	3,962	9.2	4.4–14.0
COPD/emphysema	7	1,627	3.8	0.8–6.9
Other[2]	14	3,286	7.7	2.2–3.2
1+ worsening chronic health condition	125	27,701	64.5	55.5–73.5
Sought medical care because of the crisis[2]				
Yes	36	7,819	18.2	12.4–24.0
Clinic	*16*	*3,496*	*44.7*	*26.0–63.5*
Urgent care	*15*	*3,106*	*39.7*	*20.0–59.4*
Emergency department	*9*	*1,979*	*25.3*	*7.3–43.3*
Other[3]	*6*	*1,216*	*15.6*	*5.0–26.0*
No	152	35,112	81.8	76.0–87.6
Symptoms improved when away from area				
Yes	88	20,740	48.0	38.9–57.1
No	18	3,928	9.1	4.5–13.7
Have not spent time away from area	23	5,112	11.8	6.2–17.5
No sewage-related health issues	60	13,390	31.0	3.6–22.5

[1]Households could choose more than one response

[2]Other includes Lupus, skin conditions, bronchitis, cancer, Autistic behavioral changes, etc.

[3]Other includes school nurse, allergist, and other specialist care

Table 10. Household (HH) behavioral and mental health indicators – Tijuana River Valley, 2024

	Tijuana River Valley CASPER (n=189)			
	Frequency	Estimate	% of HH	95% CI
The sewage crisis negatively affected HHs[1]				
Peace of Mind	135	31,334	72.6	65.1–80.1
Health	105	23,204	53.8	44.8–62.7
Property	64	15,320	35.5	25.5–45.5
Finances	43	9,309	21.6	15.0–28.2
Other[2]	8	1,653	3.8	1.4–6.3
No negative effects	32	7,111	16.5	9.5–23.4
1 or more effects	157	36,059	83.5	76.6–90.5
Feels home is safe in which to live				
Yes	121	28,074	65.0	56.1–73.9
No	62	13,879	32.2	24.0–40.3
Don't know/unsure	6	1,216	2.8	0.3–5.3
Loss or serious illness of pet because of the crisis				
Of HHs w/pets (n=109)	7	1,564	6.5	1.2–11.7
HH stress level since sewage crisis				
No change	73	17,789	41.4	32.6–50.3
Increased a little	67	14,727	34.3	27.5–41.1
Increased a lot	48	10,414	24.3	9.6–18.9
HH adaptive changes (life transitions) because of the crisis				
Take a different route to avoid crisis	73	17,318	40.3	31.1–49.5
Considered moving	74	16,413	38.2	29.6–46.9
Missed school or work	21	4,523	10.5	5.6–15.4
Other[2]	8	1,684	3.9	1.1–6.7
Changed jobs/school	6	1,242	2.9	0.7–5.1
Lost employment	3	–	–	–
1 or more life transition	107	24,758	57.3	47.9–66.8
Experienced behavioral health indicators because of the crisis[1]				
Trouble sleeping/nightmares	109	24,083	56.1	45.1–67.1
Mood change	64	14,949	34.7	25.7–43.9
Difficulty concentrating	65	13,948	32.5	24.9–40.0
Agitated behavior	51	12,100	28.2	19.1–37.3
Loss of appetite	53	11,613	27.1	19.3–34.8
Increased alcohol use	11	2,614	6.1	1.7–2.6
Increased drug use	4	–	–	–
1 or more behavioral health indicator	122	28,045	65.3	55.5–75.2
Experienced signs of emotional distress because of the crisis				
Headaches/stomachaches/body pain	94	21,165	49.0	39.8–58.3
Increased anxiety/worry	76	16,293	37.7	29.2–46.2
Lack of energy	66	14,476	33.5	25.7–41.4
Spending less time with friends/family	59	13,057	30.2	22.4–38.1
Sadness/depression	47	10,130	23.5	16.3–30.6
Feeling alone/isolated	24	5,076	11.8	6.5–17.0
Feeling of numbness	20	4,545	10.5	6.0–15.1
Other	7	1,496	3.5	1.0–5.9
None	60	14,727	34.1	24.9–43.3
1 or more signs	129	28,443	65.9	56.7–75.1
Received behavioral or mental health services in past month				
Yes	10	2,081	4.9	1.5–8.3
Could not get services	13	2,660	6.2	2.3–10.2
No need for services	164	37,948	88.9	82.3–94.8

