



ASSESSING DISPARITIES OF URBAN FLOOD RISK FOR HOUSEHOLDS OF COLOR IN CHICAGO

December 31, 2018

URBAN FLOODING

In a 2014 report, Center for Neighborhood Technology's (CNT) analysis revealed the repeated occurrence of flooding in areas outside federally designated floodplains within Cook County. This flooding, called urban flooding, is caused by climate change, aging infrastructure, and diminishing permeable space in cities.

In 2018, CNT expanded the 2014 research to conduct detailed analysis of flood claims data in the city of Chicago.

CHICAGO FLOODING

This closer examination of data for the city of Chicago was undertaken to determine the prevalence, cost, and impact of flooding on communities of color in Chicago.

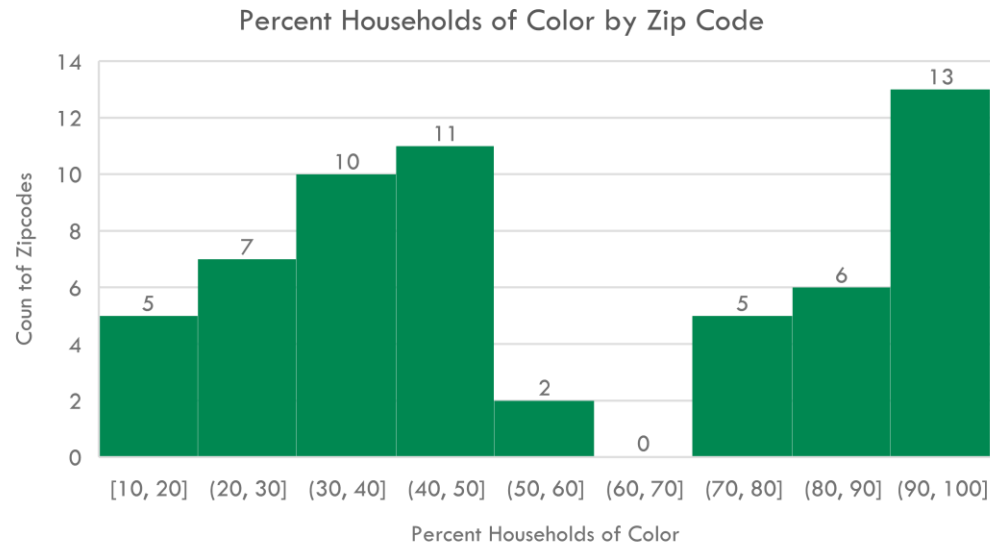
Using the dataset, CNT found that flood claim payouts were made in 56 of the 59 zip codes that intersect and are within the city boundary, between 2007 and 2016. In total, the 229,743 claims amounted to \$433 million in payouts.

87% of flood damage insurance claims were paid in communities of color.

DISTRIBUTION OF HOUSEHOLDS OF COLOR

The percentage of households of color per Zip Code is displayed in the chart below.

Many areas are very racially segregated.



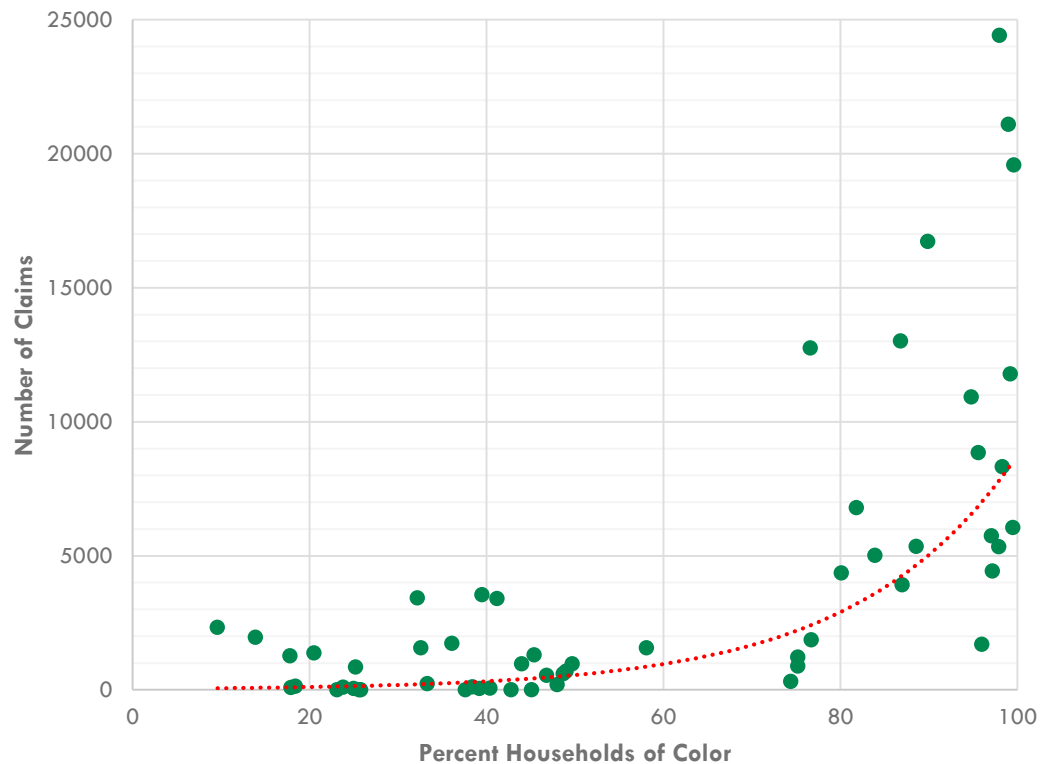
RELATIONSHIP BETWEEN FLOOD CLAIMS AND HOUSEHOLDS OF COLOR

This scatter plot examines the relationship between the number of claims and the percentage of households of color.

Overall, as the percentage of households of color increases, so do the number of flooding claims.

Additionally, as indicated by the increased steepness of the fit curve, the impact becomes larger as the percentage of households of color increases past 60%.

The fit is exponential.



