



**Potential Challenges to
Targeting Low- and
Moderate-Income
Communities in a Time of
Urgent Need:
The Case of CDBG-DR in
New York State After
Superstorm Sandy**

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Abstract

New York State received \$4.5 billion in Community Development Block Grant-Disaster Recovery (CDBG-DR) funds after Superstorm Sandy. A major CDBG-DR requirement is to prioritize assistance to low- and moderate-income (LMI) populations. The state is spending over 35 percent of the funds on community-wide (e.g., infrastructure) recovery activities. For these activities to be documented as LMI, a specified percentage of residents benefiting from them must be LMI. We explore the potential tension between addressing community recovery needs while prioritizing LMI assistance. Specifically, we develop a series of scenarios to estimate the likelihood that any community-wide activities will be documented as LMI in New York State. We find that documenting these activities as LMI is largely dependent on the underlying demographics of disaster-impacted areas. Additionally, as recovery activities increase in size, thereby impacting larger populations, they are less likely to be documented as LMI, potentially disincentivizing larger, more impactful investments. We recommend empirically-based LMI targets for CDBG-DR grantees.

Keywords: CDBG-DR, CDBG, Sandy, Recovery, Resiliency, HUD

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Contents

Abstract	2
1. Introduction	4
2. Using CDBG for Disaster Recovery	6
Evolution of CDBG-DR	6
Documenting the LMI National Objective	7
Existing Literature on the LMI Targeting Requirement	8
3. Natural Disasters in New York State	9
4. Data, Geographic Definitions, and Socioeconomic Overview	10
Data	10
Geographic Definitions	12
Overview of the Study Areas	13
5. Using Probability Analysis to Estimate the Likelihood of Service Areas Being LMI	15
Methodology	16
Results	16
Scenario I: Geographically-Random Block Groups	16
Scenario II: Adjacent Block Groups	19
6. Conclusions and Policy Recommendations	22
Recommendation 1: Link LMI targeting requirements for CDBG-DR grantees to results of standardized demographic analyses of disaster-impacted areas.	23
Recommendation 2: Consider alternative methodologies for determining what funds meet the LMI national objective using area benefit, such as applying a proportional approach.	24
Appendix	26
Appendix A: Exception Grantees in New York State for FY 2015	26
Appendix B: CDBG-DR Allocations to New York State	27
Endnotes	28
References	30

1. Introduction

When the U.S. Congress passed the Supplemental Appropriations Act of 1993 in the aftermath of Hurricane Andrew, it marked the first explicit use of Community Development Block Grant (CDBG) funds for disaster recovery purposes (Gotham 2014). Since then, what has become the Community Development Block Grant-Disaster Recovery (CDBG-DR) program has significantly expanded in amount and scope (Spader and Turnham 2014). Administered by the U.S. Department of Housing and Urban Development (HUD), the program has emerged as a flexible supplement to other recovery programs directed by the Federal Emergency Management Agency (FEMA), the Small Business Administration (SBA), and the U.S. Army Corps of Engineers (USACE).

Typically, there are no regulations specific to the DR program; instead, DR funds derive most of their regulatory characteristics from the parent CDBG program.¹ All CDBG (and CDBG-DR) funded activities must meet one of the three so-called national objectives: (1) primarily benefit low- and moderate-income (LMI) individuals and communities, (2) respond to an urgent need, or (3) prevent slum and blight (HUD 2002). What is known as the “targeting requirement” generally requires grantees to dedicate at least 70 percent of funds towards meeting the first objective (HUD 2002). In doing that, grantees must document that their activities have benefited LMI persons and/or businesses directly (“direct benefit”), targeted a population presumed by HUD to be LMI (“limited clientele”), or have benefited all the residents of an area determined to be LMI (“area benefit”). The latter approach is the focus of this paper. When grantees use area benefit, typically for community-wide activities such as infrastructure investments, they must define a “service area” that captures the activity’s primary beneficiaries (a town, school district, etc.). For the service area to meet the LMI objective, a certain percentage of the beneficiaries must be LMI.