[1]*Households could choose more than one response*

[2]*Other includes health of pet, quality of life, trust in government action, physical activity, etc.*

Table 11. Individual mental health status – Tijuana River Valley, 2024

	Tijuana River Valley CASPER (n=189)			
	Frequency	Estimate	% of HH	95% CI
Over last 2 weeks, had little interest or pleasure doing things				
Not at all	128	74,388	70.9	64.7–77.0
Several days	30	14,924	14.2	8.7–19.8
More than half	19	10,556	10.1	5.0–15.1
Nearly every day	10	5,088	4.8	0.9–8.8
Over last 2 weeks, felt down, depressed, or hopeless				
Not at all	137	79,176	75.4	69.9–81.0
Several days	34	17,335	16.5	11.5–21.5
More than half	13	6,544	6.2	2.2–10.3
Nearly every day	3	--	--	--
Patient Health Questionnaire 2 (PHQ-2) score				
Less than 3	161	91,025	86.0	80.0–92.0
3 or more	28	14,822	14.0	8.0–20.0
Over last 2 weeks, felt nervous, anxious, or on edge				
Not at all	116	66,285	63.2	55.9–70.5
Several days	51	28,102	26.8	20.0–33.5
More than half	12	6,133	5.8	2.3–9.4
Nearly every day	8	4,437	4.2	1.3–7.2
Over last 2 weeks, felt unable to stop or control worrying				
Not at all	130	73,567	70.1	63.0–77.2
Several days	36	19,139	18.2	12.8–23.6
More than half	12	6,923	6.6	2.9–10.3
Nearly every day	9	5,328	5.1	0.6–9.6
Generalized Anxiety Disorder 2 (GAD-2) score				
Less than 3	167	93,427	88.3	82.2–94.3
3 or more	22	12,420	11.7	5.7–17.8
Mental health in past 30 days				
<14 days “not good”	162	92,593	88.2	82.4–94.1
≥14 days “not good”	25	12,363	11.7	5.9–17.6
Mental health keeps from doing usual activities				
<14 days impacting activities	156	89.143	84.9	79.0–90.8
≥14 days impacting activities	31	15,814	15.1	9.2–21.0

Appendix A: Questionnaire

Community Assessment for Public Health Emergency Response (CASPER) – Tijuana River Sewage Crisis, 2024

DK=Don't Know Ref=Refused NA=Not Applicable HH=Household

Date: 10/____/2024 Cluster Number: _____ Interview Number: _____ Team name: _____

First, we would like to gather some general information about your household – this includes yourself and any other individuals who sleep at your home most nights.

Complete before beginning survey: *Type of structure*
□ *Single family* □ *Multiple unit* □ *Mobile home* □ *Other* _____

Q1. Including yourself, how many people live in your home? __#___

Q2. Including yourself, how many people living in your home are
Less than 2 years old? __#__ 2-17 years old? __#__
18-64 years old? __#__ 65 years or older? __#__ □ DK □ Ref

Q3. Is your home… □ Owned by you or somebody in your home
□ Rented □ Occupied without ownership or rent □ DK □ Ref

Q4. Does your household have any…pets? □ Yes □ No □ DK □ Ref
…livestock? □ Yes □ No □ DK □ Ref

Q5. What is the primary language spoken in your HH? *(Check ONE)*
□ English □ Spanish □ Other_____ □ DK □ Ref

Now we would like to know more about you your household's experience with air and water exposures related to the sewage crisis

Q6. How **aware** is your HH about the Tijuana River Valley sewage crisis? □ Very □ Somewhat □ A little □ Not at all □ DK □ Ref

Q7. In the past month, have you or a member of your HH been in direct contact with water from the Tijuana River?
□ Yes □ No □ DK □ Ref

Q8. In the past month, have you or a member of your HH been in direct contact with the beach water from Imperial Beach, Tijuana Slough, or Silver Strand shorelines while these beaches have been closed? □ Yes □ No □ DK □ Ref

Q9. Has your HH taken any extra steps to avoid certain areas because of the sewage contamination?
□ Yes - frequently □ Yes – sometimes □ No □ DK □ Ref

Q10. In the past month, have you or a member of your HH noticed a sewage smell…
inside your home □ Yes (Q10a) □ No □ DK □ Ref
outside your home □ Yes (Q10a) □ No □ DK □ Ref
in the neighborhood? □ Yes (Q10a) □ No □ DK □ Ref