ANALYSIS OF DATA USING TWO DIFFERENT METHODS

The analysis used two approaches:

1. Distribute Claims between Quartiles of Households – each quartile consists of approximately 25% of the city households
2. Characterize Flooding and Race
 - a. Flooding Intensity -- High, Medium, Low
 - b. Households of Color Households -- High, Medium, Low

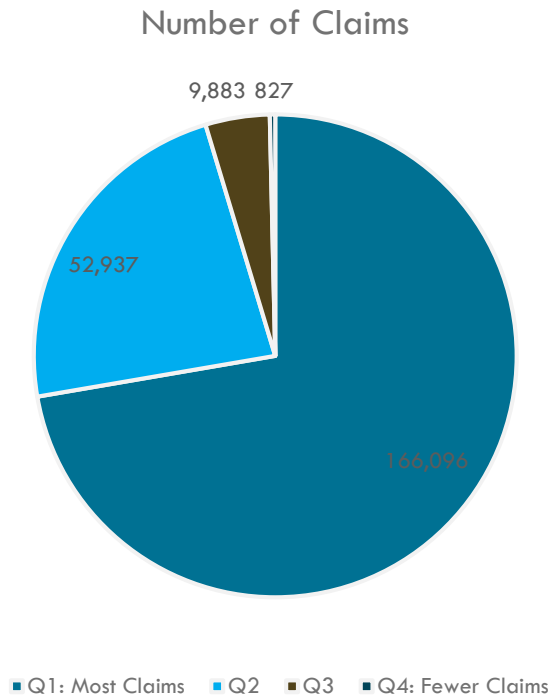
METHODOLOGY - FLOODING CLAIMS BINNED BY QUARTILES OF HOUSEHOLDS

Zip Codes are ordered by the number of claims from high to low. Running through the Zip Codes, breaks in the data are made once the aggregated sum of the number of households in the Zip Codes equals approximately 25% of the total Chicago households. Thus, each bin contains the same number of households, approximately 25% of the city's total.

BREAKOUTS: NUMBER OF FLOODING CLAIMS IN EACH QUARTILE

Flooding claims are not distributed evenly among households

- Each wedge is one quartile, or approximately 25% of the city's households.
- The chart shows the average number of claims per 1,000 households for each quartile and city-wide.



	Household Intensity Index
Q1: Most Claims	643.6
Q2	190.0
Q3	36.8
Q4: Fewer Claims	2.9

FLOODING BY QUARTILES OF HOUSEHOLDS

Zip Codes by Quartiles					
	City of Chicago	Most Claims	Percentage of City Total	Fewest Claims	Percentage of City Total
Count of Zip Codes	59	13	22%	17	29%
The total Count of flood claims	229,743	166,096	72%	827	0.4%
Total Dollars Paid flooding	\$433,429,453	\$262,795,456	61%	\$4,492,002	1.0%
Total Households - ACS 2016	1,088,849	258,060	24%	283,516	27%
Number non-Hispanic White Households	455,180	16,910	4%	199,198	44%
Percentage non-Hispanic White Households	42%	7%		70%	
Number Households of Color - ACS 2016	633,669	241,150	38%	84,318	13%
Percentage Households of Color - ACS 2016	58%	93%		30%	

Q1: QUARTILE WITH MOST CLAIMS

Flooding Characteristics

- Flooding is highly concentrated in these areas
 - 72% of the city total flood claims are paid here – 166,096
 - 59% of the dollars paid are paid here – \$262,795,456
 - Average payout per claim - \$1,582
 - A minimum of nearly 5,750 claims in a ZIP Code, and up to nearly 24,500 claims
- Racial Characteristics
 - 93% households of color – 241,150 HH
 - 7% non-Hispanic White Households – 16,910 HH
 - Or, 14x as many households of color than non-Hispanic White households live in these areas
- Racial Characteristics in context of city-wide numbers
 - 38% of the city's total households of color live here
 - 4% of the city's total non-Hispanic White Households live here



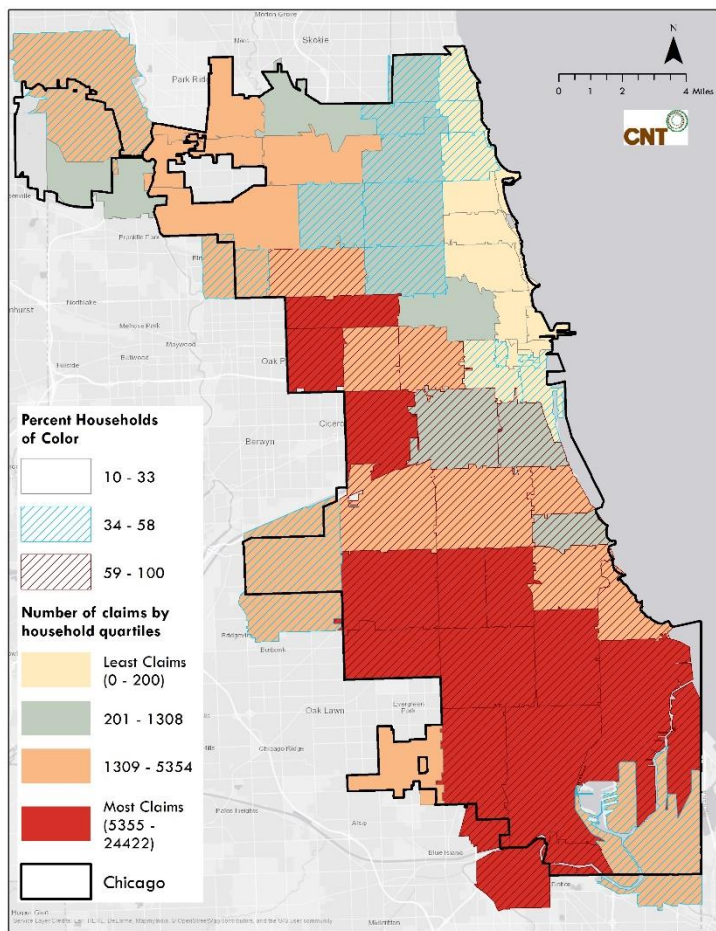
Median Household Income \$32,401

Q4: QUARTILE WITH FEWEST CLAIMS

Flooding Characteristics

- Flooding has very little impact in these areas
 - 0.4% of the city total flood claims are paid here – 827
 - 1.0% of the dollars paid are paid here – \$4,492,002
 - Average payout per claim - \$5,432
 - 3 ZIP Codes have no claims, and the maximum number of claims is 200
- Racial Characteristics
 - 30% households of color – 84,318 HH
 - 70% non-Hispanic White Households – 199,198 HH
 - Or, 2.3x as many non-Hispanic White households than households of color
- Racial Characteristics in context of city-wide numbers
 - 13% of the city's total households of color live here
 - 44% of the city's total non-Hispanic White Households live here
- Median Household Income \$92,545

FLOODING CLAIMS BINNED BY QUARTILES OF HOUSEHOLDS – HIGHER IN COMMUNITIES OF COLOR



Zip Codes are ordered by the number of claims from high to low. Breaks in the data are made once the running total or sum of the number of households in the ZIP Codes equals approximately 25% of the total Chicago households. Thus, each bin contains the same number of households.

The brown cross-hatch on the map represents Zip Codes with a high concentration of households of color. In many cases, these Zip Codes also have the highest number of claims.