Federal policymakers designed the parent CDBG program to increase individual and community resiliency by improving housing, economic development, and community assets (HUD 2002). CDBG-DR grantees are also required to demonstrate “a connection to addressing a direct or indirect impact of the disaster in a Presidentially-declared county” (HUD 2013). This geographic constraint — while eminently appropriate in the context of disaster assistance — may hinder grantees in disbursing funds to impacted communities while also meeting their overall LMI targeting requirement. This is because while general CDBG allocations are primarily based on the underlying demographics of an area (e.g., income), a disaster is blind to those characteristics. Some affected areas may have high LMI concentrations, and some may not. While grantees can design direct benefit recovery programs to specifically target LMI persons, their ability to document LMI investments using area benefit is more subject to those underlying demographics of the affected areas. And yet investments in repairing and strengthening community assets are critical to broader rebuilding efforts in the aftermath of a disaster, making them an important component of a DR grantee’s portfolio.

In most disasters, the LMI targeting requirement has remained at 70 percent of allocated funds, but federal policymakers have sometimes recognized the difficulty for grantees in addressing recovery needs while also meeting this requirement (GPO 2013). For example, Congress waived the requirement for New York State after 9/11 (GPO 2002). More recently, HUD lowered the requirement to 50 percent of allocated

funds for both Katrina and Sandy grantees (see Section 2 for a detailed discussion). What is not clear is how and why federal policymakers decide on these alternative requirements.

In this working paper, we discuss the challenges of targeting LMI communities affected by Superstorm Sandy in New York State. Since Sandy's landfall in October 2012, HUD has allocated more than \$15 billion in CDBG-DR funds, of which \$4.5 billion was granted to New York State. New York City (NYC) received a separate allocation of \$4.2 billion, and therefore the state's recovery efforts are largely, although not exclusively, focused in areas outside of the city. As noted, in the Appropriation Act, Congress gave the HUD secretary the ability to introduce an alternative targeting requirement of not less than 50 percent for all Sandy grantees (U.S. Congress 2013), which the HUD secretary subsequently availed himself of in the initial allocation notice (HUD 2013). As a result, all grantees are subject to the same 50 percent requirement regardless of the underlying demographics of their most-impacted areas. Considering the case of New York State, we ask how effective it is to apply a uniform LMI targeting requirement across the board, with particular focus on infrastructure repair and recovery investments. Further, we ask if there is an empirical approach to setting LMI targets that can more effectively address recovery needs while protecting CDBG's primary goal of assisting LMI persons and communities.

To empirically assess the impact of this policy with regard to infrastructure investments, we construct hypothetical service areas of various population sizes in New York State, excluding New York City, as well as in New York City as a point of comparison. We estimate the probability of these service areas being documented as LMI in 10,000 rounds of sampling. We use HUD's income limit data to construct the LMI status of each hypothetical service area and determine whether each service area meets the LMI threshold. We find that New York City and the rest of the state show two distinctly diverging patterns: in New York City, larger service areas are more likely to be documented as LMI. In the rest of the state, on the contrary, as service area sizes increase, there is less likelihood of them being LMI.

Our findings indicate that it may be difficult for New York State to invest in projects that serve large communities, and at the same time count those investments toward the LMI targeting requirement, even when those investments benefit large numbers of LMI persons in absolute terms. This potentially undermines recovery and resiliency investments in the affected areas. We recommend that instead of imposing a one-size-fits-all requirement for all grantees, HUD should consider the socioeconomic conditions of each grantee's most-impacted areas when establishing the targeting requirements. A more data-driven approach may facilitate disaster-recovery activities in mixed-income areas; it also presents a potential for increasing the threshold even above 70 percent in areas with large concentrations of LMI persons. The remainder of the paper is organized as follows:

In Section 2 we review the history of CDBG and the LMI national objective. Section 3 provides a brief overview of the recent storms in New York State. In Section 4 we introduce the data and geographic definitions of the affected areas, and outline the general characteristics of New York State. In Section 5 we present an analysis of the probability of a service area within the affected areas being LMI. Section 6 presents some recommendations informed by our empirical findings.

2. Using CDBG for Disaster Recovery

Evolution of CDBG-DR

By design, the CDBG program delegates significant discretion to state and local governments in spending federal grants in areas like urban and rural development, transportation, education, employment, and law enforcement (Orlebeke and Weicher 2014). Following its three predecessor programs (Urban Renewal, War on Poverty, and Model Cities), the newly established Department of Housing and Urban Development required CDBG grantees to primarily serve lower-income households and communities. Federal legislators addressed this aim in two ways: through a formula-based allocation method and through a targeting requirement on expenditures.