Q10a. IF YES, what time of day has your HH noticed the smell is the strongest? *(Check ONE)*
□ Morning □ Afternoon □ Evening/Night □ DK □ Ref

Q11. Have you or a member of your HH used any of the following to *reduce the sewage smell* inside your home? *(Check ALL)*
□ Portable air purifier, cleaner, or filter □ Air freshener/Deodorizer
□ Humidifier or de-humidifier inside your home □ Closed windows
□ Candles, incense, or oil □ Ammonia/Bleach cleaning products
□ Other _____
□ None - Did not use anything
□ No sewage smell in the home □ DK □ Ref

Q11a. *If YES to any* above, did it help to remove the smell?
□ Yes □ No □ Depends/Sometimes □ DK □ Ref

Q12. How **concerned** is your HH about the sewage crisis?
□ Very □ Somewhat □ A little □ Not at all □ DK □ Ref

Q13. Does your HH feel your home is safe to live in?
□ Yes □ No □ DK □ Ref

Q14. Has your HH changed any daily activities or routines because of the sewage crisis? *(Check ONE)*
□ Yes – many changes □ Yes – some □ No changes □ DK □ Ref

Q15. In the past month, has the sewage crisis disrupted any of the following aspects of your HH's life? *(Check ALL)*
□ Daily routines □ Social activities □ Exercise □ Sleep schedule
□ School/work □ Childcare/daycare □ Church/place of worship
□ Daily community life □ Quality time with family
□ Eating behaviors/schedule □ Other _____
□ No disruptions □ DK □ Ref

Q16. In the past month, has the sewage crisis affected any of your HH's outdoor activities? *(Check ALL)*
Time outdoors □ Increased □ Decreased □ No change □ DK □ Ref
Gardening □ Increased □ Decreased □ No change □ DK □ Ref
Visiting beaches □ Increased □ Decreased □ No change □ DK □ Ref
Parks/playgrounds □ Increased □ Decreased □ No change □ DK □ Ref
Other _____ □ Increased □ Decreased □ No change □ DK □ Ref

Q17. What is your HH **MOST** concerned about when it comes to the sewage crisis? *(Check ONE)* □ Health of HH members
□ Health of pets/livestock □ Decrease in property value
□ Other _____ □ Nothing □ DK □ Ref

Q18. Where do you get **most** of your drinking water? *(Check ONE)*
□ Tap/city □ Bottle □ Well □ Other _____ □ DK □ Ref

Q19. Has your HH changed where you get drinking water since the crisis began? □ Yes (Q19a) □ No □ DK □ Ref

Q19a. If YES, why? _____ □ DK □ Ref

Now we would like to know a little more about your household's communication preferences

Q20. Do you or does anyone in your household have any of the following? *(Check ALL)* □ Impaired hearing □ Impaired vision
□ Developmental/cognitive disability □ Difficulty understanding English □ Difficulty understanding written material
□ Difficulty with mobility □ None of the above □ DK □ Ref

Q21. Where does your household **usually** get information about the sewage crisis? *(Check ALL)* □ TV □ Radio □ Newspaper
□ Internet news □ Instagram □ Facebook □ Tik Tok □ X
□ Other social media □ Church/Place of worship
□ Schools □ Work □ Public Health Department
□ Friends/Family/Neighbor/Word of Mouth
□ Other _____
□ Have not heard any information □ DK □ Ref

Q22. Who does your household **trust most** to give accurate information about the sewage crisis? *(Check ALL)*
□ County of San Diego non-HD officials □ City officials
□ County of San Diego Health Department (HD)
□ Doctor, nurse, healthcare provider
□ Pastor, priest, spiritual leader □ Friend/Family/Neighbor/Coworker
□ Mayor □ Governor □ Other _____
□ Ourselves/household □ Do not trust anyone □ DK □ Ref

Now we would like to know a little more about your household's thoughts about the sewage crisis.