AGGREGATED FLOODING CLAIMS BY ZIP CODE, 2007–16

METHODOLOGY – FLOODING INTENSITY

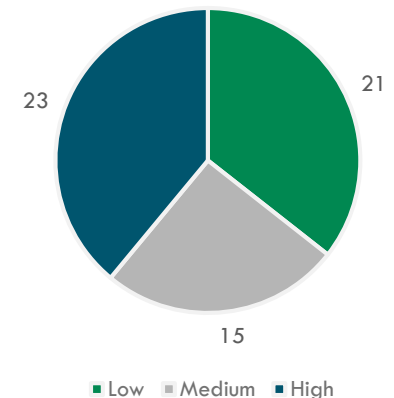
The Flooding Claim Intensity was determined for each Zip Code.

Utilizing the median number of flood claims of 1,383 three classifications were made - High, Medium and Low as follows.

Median Number of Flood Claims	1383	
High Flooding	Above 150% of the city median	2075 and up
Middle Flooding	Between 50% and 150% of the city median	692 to 2075
Low Flooding	Less than 50% of the city median	Less than 692

Flooding Category

Each Zip Code was classified as High, Medium or Low Flooding.



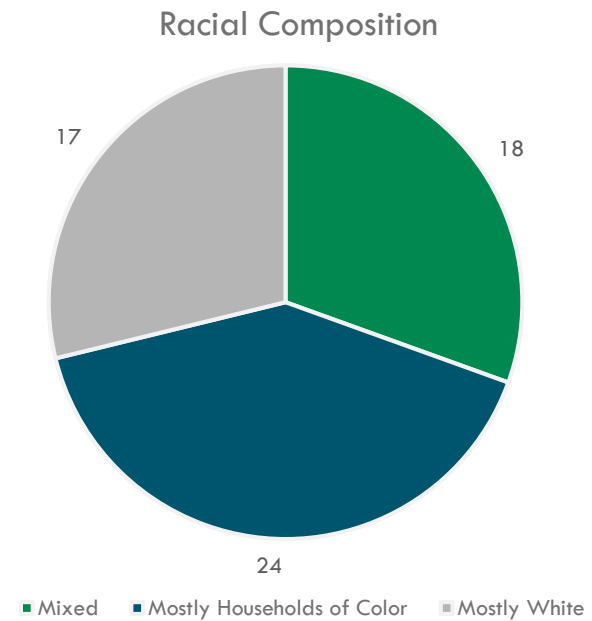
METHODOLOGY – RACIAL COMPOSITION

The Racial Composition was determined for each Zip Code as follows.

- **Mostly Households of Color** : Fewer than 1/3 of households self identifying as non-Hispanic White
- **Mixed Community**: Between 1/3 and 2/3 of households identifying as non-Hispanic White
- **Mostly non-Hispanic White**: Over 2/3 of Households self identifying as non-Hispanic White

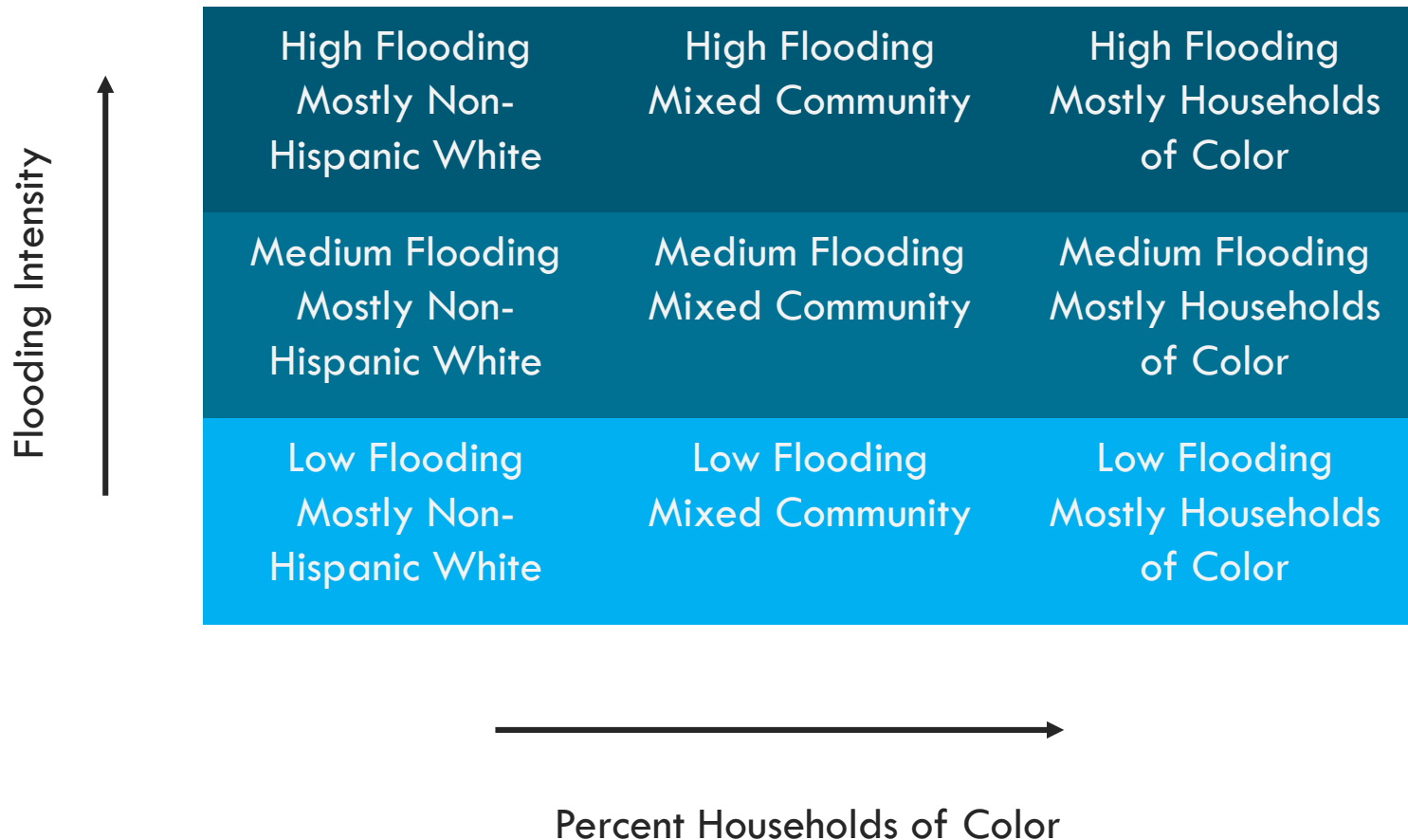
Each Zip Code was classified as Mostly Households of Color, Mixed Community or Mostly Non-Hispanic White.