To equitably allocate funds to governments, HUD developed a formula to determine eligibility based on a jurisdiction's population, poverty rates, and overcrowded housing. After experimenting with various alternatives (Orlebeke and Weicher 2014), Congress ratified two eligibility formulae, each factoring in population, poverty, and housing stock age, with varying weights (Nathan et al. 1977).² These allocation formulae have remained unchanged since 1977, and jurisdictions can apply for CDBG annual grants using whichever formula results in a larger grant (Orlebeke and Weicher 2014).

To ensure that expenditures primarily benefited lower-income populations, Congress employed an agreed-upon definition of poverty (Fisher, 1997). The Housing and Community Development Act of 1974 (HCDA) defined "low-income" as anyone with an income of 50 percent of the area median income or less (AMI), and "moderate-income" as above 50 percent, but below 80 percent, of AMI. HUD originally proposed that CDBG grantees be required to spend 80 percent of their grants (excluding administrative and planning costs) on activities primarily benefiting LMI persons or communities (referred to as a targeting requirement). After several disputes between HUD and Congress over the following decades, the targeting requirement was set at 70 percent in 1990, and has remained unchanged since then (Orlebeke and Weicher 2014, provides a more detailed history of the program). The 1974 Housing and Community Development Act allowed for the remainder of grant funds to be spent on the two other national objective activities: prevention of slum and blight formation, or response to urgent local needs (U.S. Congress 1974).

While CDBG was not originally intended for disaster response, subsequent amendments and legislation included mentions of disaster-declared areas and HUD's funding discretion to complement obligations of such federal agencies as FEMA, SBA, and the USACE (U.S. Congress 1974, Sec. 106). The CDBG program maintained this complementary role into the 1990s, but it was not until the Supplemental Appropriations Act of 1993, in the aftermath of Hurricane Andrew, that CDBG funds were specifically earmarked for disaster recovery (Gotham 2014).

Since then, while CDBG allocations have stayed flat or declined in real terms, special CDBG-DR appropriations have ballooned, rising from \$1.6 billion between 1993 and 1999 (5 percent of all CDBG allocations), to over \$46 billion in the 2000-13 period (nearly the size of CDBG's formula allocations during this period, about \$54 billion; Spader and Turnham 2014). This growth is due to both an unprecedented frequency of major disasters and to HUD's movement away from distributing many small grants to local governments and towards awarding more substantial grants to states (Spader and

Turnham 2014). The largest allocation of CDBG-DR funds to date was in the aftermath of Hurricane Katrina, in which Congress authorized HUD funding to the states of Louisiana and Mississippi. Congress also authorized HUD to modify the LMI targeting requirement from 70 to 50 percent of the grant, to facilitate the recovery process (Gotham 2014). The allocation formula that HUD developed in the aftermath of Katrina — which is based on damage severity and what is termed “unmet recovery need” (URN) — has been used for all subsequent CDBG-DR allocations (Richardson and Renner 2007).³ URN is the estimated gap between identified rebuilding and mitigation costs and total funding previously committed by other resources. It is key to DR allocations because it determines both the scope and location of expenditures.

Documenting the LMI National Objective

HUD requires all CDBG (and DR) grantees to document that the activities they fund meet the LMI national objective in three primary ways. The first is to document that the investment is serving LMI households or businesses directly (“direct benefit”); typically applied to providing housing assistance, creating housing units, creating or retaining jobs, or other assistance or services that directly benefit LMI persons. The second method, “limited clientele,” refers to activities that benefit a particular group of people that HUD presumes to be LMI, such as homeless persons, battered spouses, the elderly, and adults with disabilities, or activities that have income-eligibility restrictions. The third alternative is called “area benefit.” These are activities, such as a library, community center, park, or other community assets, that benefit all the residents of a particular area. To be considered LMI, the funded activity must benefit all residents of a defined service area that is both primarily residential and where at least 51 percent of residents are defined as LMI persons, using HUD data.⁴

In addition to standard CDBG requirements, DR grantees must also ensure that funds are used for disaster-specific purposes, known as “tie back to the disaster.” This intuitive, but very influential, additional requirement creates particular conditions for CDBG-DR grants in terms of meeting the LMI national objective — especially with regard to area benefit activities. Given the reactive nature of disaster recovery, with its focus on getting not just individuals but also entire communities back on their feet, area benefit activities can make up a large portion of a DR grantee’s programmatic portfolio, as shown by our case study.

