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Sociodemographic and housing factors for flood and mold damage in the Greater New Orleans Area after Hurricane Ida

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Abstract

Objective: As extreme weather events become more pervasive due to climate change, identifying populations with lower access to resources becomes critical for timely mitigation efforts. Here we analyzed data from a survey conducted in Louisiana after Hurricane Ida to investigate demographic and housing characteristics of those vulnerable to home damage, flooding, and mold exposure after an extreme weather event.

Methods: The survey participants comprised a convenience sample of 167 total respondents, most of whom resided in the Greater New Orleans Area. Sociodemographic, housing, and geographic factors were considered that described the population reporting home damage, flooding, and/or mold due to Hurricane Ida compared with those who did not experience these outcomes from Hurricane Ida.

Results: Sociodemographic and housing factors predicting adverse impact from Hurricane Ida included race, retirement status, educational attainment, Social Vulnerability Index (SVI), type of home, and homeownership status. Of note, those whose homes had flooded prior to Ida had significantly higher odds of reporting home damage with Ida.

Conclusions: Of all the sociodemographic factors associated with Hurricane Ida damage including flooding and mold, a greater level of the SVI was most consistent and often had the strongest associations with these adverse outcomes. A public health focus on neighborhoods with higher SVI could help lead to strategies to mitigate and prevent exposure in future flood events.

To date, only a few major floods have been studied regarding mold exposure,[1–5] and only a few hurricanes have been studied.[6–9] All of the studies have found evidence suggesting that mold damage is common. However, prior studies give mixed evidence on how long it takes to clean up after the event and whether the clean-up is effective. Flood cleanup, including drying of homes, has been shown to lower microbial levels, including mold, in homes from some studies[1,6] but not others.[7,10] Differences in study design (pre-/post-remediation, case-control), the extent of mold damage at the initial time of clean-up, residual water damage leading to continued mold growth after the clean-up, and whether water-damaged personal belongings were kept in the homes could be factors that affect the effectiveness of clean-up efforts. Sociodemographic characteristics could also have affected clean-up.

Researchers have consistently found that the level of housing dilapidation is associated with higher levels of mold and other allergens such as cockroaches.[11–13] Underlying some of the housing dilapidation could be sociodemographic factors. For example, Boston researchers found that poverty was associated with higher levels of cockroach allergen.[14] To date, the sparse literature about differences in mold exposure based upon sociodemographic factors presents mixed results, with some studies showing homes in areas with lower socioeconomic status (SES) factors such as household income, job classification, and educational status having more mold and dampness factors and others showing the opposite.[15–18] To our knowledge, the relationships between mold exposure and sociodemographic factors have not been assessed in areas affected by major flood events.

Hurricane Ida provided an opportunity to explore how some sociodemographic factors and housing factors were associated with the extent of mold damage and the time spent living in homes with visible mold growth (as reported by residents). The hurricane made landfall in New Orleans on August 29, 2021, exactly 15 years after Hurricane Katrina. Hurricanes have affected New Orleans residents repeatedly over the years and such disasters can affect the distribution of wealth among residents.[19] Social Vulnerability Index (SVI) is a composite measure of various demographic and socioeconomic factors that negatively impact communities when they face stressors such as natural disasters (e.g., hurricanes).[20] Therefore, we examined whether some residents were disproportionately burdened by mold and water damage after Hurricane Ida, and whether this burden was associated with demographic and socioeconomic factors (at the individual level) and SVI (at the community level).

Methods

Survey Details

We administered a survey to a convenience sample of residents living in the New Orleans area during December 2021, approximately 3.5 months after Hurricane Ida made landfall. The questionnaire was based upon a similar one administered after Hurricane Katrina.[21] Along with demographic information, the survey covered topics such as Hurricane Ida-related water damage, previous flood and water damage, and clean-up practices. The English-speaking survey teams were composed of teams of 2 for each location, some of whom spoke basic or intermediate Spanish. Locations included large hardware stores, work sites, Federal Emergency Management Agency (FEMA) Disaster Recovery Centers, a medical clinic, and neighborhood farmer's markets; i.e., locations where persons affected by the storm at various levels and remediating their homes may congregate given the timeline since the storm. Teams conducted surveys during typical work hours (8 am-6 pm) and during weekends to reach a wider variety of respondents. Teams read questions aloud as they showed the written survey to respondents so respondents could either point to an answer or respond verbally. The written survey was available in English and Spanish. The Spanish translation was certified by CDC's Multilingual Translation Services. The average time to complete the survey was about 10 minutes for English speaking respondents and 20 minutes for Spanish speaking respondents. Study teams provided flood clean-up pamphlets, but they did not provide any gifts or monetary compensation. This investigation protocol was reviewed by the Centers for Disease Control (CDC) and determined not to be human subjects research, using criteria established by the U.S. Department of Health & Human Services (45 CFR part 46), because it was conducted to inform local public health surveillance and in response to the hurricane.