Looking at all Zip Codes in Chicago, this is the breakdown of the racial composition



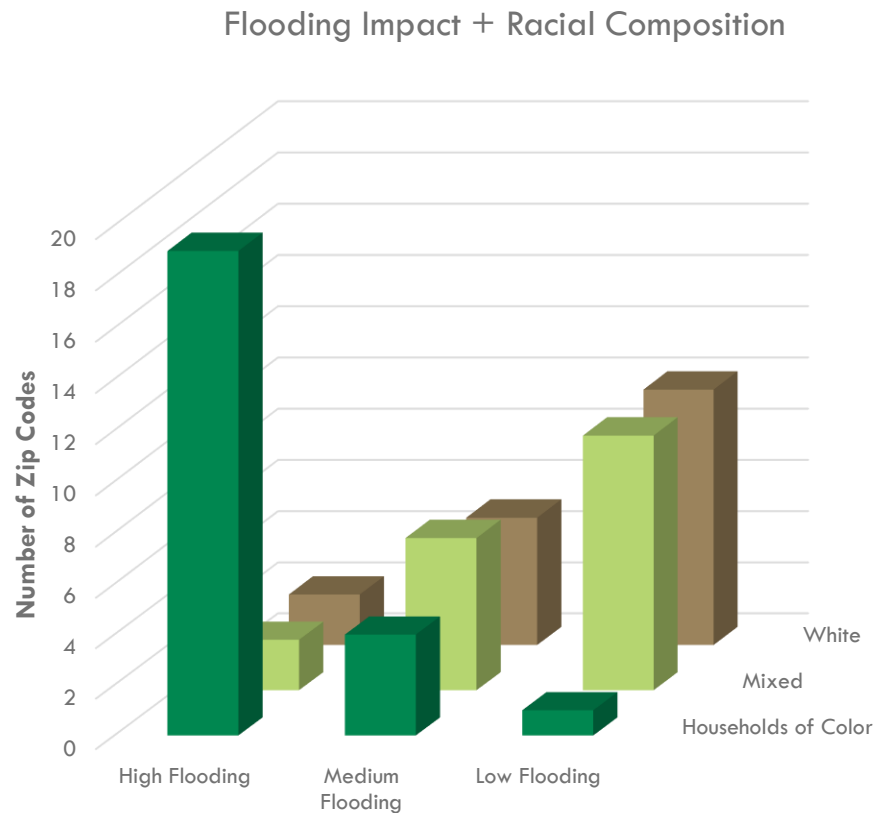
METHODOLOGY – COMPOSITE OF FLOODING INTENSITY AND RACIAL COMPOSITION

The flooding and racial composition classifications were then combined resulting in 9 categories.



HOUSEHOLDS OF COLOR ARE DISPROPORTIONATELY BURDENED

379,163 of the 1,088,849 (35%) households are in high flooding communities of color.



COMPOSITE OF FLOODING INTENSITY AND RACIAL COMPOSITION

	City of Chicago	High Flooding Zip Codes			Low Flooding Zip Codes				
		High Percentage Households of Color	Percentage of City Total	High Percentage non-Hispanic White Households	Percentage of City Total	High Percentage Households of Color	Percentage of City Total	High Percentage non-Hispanic White Households	Percentage of City Total
Count of Zip Codes	59	19	32%	2	3%	1	2%	10	17%
The total Count of flood claims	229,743	194,529	85%	5,767	3%	317	0.1%	629	0.3%
Total Dollars Paid flooding	\$433,429,453	\$325,953,706	75%	\$13,803,906	3%	\$533,801	0.1%	\$4,560,617	1%
Total Households - ACS 2016	1,088,849	379,163	35%	37,155	3%	23,203	2%	195,304	18%
Number non-Hispanic White Households	455,180	30,950	7%	27,812	6%	5,940	1%	148,183	33%
Percentage non-Hispanic White Households	42%	8%		75%		26%		76%	
Number Households of Color - ACS 2016	633,669	348,213	55%	9,343	1%	17,263	3%	47,121	7%
Percentage Households of Color - ACS 2016	58%	92%		25%		74%		24%	

HIGH FLOOD ZIP CODES

HIGH FLOOD HIGH HOUSEHOLDS OF COLOR ZIP CODES

- 85% of the city total flood claims are paid here – 194,529
- 75% of the dollars paid are paid here – \$325,953,706
- 55% of the city's total households of color live here – 379,163 HH
- Median Household income is \$34,820

HIGH FLOOD HIGH NON HISPANIC WHITE ZIP CODES

- 3% of the city total flood claims are paid here – 5,767
- 10% of the dollars paid are paid here – \$13,803,906
- 6% of the city's total non-Hispanic White Households live here – 37,155 HH
- Median Household income is \$68,821

LOW FLOOD ZIP CODES

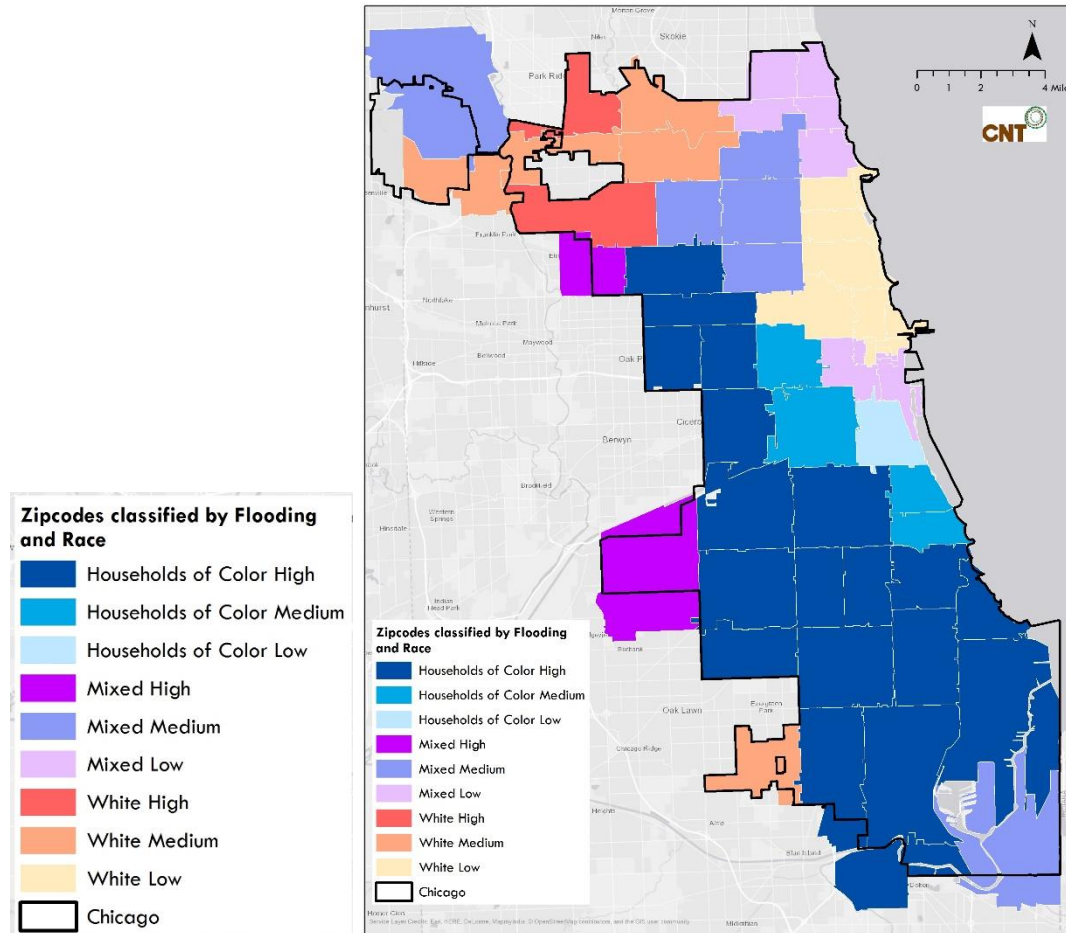
LOW FLOOD HIGH HOUSEHOLDS OF COLOR ZIP CODES