Q23. Please tell us if your HH believes the following have been **OK** or **Not OK** in the past month
a. Quality of the air in the area □ OK □ Not OK □ DK □ Ref
b. Quality of the nearby ocean water □ OK □ Not OK □ DK □ Ref
c. Quality of the Tijuana River water □ OK □ Not OK □ DK □ Ref

Q24. Please tell us if your HH believes the following are **TRUE (T)** or **FALSE (F)**

The sewage crisis is getting worse	□ T □ F □ DK □ R	The sewage issue is causing bad odors in the area	□ T □ F □ DK □ R
Our HH tap water is safe to drink	□ T □ F □ DK □ R	The sewage has negatively affected our HHs quality of life	□ T □ F □ DK □ R
The sewage cleanup in the area is sufficient	□ T □ F □ DK □ R	The sewage has made our HH's health worse	□ T □ F □ DK □ R
Our community feels like a safe place to live	□ T □ F □ DK □ R	Sewage in the Tijuana River is causing air & water pollution	□ T □ F □ DK □ R

The next questions are about the health of you and members of your household

Q25. Has the sewage crisis negatively affected your HH's…
(Check ALL) □ Property □ Finances □ Health □ Peace of Mind
□ Other_____ □ No negative effects □ DK □ Ref

Q26. How would you rate the overall health of your HH? *(Check ONE)*
□ Excellent □ Good □ Fair □ Poor □ DK □ Ref

Q27. Has your HH experienced a loss or serious illness because of the sewage crisis to…. a pet □ Yes □ No □ No pet □ DK □ Ref
… livestock □ Yes □ No □ No livestock □ DK □ Ref

Q28. In the past month, have you or a member of your HH had any health symptoms that they think were *caused by* the sewage crisis?
□ Yes (Q28a) □ No □ DK □ Ref

Q28a. *IF YES,* which symptoms? *(Check ALL)* □ Dry/Irritated throat
□ Cough □ Rash □ Fever □ Shortness of breath
□ Chest tightness/heaviness □ Headache □ Migraine
□ Nausea/Upset stomach □ Vomiting □ Diarrhea
□ Fatigue □ Dizziness/Light-headedness
□ Other _____ □ DK □ Ref

Q29. Have health symptoms you or a member of your HH had from the sewage crisis gotten better when they spent time away from the area? □ Yes □ No □ N/A – no sewage-related health issues
□ N/A – have not spent time away from the area □ DK □ Ref

Q30. Is anyone in your HH considered "medically fragile", or been told by a doctor or healthcare professional they have a chronic medical condition? □ Yes □ No □ DK □ Ref

Q31. In the past month, have you or any members of your HH experienced **worsening** of…

Allergies	□ Yes □ No □ N/A	□ DK □ Ref
Asthma	□ Yes □ No □ N/A	□ DK □ Ref
Chest/lung pain	□ Yes □ No □ N/A	□ DK □ Ref
COPD/Emphysema	□ Yes □ No □ N/A	□ DK □ Ref
Diabetes	□ Yes □ No □ N/A	□ DK □ Ref
Hypertension/heart disease	□ Yes □ No □ N/A	□ DK □ Ref
Migraines	□ Yes □ No □ N/A	□ DK □ Ref
Previous MH condition	□ Yes □ No □ N/A	□ DK □ Ref
Other _____	□ Yes □ No □ N/A	□ DK □ Ref

Q32. Have you or anyone in your household needed medical care because of the sewage crisis? □ Yes (Q32a) □ No □ DK □ Ref

Q32a. *IF YES,* where did you/they go? *(Check ALL)* □ Clinic □ Emergency Dept □ Urgent Care □ School nurse
□ Other _____ □ DK □ Ref

Q33. How has the sewage crisis affected the overall stress level of your HH? *(Check ONE)*
□ Increased a lot □ Increased a little □ No change □ DK □ Ref

Q34. Because of the sewage crisis, have you or a member of your HH…

Lost employment	□ Yes □ No □ N/A	□ DK □ Ref
Changed jobs	□ Yes □ No □ N/A	□ DK □ Ref
Change schools	□ Yes □ No □ N/A	□ DK □ Ref
Changed day care	□ Yes □ No □ N/A	□ DK □ Ref
Missed school or work	□ Yes □ No □ N/A	□ DK □ Ref
Considered moving	□ Yes □ No □ N/A	□ DK □ Ref
Take a different route to avoid sewage-contaminated areas	□ Yes □ No □ N/A	□ DK □ Ref
Other_____	□ Yes □ No □ N/A	□ DK □ Ref

Q35. In the past month, have you or a member of your HH had any of the following *because of the sewage crisis?*