While grantees can design direct benefit programs in disaster-affected areas to specifically target LMI persons, they potentially face greater barriers in targeting LMI communities. The tie-back requirement necessarily limits a grantee’s geographical choice of recovery investments to fund to disaster-impacted areas. If these areas have relatively few pockets of concentrated poverty, siting projects that both address unmet recovery needs and meet the required LMI thresholds may be difficult. In other words, the damage to community assets may not have occurred in areas with sufficient concentrated poverty to meet the LMI national objective through area benefit.

Another hurdle arises from the scope of many recovery and resiliency projects. In many cases, activities focus on repairing or improving damaged infrastructure that benefits entire communities. These investments can benefit relatively large numbers of LMI individuals in absolute terms, but because the service areas are so large — serving many individuals from across the income spectrum — they may fail to meet the LMI threshold. This scenario creates a potential tension between recovery and resiliency

and a core principle underpinning the CDBG-DR program, namely targeting LMI. At the extreme, a grantee may be incentivized to invest in many small activities that it is sure will benefit majority LMI communities rather than a larger or more appropriate activity with more beneficiaries that may benefit more LMI persons in absolute terms. This tension is an understudied area that has profound consequences for communities recovering from disaster.

Existing Literature on the LMI Targeting Requirement

To facilitate relief and recovery efforts, Congress has included provisions that allow greater flexibility in the use of CDBG-DR funds. HUD can specify an alternative for a number of requirements, such as the income targeting provision, in order to allow grantees to address the most pressing needs of disaster-affected communities (Boyd 2011; McCarty, Perl, and Foote 2005). As noted, HUD has lowered the 70 percent targeting requirement to 50 percent in various initial allocation notices.⁵ In response to the attacks of September 11, 2001, Congress waived the targeting requirement altogether, as long as New York State (through the then newly established Lower Manhattan Development Corporation, LMDC) made “a good faith effort to maximize benefit to LMI persons, and maintain[ed] documentation of such efforts” (GPO 2002, 36017; see also Goldberg 2006, 71). After the initial allocation, CDBG-DR grantees may also seek to reduce the targeting requirement by submitting justification to HUD. For instance, the city of Minot, North Dakota, and Luzerne County, Pennsylvania, both applied to HUD for LMI waivers, and HUD lowered the requirement to 23 and 27 percent of funds, respectively, for specific projects (GPO 2014, 60490).

While researchers generally view CDBG as a flexible tool for disaster recovery (McCarty, Perl, and Foote 2005; GAO 2010), some observers have argued that lowering the targeting requirement provides additional flexibility in using federal funds to better address urgent recovery needs (Boyd 2011) and bypass potentially cumbersome federal regulations to ease the delivery of disaster resources to communities (Liu 2010).

However, many researchers have also criticized the use of waivers. Gotham (2014) maintains that waivers undermine the grantees’ responsibility to enforce the rules and achieve the goals of the CDBG program, reducing accountability and oversight. In lowering Mississippi’s income requirement after Hurricane Katrina, researchers observed that the recovery efforts did not prioritize LMI families, and consequently isolated them (Lowe 2012; Craig-Taylor 2010). Gotham (2014) further argues that in Mississippi and Louisiana — which was also granted lowered LMI requirement — the failure to meet the LMI national objective reinforced and perpetuated racial and class inequalities.