- 0.1% of the city total flood claims are paid here – 318
- 0.1% of the dollars paid are paid here – \$533,801
- 1% of the city's total households of color live here – 5,940 HH
- Median Household income is \$42,776

LOW FLOOD HIGH NON HISPANIC WHITE ZIP CODES

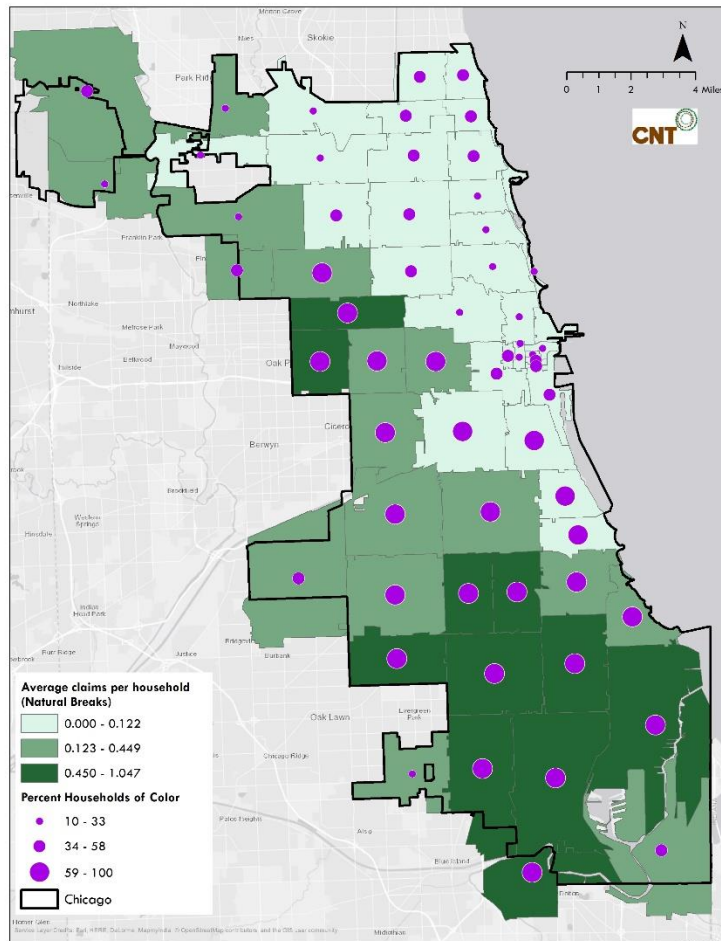
- 0.3% of the city total flood claims are paid here – 629
- 1.0% of the dollars paid are paid here – \$4,560,617
- 33% of the city's total non-Hispanic White Households live here – 148,183 HH
- Median Household income is \$89,511

MAP: COMPOSITE OF FLOODING CLAIM INTENSITY AND RACIAL COMPOSITION



AGGREGATED FLOODING CLAIMS BY ZIP CODE, 2007–16

CLAIMS PER HOUSEHOLD

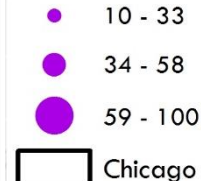


Highest claims per household in communities of color

Average claims per household (Natural Breaks)

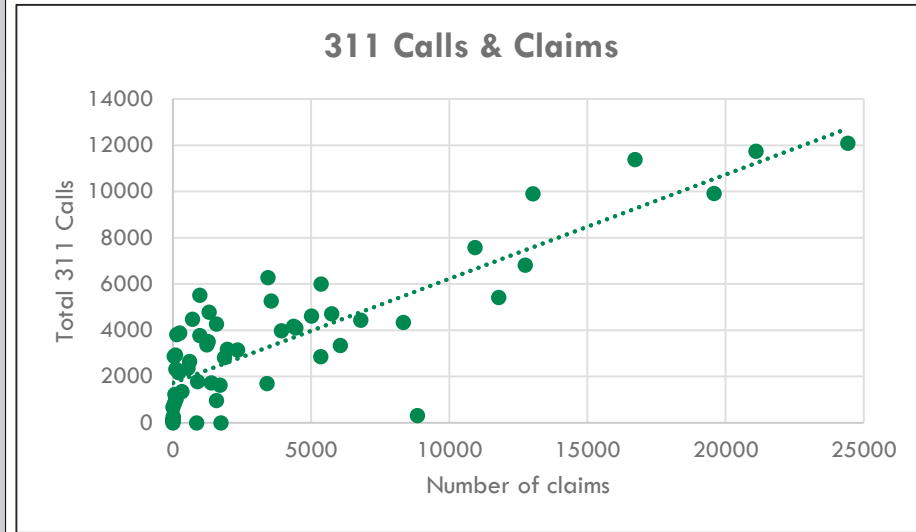
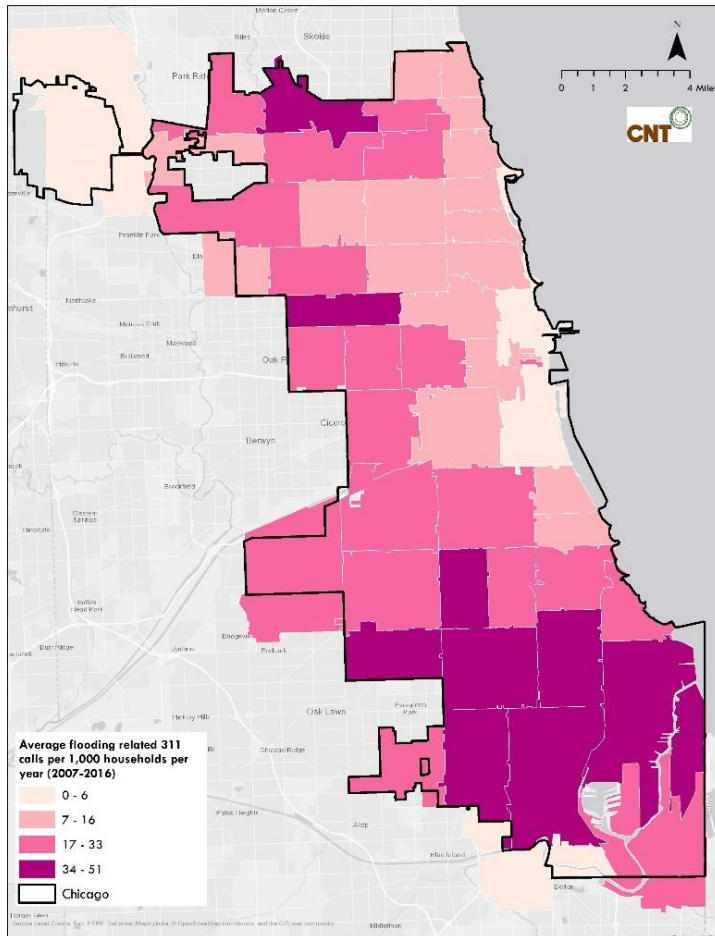