Difficulty concentrating	□ Yes □ No	□ DK □ Ref
Trouble sleeping/nightmares	□ Yes □ No	□ DK □ Ref
Loss of appetite	□ Yes □ No	□ DK □ Ref
Agitated behavior	□ Yes □ No	□ DK □ Ref
Mood changes (e.g., irritable, sad)	□ Yes □ No	□ DK □ Ref
Increased alcohol consumption	□ Yes □ No	□ DK □ Ref
Increased drug use, including marijuana	□ Yes □ No	□ DK □ Ref

Q36. Have you or members of your household experienced any of the following because of the sewage crisis? *(Check ALL)*
□ Lack of energy □ Feelings of numbness
□ Sadness/depression □ Increased anxiety/worry
□ Headaches/stomachaches/body pain □ Feeling alone/isolated
□ Spending less time with friends/family
□ Other _____
□ None □ DK □ Ref

Q37. In the past month**,** have you or members of your HH received services from a counselor, pastor/clergy member, therapist, social worker, or hotline (e.g., 988) for behavioral health concerns as a result of the sewage crisis?
□ Yes □ No – couldn't get services □ No – no need □ DK □ Ref

Now we are going to ask about YOU as an INDIVIDUAL. Please remember your responses are confidential and private

Q38. Thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the **past 30 days** was your mental health not good? __#__ □ DK □ Ref

Q39. During the **past 30 days**, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation? __#__ □ DK □ Ref

Q40. Over the last **2 weeks**, how often have you…

Had little interest or pleasure in doing things?	□ Not at all	□ Several days	□ More than half the days	□ Nearly every day	□ DK □ Ref
Felt down, depressed or hopeless?	□ Not at all	□ Several days	□ More than half the days.	□ Nearly every day	□ DK □ Ref

Q41. Over the last **2 weeks**, how often have you…

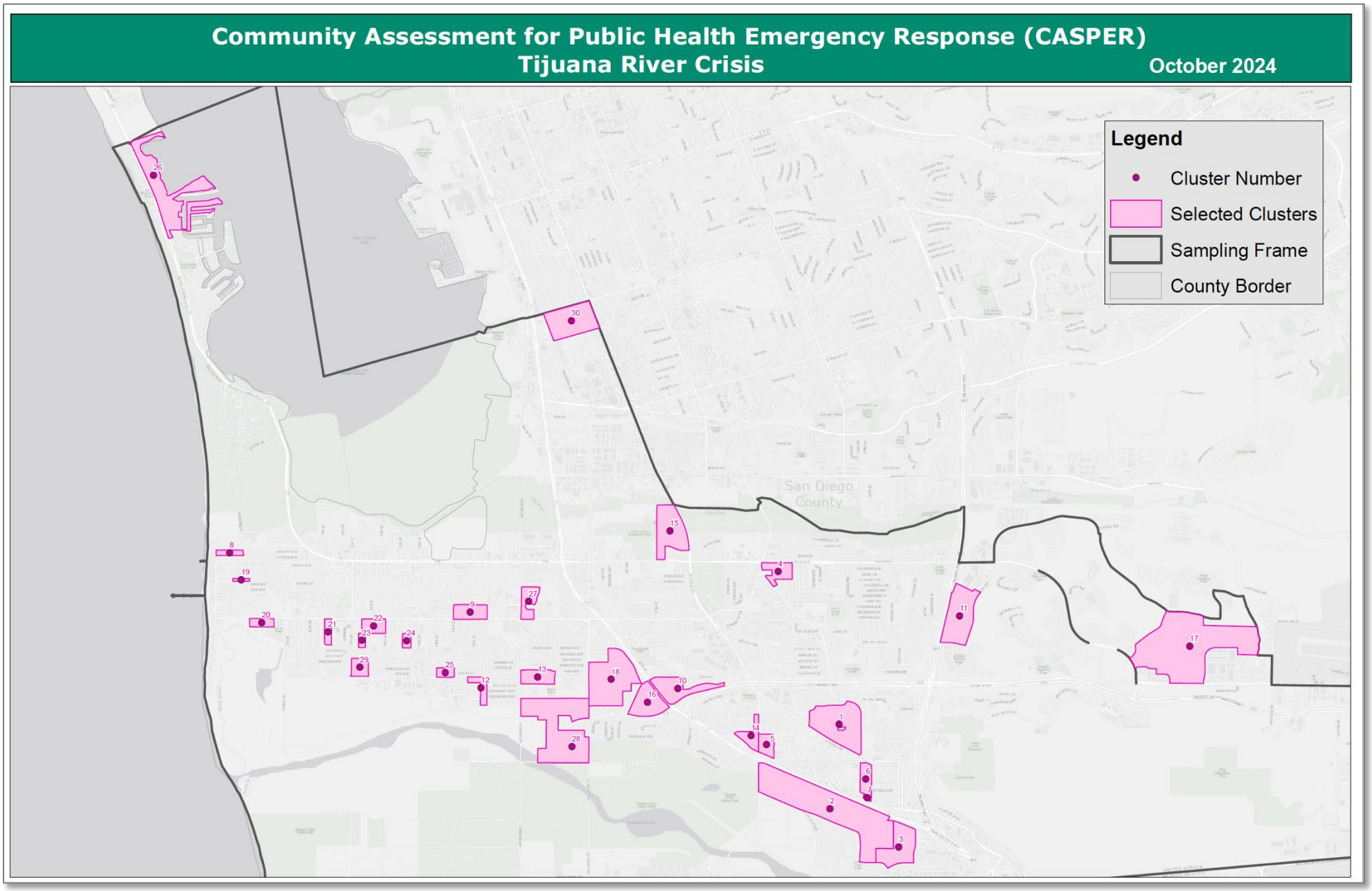
Felt nervous, anxious, or on edge?	□ Not at all	□ Several days	□ More than half the days	□ Nearly every day	□ DK □ Ref
Been unable to stop or control worrying?	□ Not at all	□ Several days	□ More than half the days	□ Nearly every day	□ DK □ Ref