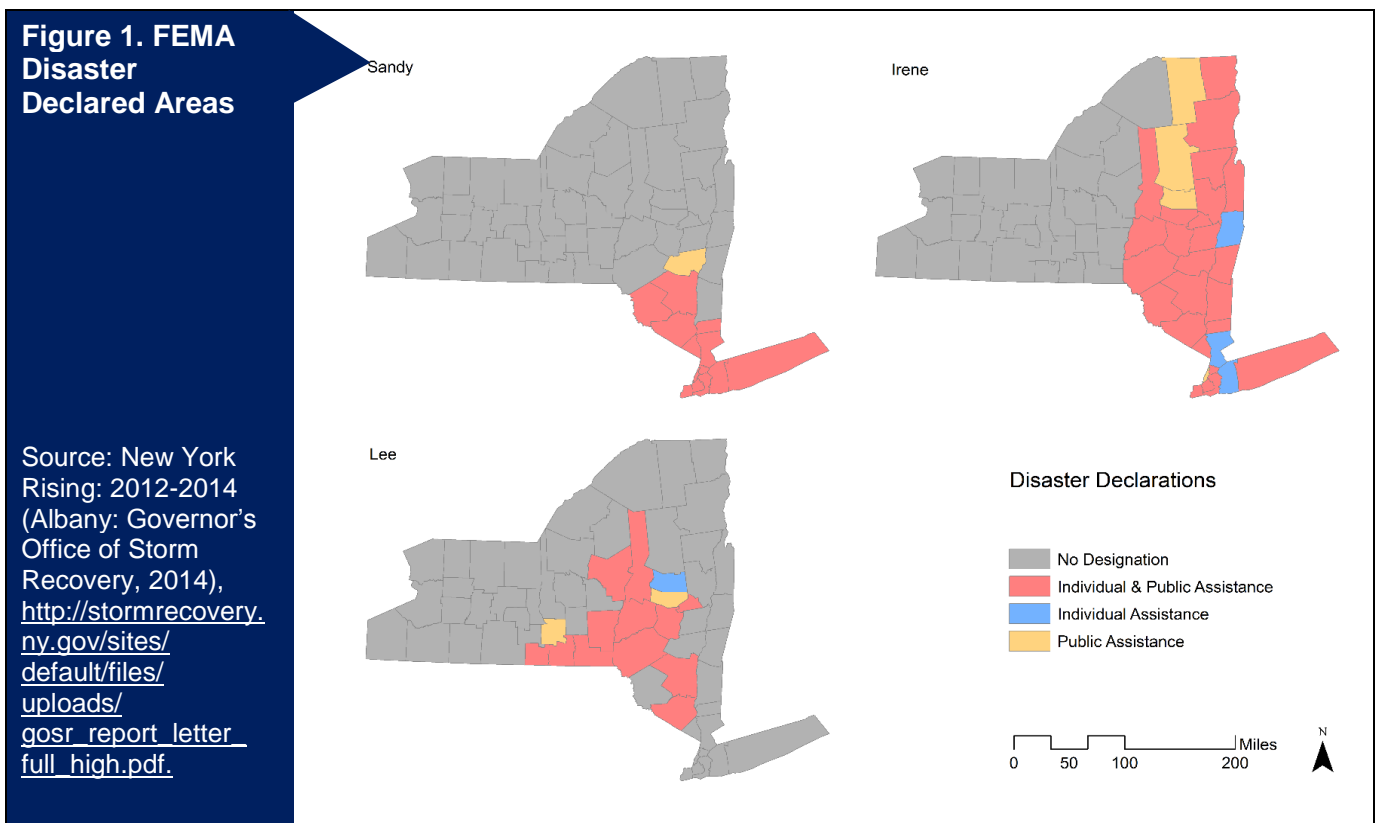
Despite academic criticism, the rather frequent use of waivers in past CDBG-DR grants implies a mismatch between the predetermined targeting requirement and the existing local conditions. It highlights the need for those requirements to be more closely aligned with the actual demographics of disaster-impacted areas and specific recovery goals. While many researchers have examined the downsides of waivers, there has been much less discussion about applying uniform targeting requirements and the often opaque rationale behind them. Such discussion could be informed by using HUD’s income data to examine predisaster demographics of impacted areas. This is the scholarship area to which we are contributing. We pose two specific research questions:

1. How effectively does a uniform targeting requirement serve CDBG's primary goal of serving LMI communities in a disaster context?
2. What alternative approaches do empirical findings suggest with regard to improving the targeting requirement for LMI communities?

In the following sections, we discuss New York State's CDBG-DR allocation, and explain data and methodology.