Percent Households of Color

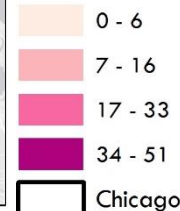


AGGREGATED FLOODING CLAIMS BY ZIP CODE, 2007-16

MAP: 311 FLOODING CALLS



Average flooding related 311 calls per 1,000 households per year (2007-2016)



The high rate of flooding related 311 calls in high flooding zip codes is an indicator of its affect on quality of life.

AGGREGATED 311 CALLS BY ZIP CODE, 2007-16

COMMUNITY RESIDENT STORIES

Portage Park Resident, 60641

Flooded twice since 2015

Emotionally, in the moment it was pretty rough because your home is your investment and we had already lived in the home a couple of years and we weren't expecting, we weren't prepared, we didn't know anything about flooding and so when you see the water coming it's traumatizing, you feel like you're fighting for your house and for your life trying to throw all of this water out.

My mother stayed downstairs where it flooded so she missed about three days of work. I missed one. It was a really tedious cleanup. The water came in and it was about a foot high, it touched all of the drywall. There was a lot of cleaning going on, a lot of throwing things out, trying to rescue some of your personal items that have more sentimental value than they do monetary value.

COMMUNITY RESIDENT STORIES

Calumet Heights Resident, 60617

Flooded four times since 2014

Being a first-time homebuyer, I only had \$5,000 insurance coverage. That flood cost me \$11,000 and that was the very first one, so I hadn't even been in my house for one year and I had \$11,000 worth of damage.

It is stressful because when you keep having the water you're not sure where it's coming from and then that's more money. It takes more, depending on which insurance company you have, it takes more to increase your water backup. They only have two choices. They have a \$5,000 and a \$10,000 so you can only get one or the other. Not only did I have to take a \$6,000 loan, it hit my insurance. My insurance went up, and I also had to increase my water backup from the \$5,000 to the \$10,000 so I took a lot of money lost.

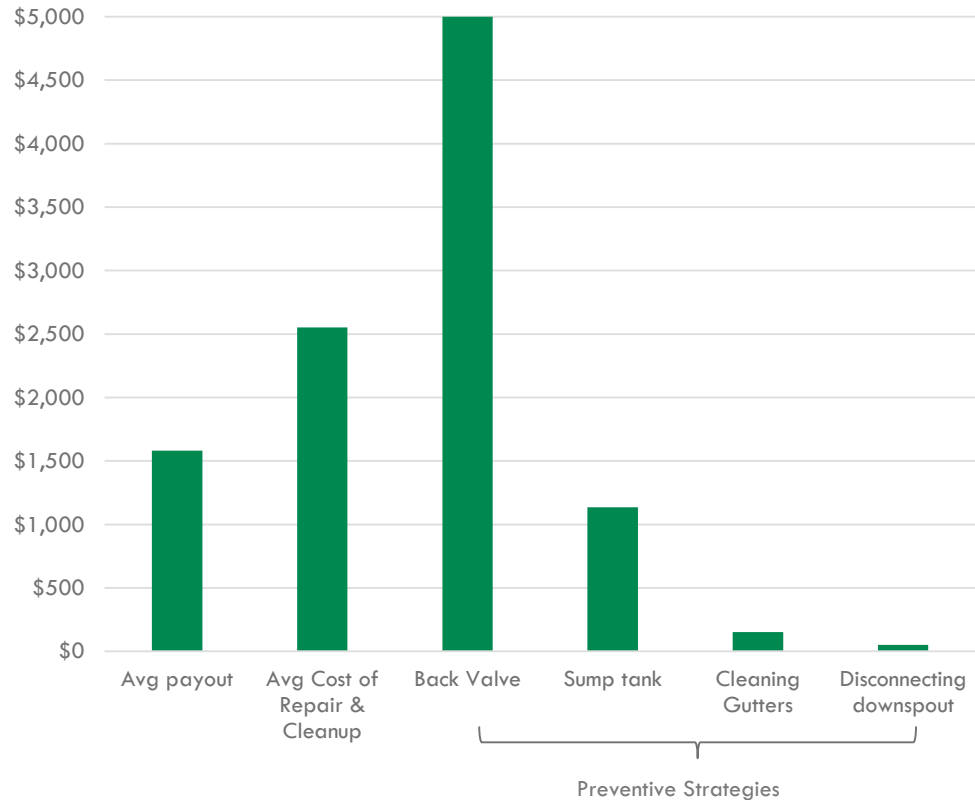
The average payout in highest flooding zip code quartile - **\$1,582**

Average costs for repair & cleanup of water damage - **\$2,551** (Source: [Home Advisor](#))

Cost estimates for a range of preventive strategies

- Back Valve – **\$5,000** (Source: [New York City Environmental Protection](#))
- Sump Pump – **\$1,135** (Source: [Home Advisor](#))
- Cleaning Gutters Biannually – **\$151** (Source: [Home Advisor](#))
- Disconnecting Downspout – **\$50** (Source: [3 Rivers Wet Weather](#))

Estimate of preventive strategies versus repairs



COST OF FLOOD PREVENTIVE STRATEGIES

POLICY DISCUSSION

The U.S. EPA defines environmental justice is “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.” Environmental injustice occurs when a group of people bears a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies.

The findings in this report indicate that low-income and communities of color in Chicago disproportionately experience urban flooding impacts.

This section presents several policy ideas for consideration. **Policy development should be led by frontline communities in Chicago which are most impacted by environmental injustice.**

SIX STRATEGIES

- 1. Recognize urban flooding as a potential environmental justice concern in municipal and state policies.**
- 2. Ensure that stormwater infrastructure is equitably and adequately funded.**
- 3. Prepare neighborhood stormwater management plans and projects in partnership with community-based organizations.**
- 4. Develop and provide open access to urban flooding datasets.**
- 5. Adopt building code amendments and building inspection protocols that incorporate flood mitigation measures.**
- 6. Establish a stormwater management portfolio standard, with dedicated funding for environmental justice communities that experience flooding.**

SIX STRATEGIES

- 1. Recognize urban flooding as a potential environmental justice concern in municipal and state policies.**

The City of Chicago should develop environmental justice policies, establish an environmental justice office, and adopt an environmental justice ordinance.