A Chi-square analysis tested for differences between the subset of data used in this manuscript and the full dataset that had incomplete responses for some variables of interest from the overall cohort. Supplemental Figure 1 shows demographic and housing variable comparisons between the subset of data analyzed and the full dataset (with incomplete responses to some variables). For some variables, general population characteristics of the New Orleans metro area (2019) from the U.S. Census Bureau's American Housing Survey (AHS) were displayed;[22] however, statistical comparisons with our datasets were not possible because of 1) the way that we collapsed some categories within each variable (e.g., non-White population); 2) data suppression of some categories of the AHS (e.g., Asian); and 3) some variables were not present in the AHS (e.g., pre-Ida flood; denoted as "U" for unavailable in Supplemental Figure 1).

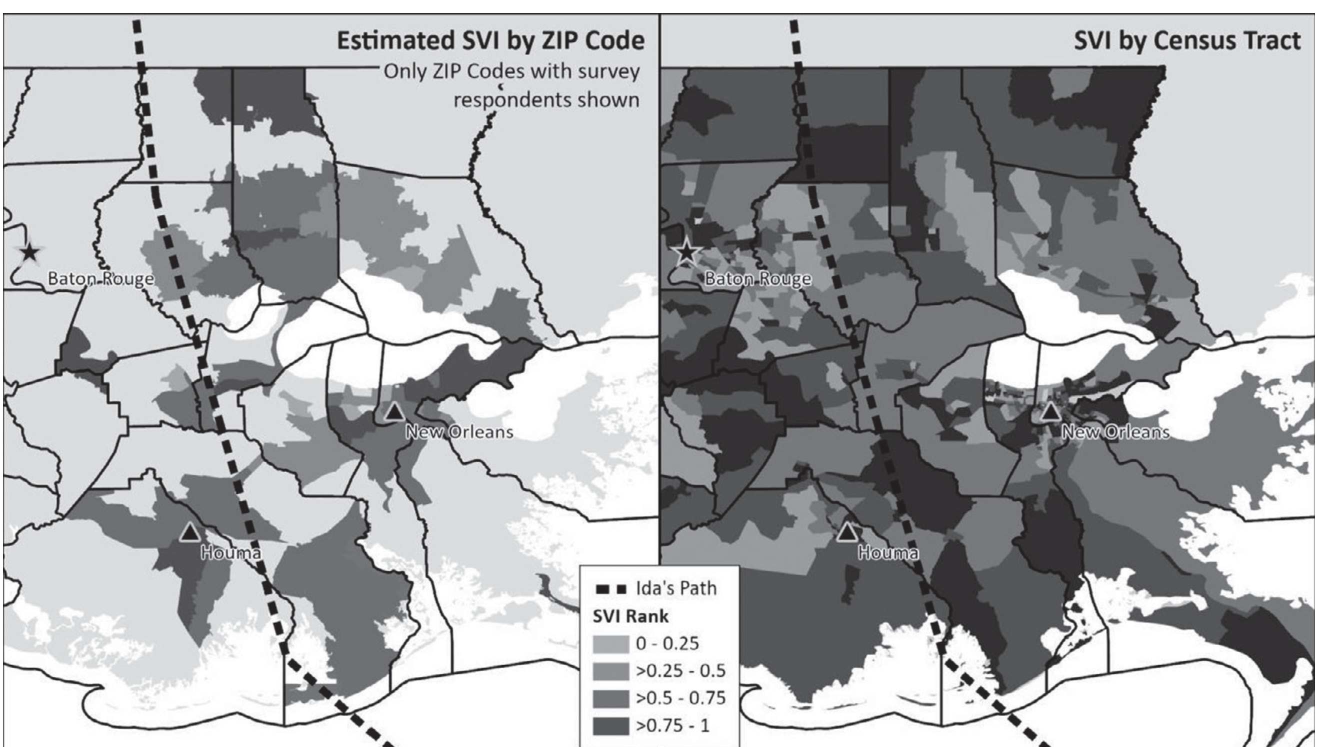

Figure 1. Social vulnerability index rankings by census tract (right) and residence weighted SVI ranking estimates by ZIP Code (left) for Louisiana. Only ZIP Codes with survey respondents have estimated SVI ranks. All boundaries come from the US Census Bureau.