3. Natural Disasters in New York State

On October 29, 2012, Superstorm Sandy, the largest storm in New York State's recorded history, swept ashore. It came on the heels of Hurricane Irene and Tropical Storm Lee, which devastated many communities in upstate New York and severely damaged parts of Long Island in 2011. Due to the three storms, FEMA declared a total of thirty-eight counties as Disaster Areas, as demonstrated in [Figure 1](#) below:

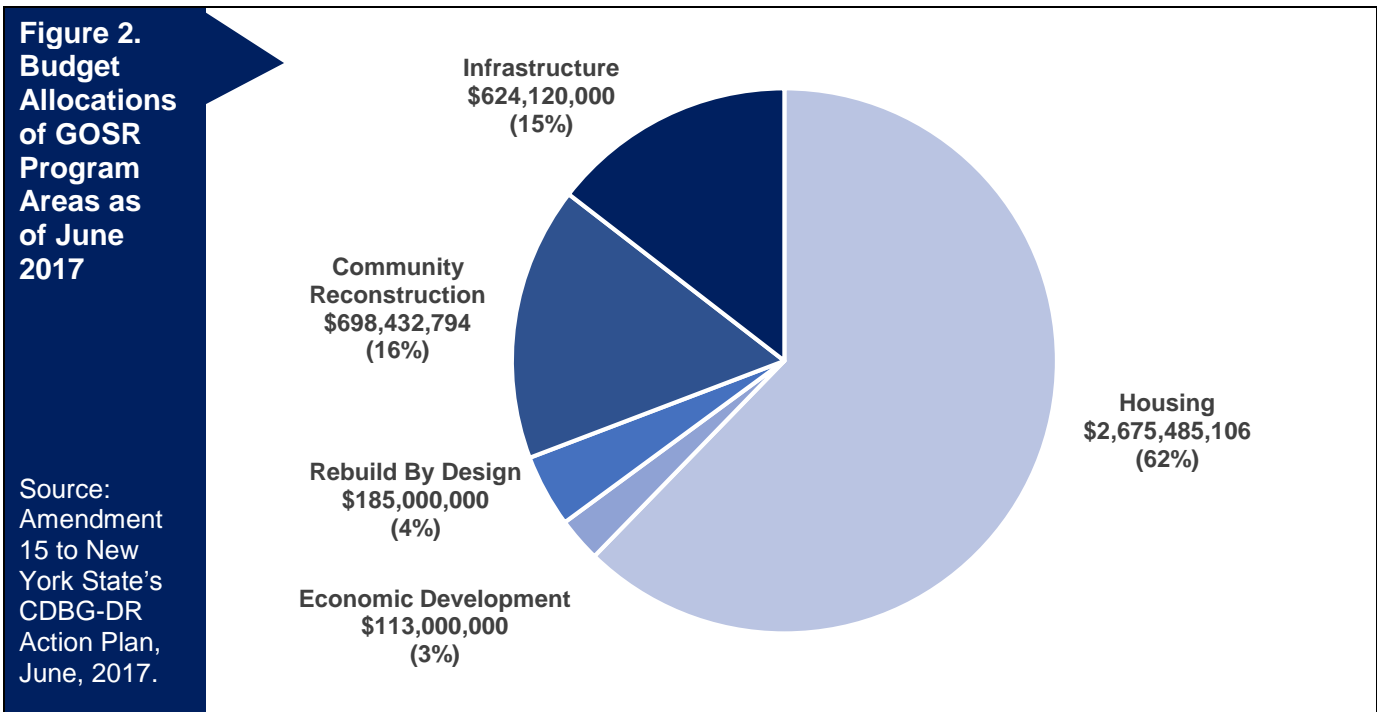


With the Disaster Relief Appropriations Act of 2013 (U.S. Congress 2013), Congress made \$16 billion in CDBG-DR funds available for necessary expenses related to disaster relief, long-term recovery, restoration of infrastructure and housing, and economic revitalization in calendar years 2011, 2012, and 2013.⁶ On March 5, 2013, HUD published Federal Register Notice 01: 5696, which outlined the allocation of CDBG-DR funds to six grantees. Although the allocations were made in whole to four states (Connecticut, Maryland, New Jersey, and Rhode Island), the allocation to New York was divided between New York City and the remainder of New York State (see Appendix B).