Q42. Last question, what is your HHs greatest need as result of the Tijuana River sewage crisis at this time?

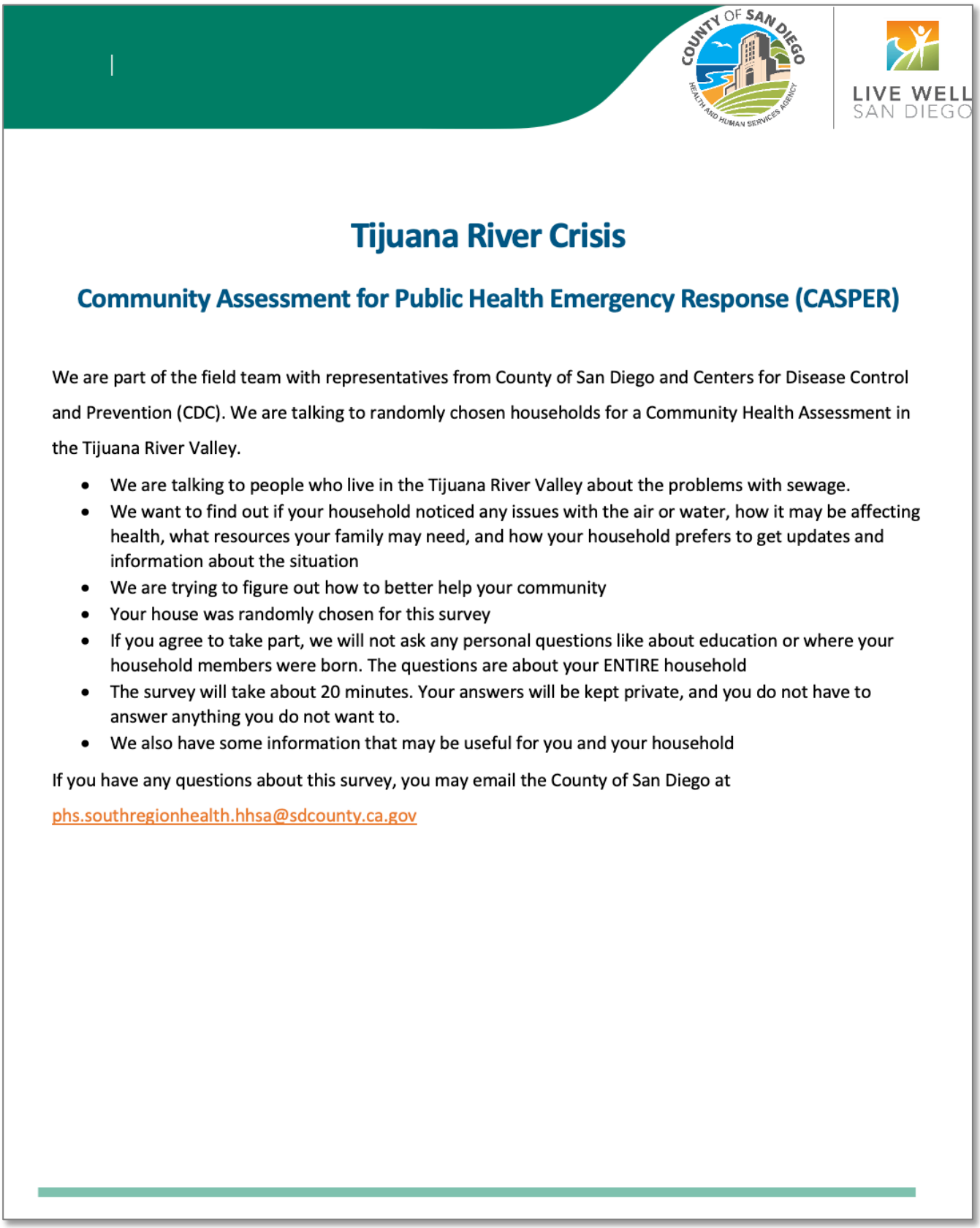
□ Nothing □ DK □ Ref

NOTE: Questionnaire was also translated into Spanish

Appendix B: Selected Clusters



Appendix C: Consent Script



Tijuana River Crisis

Community Assessment for Public Health Emergency Response (CASPER)

We are part of the field team with representatives from County of San Diego and Centers for Disease Control and Prevention (CDC). We are talking to randomly chosen households for a Community Health Assessment in the Tijuana River Valley.

- We are talking to people who live in the Tijuana River Valley about the problems with sewage.
- We want to find out if your household noticed any issues with the air or water, how it may be affecting health, what resources your family may need, and how your household prefers to get updates and information about the situation
- We are trying to figure out how to better help your community
- Your house was randomly chosen for this survey
- If you agree to take part, we will not ask any personal questions like about education or where your household members were born. The questions are about your ENTIRE household
- The survey will take about 20 minutes. Your answers will be kept private, and you do not have to answer anything you do not want to.
- We also have some information that may be useful for you and your household

If you have any questions about this survey, you may email the County of San Diego at phs.southregionhealth.hhsa@sdcounty.ca.gov

NOTE: Consent was also available in Spanish

Appendix D: Confidential Referral Form

Community Assessment for Public Health Emergency Response

Confidential Referral Form

Date: __/__/____ Time: __:__
Cluster No.: _____
Interviewer's Initials: _____

Name: _____

Address: _____

Contact Information:

Home telephone: _____ - _____ - _____

Cell phone: _____ - ____ - _____

E-mail: _____

Summary of Need:

_____
_____
_____
_____
_____
_____
_____

Referral Made: Yes ☐ No ☐