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Social Vulnerability Index (SVI) by ZIP Code

Currently, CDC provides Social Vulnerability Index (SVI) data at the census tract level.[20] However, since communities often identify more with their ZIP Code than census tract, and census tract information was not readily available from the survey data, here we have estimated SVI at the ZIP Code-level. To do that, we used the United States Postal Service (USPS) crosswalk, made available by the US Department of Housing and Urban Development (HUD), for the year and quarter after Hurricane Ida made landfall.[23] This crosswalk helped to estimate the portion of residences in one geography that overlapped with the other. The SVI rank for the ZIP Code was then estimated by taking the weighted average of SVI ranks for each tract that had residence units overlapping with a particular ZIP Code. The weight assigned was based on the relative number of residences which overlapped between the tract and the zip code. A map comparing the estimated SVI of the ZIP Codes represented by the study population and the SVI for all census tracts in southeast Louisiana is shown in Figure 1. As in the original SVI scores for the census tract, estimated SVI for the ZIP Codes ranged from 0-1, relative to other tracts or ZIP codes in the state, and values closer to 1 indicated higher vulnerability. ZIP Codes with estimated SVI ≥ 0.5 (i.e., areas with SVI higher than 50% of the ZIP Codes in the state) were considered to have "high SVI" for the purpose of this study.

$$\text{ZIP Code SVI rank} = \sum[(\%\text{residences in ZIP Code present in tract}) \times (\text{SVI rank of tract})]$$

Study Design

Because the survey data successfully captured a cross-section of the area affected by Hurricane Ida (Figure 1), a case-control study with unmatched controls was established based on participants' responses regarding home damage, flooding, and mold growth due to Hurricane Ida and the amount of time they spent in a home with mold. Participants who answered "yes" to home damage, flooding, mold growth and indicated any time spent in a home with mold were considered "cases" whereas those who responded "no" were the unmatched controls. Univariate and multivariable binomial logistic regression was conducted in SAS v9.4 (Cary, NC) to identify social and environmental variables predicting respondents' odds of having experienced 4 separate outcomes: 1) any home damage; 2) specifically flooding of the home; 3) specifically mold growth; and 4) having spent any time in a moldy home. Alpha of 0.1 was used to determine whether variables were added to or removed from the multivariate stepwise model. Explanatory variables included 5 sociodemographic and socioeconomic factors (age, race, ethnicity, retirement status, and educational attainment) and 6 housing and geographic factors (type of home, age of home, homeownership, ZIP Code SVI, and flooding and/or mold in home prior to Hurricane Ida). Because this is an exploratory study with a small convenience study sample, we considered a threshold of up to $\alpha = 0.1$ in order to favor the inclusion of "false positive" variables for further study, rather than possibly omit important factors that could be worthy of future research. Nonetheless, the majority of the variables discussed in the text are statistically significant at $\alpha = 0.05$. In Supplemental material, we provided a table that showed associations among all of the variables included in our exploratory regression models.

Results

Of the 306 people who consented (~31% of the 995 invited) to participate, 268 responded to the question(s) regarding their experience with home damage (including flooding and mold) resulting from Hurricane Ida. Of these, only 167 respondents had complete answers for each of the questions of interest in our analysis (e.g., age, race, ethnicity, retirement status, and educational attainment, type of home, age of home, homeownership, ZIP code SVI, and flooding and/or mold in home prior to Hurricane Ida). Therefore, our analysis was limited to the characteristics of 167 respondents, 77% of whom (128/167) lived in a ZIP Code that had an estimated SVI score of 0.5 or higher (i.e., more vulnerable than 50% of other ZIP Codes in the state). A quarter (42/167) of the respondents were age 65 or older and 26% were retired (43/167). Almost half (46%) of the respondents reported they were a race other than white (77/167); only 6 respondents identified as Hispanic/Latino. Almost half (47%) had a college degree (79/167) and only 16% rented their home or specifically said they did not own the home (27/167). Nearly half (44%) of the homes (74/167) were reported as built before 1980. Many homes had pre-Hurricane Ida flood damage (39%; 65/167) and mold (46%; 76/167). Of all homes, 63% (106/167) of homes had damage; 14% (23/167) had flooding, and 46% (76/167) had mold from Hurricane Ida.

