Texas Flood Registry

2020 Report

Prepared by
the Children’s Environmental Health Initiative (CEHI)
Message from the Project Leaders

Three years have passed since Hurricane Harvey, which sparked the launch of the Texas Flood Registry (originally the Hurricane Harvey Registry). In February 2019, we shared a preliminary report on the first 9,798 registrants. As of April 2020, over 20,000 community members had joined the registry, providing insights into the living environments of 60,000 residents throughout the region.

In 2019, it became obvious that we must adapt to the needs of our community and measure the impact of other storms and repeated flooding events. In May, torrential rainstorms battered Southeast Texas for multiple days. Four months later, Tropical Storm Imelda, the second 1,000-year flood in two years, occurred. In light of these two weather disasters, we changed our name from the Hurricane Harvey Registry to the Texas Flood Registry to reflect our expanded commitment to understanding the health and housing impacts of all major storms in Texas. This report includes updates on Harvey’s long-term impact and recent findings about the health and housing effects of the May 2019 storms and Tropical Storm Imelda.

Texans have played a vital role in helping us achieve the project’s goal of measuring the long-term health and housing impacts of major storms. We are especially grateful for the support this collaborative effort has received from residents, community organizations, health departments, and state organizations.

Our team looks forward to maintaining strong local partnerships and continuing to bridge the gap between researchers, public health departments, and our communities. We appreciate everyone who gave their time to take a survey. As we continue to recover and prepare for future storms, it is important that solutions include the voice of every resident in the region.

Sincerely,

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Since launching this project in 2018, 20,067 unique registrants have shared their storm experiences, with approximately 20% of registrants completing more than one survey. As of April 1, 2020, there were 19,993 responses to the Hurricane Harvey survey, 3,559 responses to the May 2019 storms survey, and 1,402 responses to the Tropical Storm Imelda survey. On average, these registrants represent 3-person households, capturing the storm experiences of over 60,000 residents in the region.
Impacts

The results show greater exposure to floodwaters, property damage, and income loss due to Hurricane Harvey, compared to Tropical Storm Imelda, and the May 2019 storms. Forty-four percent of registrants reported home flooding due to Harvey, compared to 15% and 4% of registrants reporting flooding due to Tropical Storm Imelda and the May 2019 storms, respectively. For the May 2019 storms and Tropical Storm Imelda, registrants have reported greater income loss compared to home flooding, which suggests that economic impacts are more common than direct flood impacts for both storms.

### Percent of registrants impacted by experience and by storm

<table>
<thead>
<tr>
<th>Experience</th>
<th>Hurricane Harvey</th>
<th>May 2019 Storms</th>
<th>Tropical Storm Imelda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Flooded</td>
<td>44%</td>
<td>15%</td>
<td>4%</td>
</tr>
<tr>
<td>Contacted Floodwater</td>
<td>4%</td>
<td>13%</td>
<td>27%</td>
</tr>
<tr>
<td>Vehicle Damaged</td>
<td>60%</td>
<td>35%</td>
<td>13%</td>
</tr>
<tr>
<td>Income Loss</td>
<td>20%</td>
<td>14%</td>
<td>46%</td>
</tr>
</tbody>
</table>

### Percent of registrants with homes flooded during Hurricane Harvey by Zip Code Tabulation Area

The map shows the percentage of registrants with homes flooded during Hurricane Harvey by Zip Code Tabulation Area. The colors indicate the percentage of registrants with homes flooded, ranging from <9% to 74%+. The map highlights the areas affected by the storm, with darker colors indicating a higher percentage of registrants affected.
Physical Health

The results show the prevalence of symptoms differs between storms, suggesting greater physical health impacts from Hurricane Harvey compared to other storms. Sixty-three percent of registrants reported at least one symptom due to Hurricane Harvey, compared to 9% of registrants who reported symptoms due to Tropical Storm Imelda.

Percent of registrants reporting symptoms by symptom and storm

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Hurricane Harvey</th>
<th>May 2019 Storms</th>
<th>Tropical Storm Imelda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runny Nose</td>
<td>49%</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Headaches/Migraines</td>
<td>27%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Problems Concentrating</td>
<td>23%</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Shortness of Breath</td>
<td>22%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Skin Rash</td>
<td>10%</td>
<td>2%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Percent of registrants experiencing 1+ symptoms due to Hurricane Harvey by Zip Code Tabulation Area

[Map showing the percentage of registrants experiencing symptoms by Zip Code Tabulation Area. Colors range from <52% to 76% - 89%.]
Physical Health

Additionally, results suggest the physical health impacts of Hurricane Harvey are more pervasive, affecting registrants whether or not they experienced flooding. The figure below shows a side-by-side comparison of registrants reporting at least one symptom by storm and flooding status. Of registrants reporting no flooding during Harvey, 55% reported at least one symptom, compared to 7% of registrants who completed the Imelda survey.

Percent of registrants who experienced at least 1 symptom by storm

<table>
<thead>
<tr>
<th>Storm</th>
<th>Experienced 1+ symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvey</td>
<td>63%</td>
</tr>
<tr>
<td>May 2019</td>
<td>8%</td>
</tr>
<tr>
<td>Imelda</td>
<td>9%</td>
</tr>
</tbody>
</table>

Percent of registrants experiencing 1+ symptoms by home flooded status and storm

- Hurricane Harvey: 72%
- May 2019 Storms: 36%
- Tropical Storm Imelda: 23%

- Flooded: 55%
- Not Flooded: 6%
The mental health impacts of Hurricane Harvey continue to persist almost three years later. Of the 20% of registrants reporting changes in behavior, depression, anxiety, sleep problems, or memory problems as a result of the May 2019 storms, 92% reported these changes were related to their experience during Harvey. Of the 30% of registrants reporting mental or emotional changes due to Tropical Storm Imelda, 78% reported these changes were related to Harvey. Responses to the Impact of Event Scale questionnaire indicate that for 25% of registrants, Hurricane Harvey was a severe impact event capable of altering one’s ability to function.

Percent of registrants reporting emotional changes by storm

- **Severe Impact Event**
  - Harvey: 25%
- **Emotional Changes**
  - May 2019: 20%
  - Imelda: 30%

Percent of registrants indicating Hurricane Harvey as a severe impact event by Zip Code Tabulation Area

![Map showing distribution of severe impact events by Zip Code Tabulation Area]
Next Steps

The Texas Flood Registry team is actively working to build a registry that represents all storm experiences. As new storms continue to disrupt our lives, the Texas Flood Registry will be there to collect data that will provide answers to residents’ questions, and bring needed resources to our communities.

We are filled with gratitude to all who have registered and the community groups that work with us. With your support and participation, the Texas Flood Registry will continue to:

- Measure the impacts of Hurricane Harvey and other major storms
- Share findings to inform public health solutions and planning for future disasters
- Help residents recover and prepare for future storms

We encourage you to share information about the Texas Flood Registry with your family, friends, and community. **If you have not already, please visit registry.rice.edu to take a survey and see our latest updates.**

In addition, with the emergence of COVID-19, the Texas Flood Registry team created the COVID-19 Registry. We saw the pandemic as a call to action to leverage our resources and help local health departments in their response efforts. **We ask that you visit registry.rice.edu/covid19 to enroll in the registry and provide real-time information on the impact and spread of the virus.** Your responses will help health departments track the virus’ spread over time and across geography, allowing them to better manage resources and improve public health.

[COVID-19 Registry]
Help measure the health and economic impacts of COVID-19. Join the COVID-19 Registry!

registry.rice.edu/COVID19
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