Referred to: _____

Appendix E: Public Health Materials

SOUTH REGION CDC HEALTH SURVEY

*The Centers for Disease Control and Prevention (CDC) is working with the County of San Diego to learn more about **health concerns and impacts from sewage and pollution in the Tijuana River Valley**. This will be done through a survey called a Community Assessment for Public Health Emergency Response, or CASPER.*

WHAT IS A CASPER?

CASPER stands for Community Assessment for Public Health Emergency Respor
type of household survey developed by the CDC.

- It is a way to quickly gather information about the needs of an affected con
- It is a point-in-time survey.

HOW IS A CASPER DONE?

CASPER is done by interviewing people face-to-face in their community.

- A CASPER uses a two-stage sampling method designed to pick just the righ of households to interview. First, 30 blocks (clusters) are selected, then 7 households are selected in each block. A total of 210 interviews will be cor
- Representatives from the County and CDC will visit randomly selected hom South Region. They will ask about health concerns, experiences, and impac sewage and pollution in the Tijuana River Valley.
- If your home is randomly selected, the in-person survey will take about 15 of your time. Participation is voluntary and anonymous.

WHAT WILL THE DATA BE USED FOR?

There has been a long history of cross-border flows containing untreated sewa sediment, and trash entering the Tijuana River Valley. This impacts local recrea damages sensitive habitats, threatens public health, and causes beach water co closures.

Your input will help us better understand the health status, experiences, and n the South region of San Diego County related to sewage and pollution in the Ti River Valley.

To lea
sandi

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LIVE WELL SAN DIEGO

Sewage Safety

Sewage can run out into the yard or land from wastewater backing up from underground sewer pipes, or septic tank build up, or heavy rains.