We observed statistical differences between the subset analyzed in this manuscript (n = 167) and the full dataset that contained incomplete responses (Supplemental Figure 1). In the final subset analyzed in this manuscript, there were fewer respondents who identified as Hispanic ($P = 0.0004$), but there were more respondents with a college degree ($P = 0.002$), when compared to the full dataset that includes "incomplete" responses. No statistical differences were observed for pre-Ida flood, pre-Ida mold, SVI, and retirement status between the 2 datasets. Although a statistical comparison was not possible between the final subset analyzed in this manuscript and the available data from the American Housing Survey (AHS, 2019), both the full dataset and the final subset mirrored the general population of the New Orleans metro area for all variables.

Home Damage Due to Hurricane Ida

Survey respondents who identified as a race other than "White only" had 3-times higher odds ($P = 0.0013$) of reporting home damage due to Hurricane Ida (Table 1). No significant difference was noted for those who were older than 65 years, retired, Hispanic or Latino, or did not have a college degree. In terms of housing and geographic characteristics, those who experienced flooding pre-Hurricane Ida had more than twice the odds of reporting home damage with Hurricane Ida ($P = 0.0117$). Of note, most people (n = 97/100) whose homes had flooded prior to Hurricane Ida experienced it due to natural events such as other hurricanes or heavy rains, as opposed to structural or plumbing issues, and 15% ($n = 15$) had homes flooded during more than 1 natural event (Figure 2). No difference in odds of home damage due to Hurricane Ida was noted by type of home, age of home, mold growth pre-Hurricane Ida, or SVI.

The following sociodemographic variables were retained in the stepwise multivariable logistic regression model for reported damage from Hurricane Ida (Table 2): race other than "White only" ($P = 0.0057$), single-family home ($P = 0.0319$), rental status ($P = 0.0288$), and pre-Hurricane Ida flood ($P = 0.0436$). Persons with a race other than White had 2.7 times higher odds (95% CI: 1.3, 5.4) of reporting home damage with Hurricane Ida than people who identified exclusively as White. In terms of housing-related risk factors, people whose homes had flooded prior to Ida had about

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Table 1. Predictors for Hurricane Ida Damage. Crude logistic regression models (*n* = 167)

Predictors	Total sample size	Any Hurricane Ida damage: Percent with any damage	Any Hurricane Ida damage: OR (95% CI)	Flooding from Hurricane Ida: Percent with flooding	Flooding from Hurricane Ida: OR (95% CI)	Mold after Hurricane Ida: Percent with mold	Mold after Hurricane Ida: OR (95% CI)
Age 65+ years							
No	125	61%		13%		42%	
Yes	42	71%	1.6 (0.8–3.4)	17%	1.4 (0.5–3.6)	55%	1.6 (0.8–3.3)
Race other than White							
No	90	52%		10%		36%	
Yes	77	77%	**3.0 (1.5–5.9)****	18%	2.0 (0.8–4.9)	57%	**2.4 (1.3–4.5)****
Hispanic							
No	161	63%		14%		45%	
Yes	6	83%	3.0 (0.3–26.0)	17%	1.3 (0.1–11.3)	67%	2.5 (0.4–13.9)
Retired							
No	124	61%		10%		43%	
Yes	43	70%	1.5 (0.7–3.1)	23%	**2.6 (1.0–6.4)****	53%	1.5 (0.8–3.1)
College degree							
No	88	64%		19%		48%	
Yes	79	63%	1.0 (0.5–1.9)	8%	**0.3 (0.1–0.9)****	43%	0.8 (0.4–1.5)
Single-family home							
No	28	75%		14%		57%	
Yes	139	61%	0.5 (0.2–1.3)	14%	1.0 (0.3–3.0)	43%	0.6 (0.3–1.3)
Renter							
No	140	66%		14%		46%	
Yes	27	48%	**0.5 (0.2–1.1)***	15%	1.1 (0.3–3.6)	41%	0.8 (0.3–1.8)
Pre–1980 home							
No	93	63%		13%		48%	
Yes	74	64%	1.0 (0.5–1.9)	15%	1.2 (0.5–2.8)	43%	1.0 (0.6–1.9)
Pre-Ida flood							
No	102	56%		14%		44%	
Yes	65	75%	**2.4 (1.2–4.8)****	14%	1.0 (0.4–2.5)	48%	1.5 (0.6–2.2)
Pre-Ida mold							
No	91	65%		13%		46%	
Yes	76	62%	0.9 (0.5–1.7)	14%	1.1 (0.5–2.7)	45%	0.9 (0.5–1.7)
SVI (≥0.50)							
No	39	51%		5%		26%	
Yes	128	67%	**1.9 (0.9–4.0)***	16%	**3.6 (0.8–16.2)***	52%	**3.1 (1.4–6.9)****