The City of Chicago and State of Illinois environmental justice policies should adopt language to add urban flooding as a potential environmental justice concern.

SIX STRATEGIES

2. Ensure that stormwater infrastructure is equitably and adequately funded.

The IEPA should prepare an equity report for stormwater infrastructure funding programs, including the State Revolving Fund (SRF) loan program, to determine whether funds have been equitably distributed to environmental justice communities that experience flooding. The IEPA should update program guidelines to require loan recipients to demonstrate the equitable use of funds.

The Metropolitan Water Reclamation District (MWRD) and the City of Chicago should prepare equity reports for the stormwater infrastructure state of repair, and the capital investment programs.

State legislation should enable MWRD to invest in flood mitigation assistance on both publicly-owned and privately-owned land within the City of Chicago. Flood mitigation assistance programs should include dedicated funding for environmental justice communities that experience flooding.

SIX STRATEGIES

3. Prepare neighborhood stormwater management plans and projects in partnership with community-based organizations.

MWRD and the City of Chicago should:

- Convene public listening sessions and community flood mapping workshops that identify “hidden” urban flooding areas.
- Publish an urban flooding vulnerability map that incorporates flood exposure, sociodemographic, and community health factors.
- Design outreach and education activities to engage the specific preferences and needs of diverse communities. Train and employ community-based organizations to provide flood prevention education for residents.
- Develop neighborhood stormwater management plans that incorporate community feedback solicited through the planning process.
- Prioritize stormwater management projects that have multiple community benefits, such as green infrastructure job training programs. Conduct charrettes to co-design flood mitigation projects with residents.

POLICY DISCUSSION

SIX STRATEGIES

4. Develop and provide open access to urban flooding datasets.

To better inform local stormwater management efforts and community awareness of flood risk, the MWRD, City of Chicago and State of Illinois should provide transparent access to maps and datasets identifying where urban flooding is occurring, using sources such as flood-related insurance claims, 311 complaints, and stormwater flow path analysis.

SIX STRATEGIES

5. Adopt building code amendments and building inspection protocols that incorporate flood mitigation measures.

Many existing homes have inadequate flood protection measures. Building inspectors should be trained to assess flood risk and identify specific actions to mitigate risk.

The building code could also address residential construction projects which are not regulated under the existing City of Chicago stormwater management ordinance, such as requiring the owner to maintain existing levels of stormwater infiltration when conducting exterior renovations.

All new development proposals should be reviewed for potential to create localized urban flooding.

SIX STRATEGIES

6. Establish a stormwater management portfolio standard, with dedicated funding for environmental justice communities that experience flooding.

A stormwater management portfolio standard would provide annual, incremental targets for reducing stormwater runoff.

A portfolio standard could be voluntarily tested within a community, with the cooperation of MWRD and the City of Chicago. A technical resource manual should be developed concurrently, to provide modeled quantitative benefits of green infrastructure and other stormwater management measures.

Funding should be secured to meet the annual portfolio targets, and include dedicated funding for environmental justice communities that experience flooding. State legislation may be necessary to ensure adequate and reliable program funding and financing mechanisms.

ABOUT CNT

The Center for Neighborhood Technology (CNT) is an award-winning innovations laboratory for urban sustainability. Since 1978, CNT has been working to show urban communities in Chicago and across the country how to develop more sustainably.

As a creative think-and-do tank, we research, promote, and implement innovative solutions to improve the economy and the environment; make good use of existing resources and community assets; restore the health of natural systems and increase the wealth and well-being of people—now and in the future. CNT's unique approach combines cutting edge research and analysis, public policy advocacy, the creation of web-based information tools for transparency and accountability, and the advancement of economic development social ventures to address those problems in innovative ways.

More information about CNT is available at www.cnt.org

ACKNOWLEDGEMENTS

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Policy Discussion: Marcella Bondie-Keenan

Analytical Director: Peter Haas

APPENDIX

DATA SOURCES

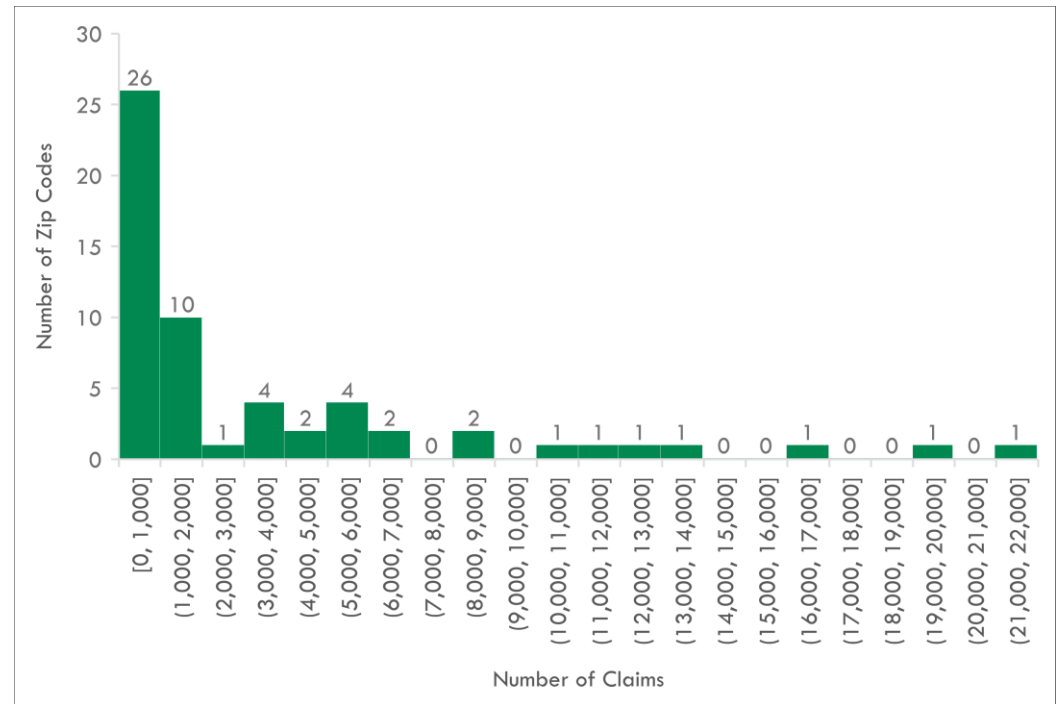
Since data from flooding claims is limited, CNT combined four data sources: FEMA's National Flood Insurance Program, FEMA's Disaster Relief Assistance, SBA's Disaster Loan Program and a limited dataset from private insurance. The number of approved claims and dollars paid from these sources for the years 2007 – 2016 is aggregated to ZIP Codes.