PROTECT YOURSELF AND OTHERS FROM SEWAGE

Avoid Direct Contact

- Stay away from areas with visible sewage spills.
- Do not allow children to play in areas where visible sewage is present.

Wear Protective Gear

- Use gloves, masks, and boots when cleaning or handling items contaminated with sewage.

Proper Cleaning

- Disinfect all surfaces with a bleach solution.
- Wash clothes and fabrics that have come into contact with sewage separately in hot water.

Personal Hygiene

- Wash hands well with water and soap.
- Do not touch your nose, mouth, eyes, or ears with your hands, unless your hands have been washed.

Seek Help

- Talk to your doctor or nurse if you are sick after being exposed to sewage.

Scan QR code for more resources and updates, or visit South Region Illness Concerns.

Scan QR code to see if water areas are monitored, under advisory, or have been closed for health or safety reasons, or visit the Beach & Bay Water Quality Program.

LIVE WELL SAN DIEGO

07/22/2024

ENVIRONMENTAL & YOUR HEALTH

WHAT'S THAT SMELL?

Hydrogen sulfide is a colorless gas. At low le
eggs. Hydrogen sulfide occurs naturally in so
organic decomposition (breakdown), such as
with large amounts of decaying seaweed.

STEPS TO TAKE

Smelling hydrogen sulfide does not always n
the smell is strong, or you are concerned, the

Reduce Exposure

- Limit outdoor activity.
- Keep windows and doors closed.
- Air out your home, or business, when odors are not present.

Improve Air Quality in Your Home or Business

- Use air conditioning, or portable indoor air purifiers. Look into whether filters need to be replaced.
- Use certified HEPA filters with activated charcoal.
- If possible, run your air conditioner at your business for 1-2 hours before opening.

Call Your Doctor

- If you are experiencing persistent, worrisome, or worsening symptoms from strong odors, call your doctor, especially if you have chronic health conditions.
- If you do not have a doctor, contact 2-1-1 San Diego.

MORE INFORMATION

Scan this QR code, or visit sandiegocounty.gov/southregionhealth.

LIVE WELL SAN DIEGO

9/13/2024

Appendix F: Interview Team Quotes from the Field (selected list)

"*When we were interviewing a husband and wife, they spoke about how their kids' class had to be cancelled because of the quality of air and how they are very concerned about the future of their children's health and now they don't want the lives of their kids to be more affected than they already are.*" – Interview Team

"*One of the residents we interviewed has been aware of the Tijuana River Crisis for decades. Since the boil water advisories, she has stopped drinking tap water. Her and her family only drink bottled water. They have also moved parts of town because of the smell and pollution.*" – Interview Team

"*A resident has been surfing since he was 13 years old and now has to leave his community/local beach to drive up the coast to safer beaches. He is now experiencing worsening health conditions related to respiratory illnesses (i.e., asthma, allergies).*" – Interview Team

"*Our one interview was super happy to speak with us as she has directly felt the impacts of the sewage crisis. She remembers when it began 35+ years ago and had to move after retiring from being a preschool teacher in IB. When she leaves the area her allergy-like symptoms go away, making her feel worse when she gets back…*" – Interview Team

"*One resident was so passionate about this, ... He said if this was happening in La Jolla, it would've been fixed years ago.*" – Interview Team

"*I visited 2 homes, each home included a woman in her 60's who gardens and developed a rash on their elbows and backs. The rashes seems to go away when the garden less frequently. Residents have no where to "hide" because the stench is outside and in their homes. One couple takes 4-6 hour drives at night to get away from the neighborhood when it stinks. This is affecting their sleep and ability to work. The stench is commonly smelled between 6pm-5am. A man is concerned that the sewage is causing respiratory infections and edema in his children, and they had gone to the hospital for these symptoms multiple times. Another woman said that if she had young children, she would move.*" – Interview Team

"*One resident told us that they use multiple filtration systems for drinking water for themselves and their pets, and they installed a filter in their shower because of their sensitive skin.*" - Interview Team

"*Households we spoke to today really seemed to have their neighborhood social activities affected. No one wants be outside in the evening so the kids do not play or hang out with each other. One woman said her daughter's friends don't want to come to her house because of the smell.*" – Interview Team

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Interview Team Members & Survey Respondents!

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention and the Agency of Toxic Substances and Disease Registry