*$P < 0.1$; **$P < 0.05$

twice the odds (95% CI: 1.0, 4.4) of experiencing damage with Ida compared with those with no prior flooding. People living in single-family detached homes had significantly lower odds (OR: 0.3; 95% CI: 0.1, 0.9) of reporting home damage with Ida than those living in other types of homes, such as townhomes, apartments, mobile homes, etc. Renters in our sample also had lower odds (OR: 0.3; 95% CI: 0.1, 0.9) of reporting damage compared with homeowners.

Flooding Due to Hurricane Ida

No respondents reported more than 3 feet of flooding due to Hurricane Ida. Two socioeconomic factors (retirement status and college degree attainment) were significant predictors of flooding related to Hurricane Ida. Respondents who were retired had 2.6 times higher odds of reporting flooding during Ida ($P = 0.0409$). Respondents with a college degree had 70% lower odds of reporting

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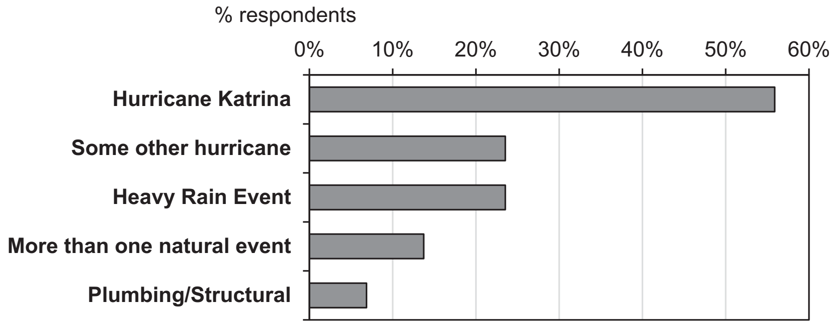

Figure 2. Reasons that respondents reported flooding pre-Hurricane Ida. Participants could select more than 1 response. Prior to Hurricane Ida, the majority (94% of participants) experienced flooding due to natural events such as hurricanes or heavy rainfall, with 14% participants experiencing flooding during more than 1 natural event.

Table 2. Predictors for Hurricane Ida Damage. Stepwise logistic regression models (n = 167)

	Any Hurricane Ida damage	Any Flooding from Hurricane Ida	Any Mold after Hurricane Ida	Mold level (> 10 square feet)	Any time spent in home with mold
Risk Factors	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age 65+ years			2.0 (0.9–4.2)*		
Non-white only	2.7 (1.3–5.4)**		2.2 (1.2–4.3)**		
Hispanic					
Retired		2.3 (0.9–6.0)*			
College degree		0.4 (0.2–1.2)*			
Single-family home	0.3 (0.1–0.9)**		0.4 (0.2–1.1)*		
Renter	0.3 (0.1–0.9)**				
Pre–1980 home					
Pre-Ida flood	2.1 (1.0–4.4)**				
Pre-Ida mold					
High SVI (≥0.50)		3.6 (0.8–16.5)*	3.3 (1.4–7.6)**	3.0 (1.2–7.7)**	2.6 (1.1–5.9)**

*P < 0.1; **P < 0.05

flooding during Ida (P = 0.0036) compared with those without a college degree (Table 1). No statistically significant differences were observed at α = 0.05 for any of the variables in the adjusted model (Table 2).