DISTRIBUTION NUMBER OF CLAIMS

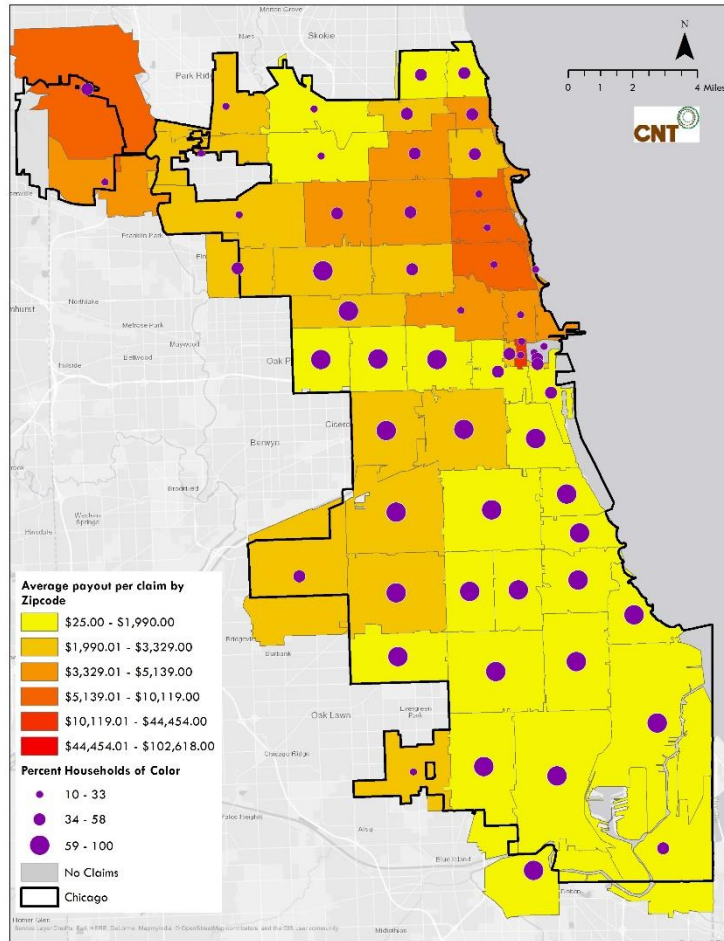
59 Zip Codes are within or intersect Chicago.

Of these 59 Zip Codes, the distribution of flood claims is severely skewed.

Per Zip Code, the average number of claims is 3,895 and the median is 1,383.



AVERAGE CLAIM AMOUNT PER CLAIM

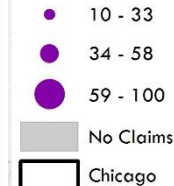


Highest claims per household but smaller claim amounts in communities of color

Average payout per claim by Zipcode



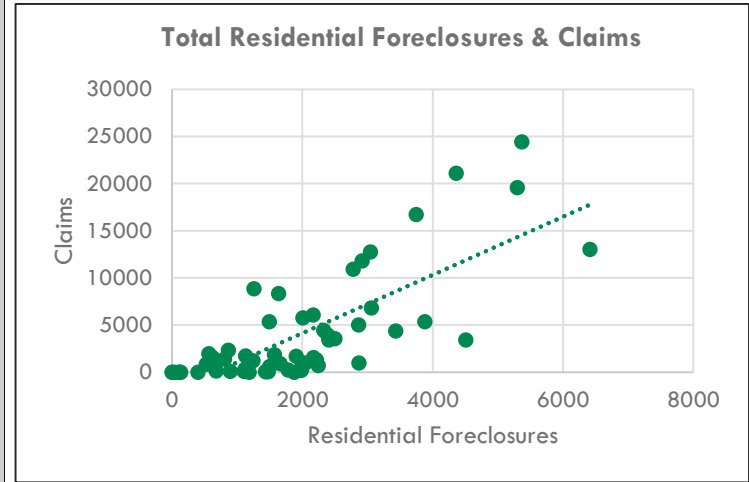
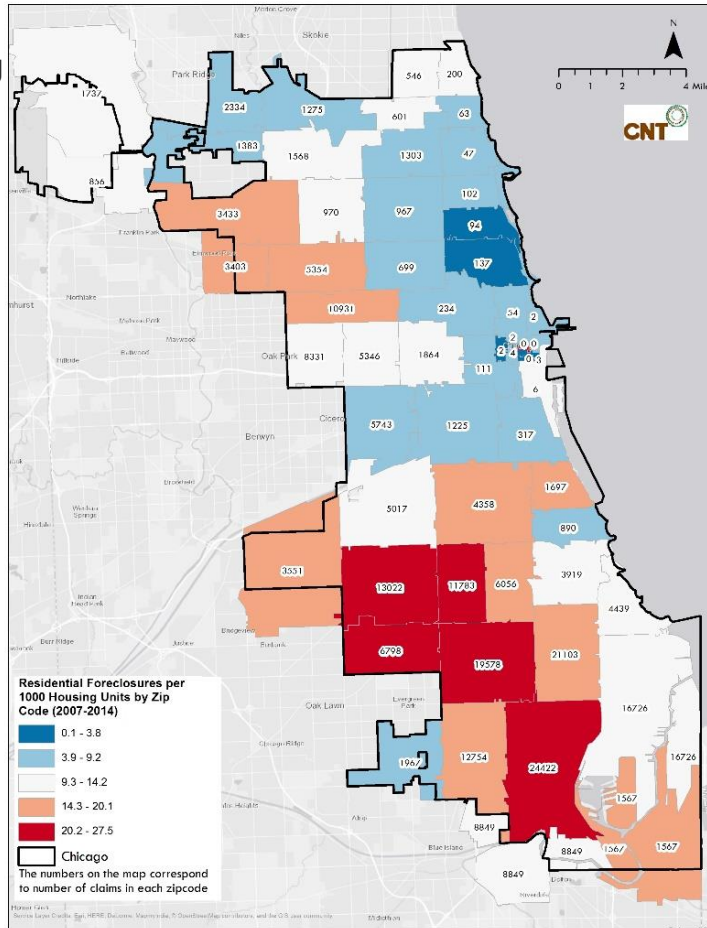
Percent Households of Color



AGGREGATED FLOODING CLAIMS BY ZIP CODE, 2007-16

MAP: FORECLOSURES

In some high flooding communities of color, foreclosure rates are very high. Several factors contribute to housing foreclosures and the result of repeated flooding on foreclosures is difficult to measure.



Residential Foreclosures per 1000 Housing Units by Zip Code (2007-2014)

- 0.1 - 3.8
- 3.9 - 9.2
- 9.3 - 14.2
- 14.3 - 20.1
- 20.2 - 27.5

Chicago
The numbers on the map correspond to number of claims in each zipcode

AGGREGATED FORECLOSURES BY ZIP CODE, 2007-14