Mold Growth Following Hurricane Ida

Race was a significant demographic predictor of mold growth after Hurricane Ida (P = 0.0056). Respondents identifying as races other than “White only” had 2.4 times higher odds (95% CI: 1.3-4.5) of reporting mold growth after Ida compared to White participants. In terms of geographic factors, SVI was a significant risk factor (P = 0.0056), with those living in areas with SVI ≥ 0.5 reporting 3.1 times higher odds (95% CI: 1.4-6.9; Table 1) of experiencing mold growth post-Ida. Both of these variables remained significant in the multivariable model (Table 2). Changing the SVI cutpoints (e.g., 75th and 90th percentiles) led to a decrease in sample size in comparison groups and unstable estimates in the regression models; and therefore, could not be tested.

Of people who reported mold, about a third reported having <10sqft, 10-100sqft, and >100sqft mold each. In the crude logistic regression (Table 3), SVI (P = 0.0231) was a significant predictor of respondents reporting >10sqft mold post-Ida. Participants living in zip codes with SVI ≥ 0.5 had 3 times higher odds (95% CI: 1.2-7.7) of reporting mold after Hurricane Ida. Only SVI was retained as a statistically significant variable in the multivariable regression model for predicting odds of >10sqt mold post-Ida (Table 2).

In terms of time spent in a home with mold, SVI was the only significant variable that predicted odds of spending any time (vs. no time) in a home with mold (Tables 2 and 3). People living in areas with SVI ≥ 0.5 had more than twice the odds of reporting spending time in a home with mold (P = 0.0232).

Discussion

In our study of various sociodemographic, housing, and geographic factors, neighborhoods with higher SVI were associated with adverse outcomes related to mold from Hurricane Ida. Of note, SVI may also be a predictor of home damage and flooding due to Ida, albeit these relationships were significant only at α = 0.1 (Table 1). Nonetheless, given the small size of the convenient sample (n = 167), P<0.1 may be suggestive of important relationships – potentially those with greater variability in the population – and warrants further investigation.

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Table 3. Risk factors for flood and mold exposure levels. Crude logistic regression models (n = 167)

		Mold level (>10 square feet)		Any time spent in home with mold	
Risk Factors	Total sample size	Percent with mold >10 sq. ft.	OR (95% CI)	Percent spent time in home with mold	OR (95% CI)
Age 65+ years					
No	125	30%		36%	
Yes	42	31%	1.1 (0.5–2.2)	48%	1.6 (0.8–3.3)
Non-white only					
No	90	24%		33%	
Yes	77	38%	**1.9 (1.0–3.6)***	45%	1.7 (0.9–3.1)
Hispanic					
No	161	31%		38%	
Yes	6	17%	0.4 (0.1–3.9)	67%	3.3 (0.6–18.4)
Retired					
No	124	29%		37%	
Yes	43	35%	1.3 (0.6–2.7)	44%	1.3 (0.7–2.7)
College degree					
No	88	35%		44%	
Yes	79	25%	0.6 (0.3–1.2)	33%	0.6 (0.3–1.2)
Single-family home					
No	28	21%		43%	
Yes	139	32%	1.8 (0.7–4.6)	38%	0.8 (0.4–1.9)
Renter					
No	140	33%		39%	
Yes	27	19%	0.5 (0.2–1.3)	37%	0.9 (0.4–2.1)
Pre–1980 home					
No	93	31%		38%	
Yes	74	30%	0.9 (0.5–1.8)	41%	1.1 (0.6–2.1)
Pre-Ida flood					
No	102	30%		40%	
Yes	65	31%	1.0 (0.5–2.0)	37%	0.9 (0.5–1.7)
Pre-Ida mold					
No	91	30%		37%	
Yes	76	32%	1.1 (0.6–2.1)	41%	1.2 (0.6–2.2)
High SVI (≥0.50)					
No	39	15%		23%	
Yes	128	35%	**3.0 (1.2–7.7)****	44%	**2.6 (1.1–5.9)****

*P < 0.1; **P < 0.05

In addition to SVI, people who experienced flooding prior to Ida had higher odds of reporting home damage with Hurricane Ida as well. This suggests that there could be a difference in who has the resources to remediate home damage after a hurricane, with improper (or no) remediation leading to more issues in the future. Although several allergen avoidance studies have included a component to reduce mold in homes;[25–26] only 1 has focused exclusively on moisture and mold.[27] In that study, the average cost of mold repair was $3458 (ranging from $535-$6500). The costs of that 2006 study could already be considered high for many households (not considering inflation) and is likely to not be generalizable to an area with widespread hurricane damage, where supply chain issues, labor shortages and limited insurance coverage could drive up the costs of remediation. In areas affected by hurricanes, renters and owners of homes that are repeatedly flooded might not choose or be able to invest in long-term remediation strategies (e.g., raising the home on pylons), so those households could rely more upon quick fixes which are not sustainable against future damage, flooding, and/or mold growth. This highlights a disparity in the way populations within the same hurricane-prone region experience extreme weather events as persons with fewer economic means may be forced to continue living in unsustainable conditions that increase their risk of experiencing adverse outcomes during extreme weather events.

This conclusion is further supported by individual-level predictors of adverse outcomes, such as retirement status, "Other" race, type of home, and college education. On a population level, "Other" race, lower educational attainment, and living in apartments or mobile homes is associated with lower SES due to systemic factors. Older adults, especially those who are retired, are more likely to be living on a fixed income than people who are employed. People of lower SES might be less likely to afford to live in neighborhoods with lower flood risk like in some parts of New Orleans.[28–30] It is also more difficult for them to afford the upfront cost (or be approved for loans that would cover the cost) of long-term remediation that might protect a home from future hurricane-related damage. It is likely that a subset of this same population also lives in areas of high SVI; however, we note that SVI is a percent population-based geographic metric that does not consider individual characteristics. Nonetheless, SVI can be an important indicator of the general characteristics of the population in the area where the person resides. Thus, the demographic, socioeconomic, and geographic factors considered together strengthened our model to support the conclusion that a subset of the population living in a hurricane-prone area is more likely to experience repeated, adverse effects from extreme weather events.

To our knowledge, this is the first examination of how demographic and socioeconomic factors (adjusting for other covariates such as previous hurricane damage) are associated with flood and mold damage after hurricanes. Authors of 2 previous studies in the aftermath of Hurricane Katrina suggested that households with lower social vulnerabilities and greater economic means (e.g., with wealthier children in private schools) might have had the necessary resources to return to New Orleans and rebuild their homes.[31, 32] However, the study did not directly collect information to support that conclusion. Our study had questions specifically about SES, but our analysis still has limitations that limited interpretation of the results. For example, the study uses a convenience sample surveyed outside of hardware stores and other locations during the daytime on weekdays and weekends. This was not a random sample of all residents of New Orleans nor was it a large sample, especially after excluding participants who opted not to answer certain questions on the survey. Reporting and selection biases were likely introduced by preferentially surveying people who were actively making repairs to their homes. Renters are less likely to be making structural repairs to their home, and that might explain both the small number of renters in our sample and their lower odds of reporting home damage with Ida. Other limitations include the following: 1) we collected self-reported information of hurricane damage (e.g., people might not have known they had mold damage); we were not able to corroborate those reports; and 2) our stepwise regression results suggest an exploratory assessment of the relationship between resident/housing factors and mold/flood damage from Hurricane Ida. The generalizability to the general population of the New Orleans metro area (Supplemental Figure 1) may be limited. Our subset data reflected a higher education level (i.e., more respondents with a college degree) and had fewer respondents who identified as Hispanic. Both the full dataset and the final subset mirrored the general population in terms of the other demographic and housing variables selected; however, the sacrifice in sample size was necessary in order to avoid comparisons with varying compositions of respondents for each variable evaluated and ensure comparability between the crude and adjusted logistic regression results by using the same dataset for both analyses. These limitations notwithstanding, our study found some sociodemographic factors that were significantly associated with mold and other home damage after Hurricane Ida, such as "Other" race; and living in an area with a high SVI score. In southern Louisiana alone, there are over 1 million people living in high SVI areas, with about half of them living in the highly populated Jefferson and Orleans parishes (counties). In terms of implications for these findings, public health practitioners could prioritize demographic and geographic groups identified as potentially more likely to be affected by hurricane-related damage and mold for post-disaster outreach. Further, social and structural determinants of health might drive vulnerability to mold and flood damage during hurricanes.[28] Addressing social and structural determinants of health at their root, such as improving access to health-beneficial resources, could help mitigate the disparities we see after disasters. Given that climate change is predicted to make extreme weather events both more frequent and more intense, the factors identified in this study should be further explored in future studies of hurricane-affected areas in order to confirm if there is a pattern of vulnerability. The information gained from these studies would be critical for improving the resiliency of coastal communities, both urban and rural, against hurricanes and other extreme weather events.

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1017/dmp.2025.13.

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