HUD acknowledged that the standard 70 percent LMI target “...could be difficult to reach, and perhaps even impossible, for many grantees affected by Hurricane Sandy. [It] may prevent grantees from providing assistance to damaged areas of need” (GPO 2013). As a result, the Notice imposed an alternative targeting requirement of 50 percent on all grantees (ibid).

New York State is required to spend at least 80 percent of its CDBG-DR funds in what HUD defines as Most Impacted and Distressed (MID) counties: Nassau and Suffolk counties on Long Island; Rockland and Westchester counties, and the five counties of New York City (GPO 2013). However, as noted before, New York City received its own allocation and, therefore, New York State has focused most of its recovery efforts in the other four MID counties.

At the time of writing, the state is expending its CDBG-DR allocation in four broad areas identified as: 1) Housing; 2) Economic Development; 3) Infrastructure and Community Reconstruction; and 4) Rebuild By Design, HUD’s resiliency initiative in collaboration with the nonprofit sector. [Figure 2](#), reflecting the state’s CDBG-DR budget at time of writing, shows that about 35 percent of the allocation is budgeted for activities that typically use the area benefit methodology.



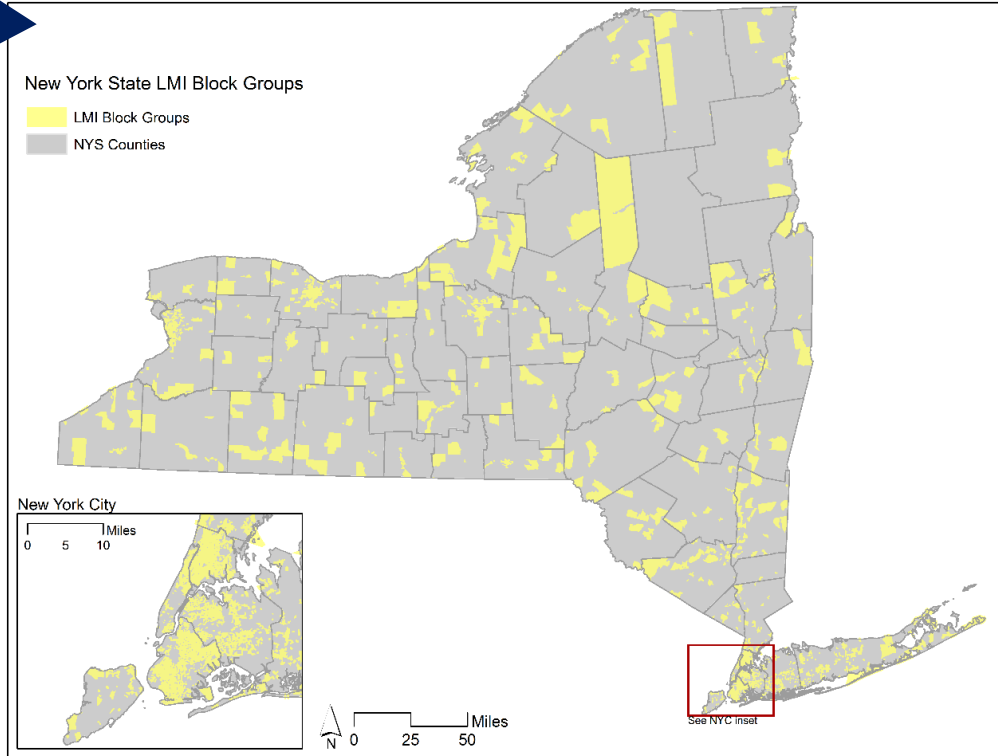
4. Data, Geographic Definitions, and Socioeconomic Overview

Data

The primary dataset for this study is HUD’s 2015 Low- and Moderate-Income Summary Data (LMISD). This publicly available dataset provides total population, as well as the number of LMI persons for a range of geographic levels for every state. We use the most disaggregated level of data available, the Census block group. There are over 15,000 block groups in New York State, with an average population of

approximately 1,200 residents. Population and income estimates derive from the 2006-10 American Community Survey 5-Year Estimates and 2015 HUD Section 8 Income Limits. We assign the LMI status to block groups with at least 51 percent of their population (or a lower percentage in exception areas) earning less than 80 percent of the Area Median Income. [Figure 3](#) below illustrates the LMI block groups in New York State.

Figure 3. LMI Block Groups in New York State

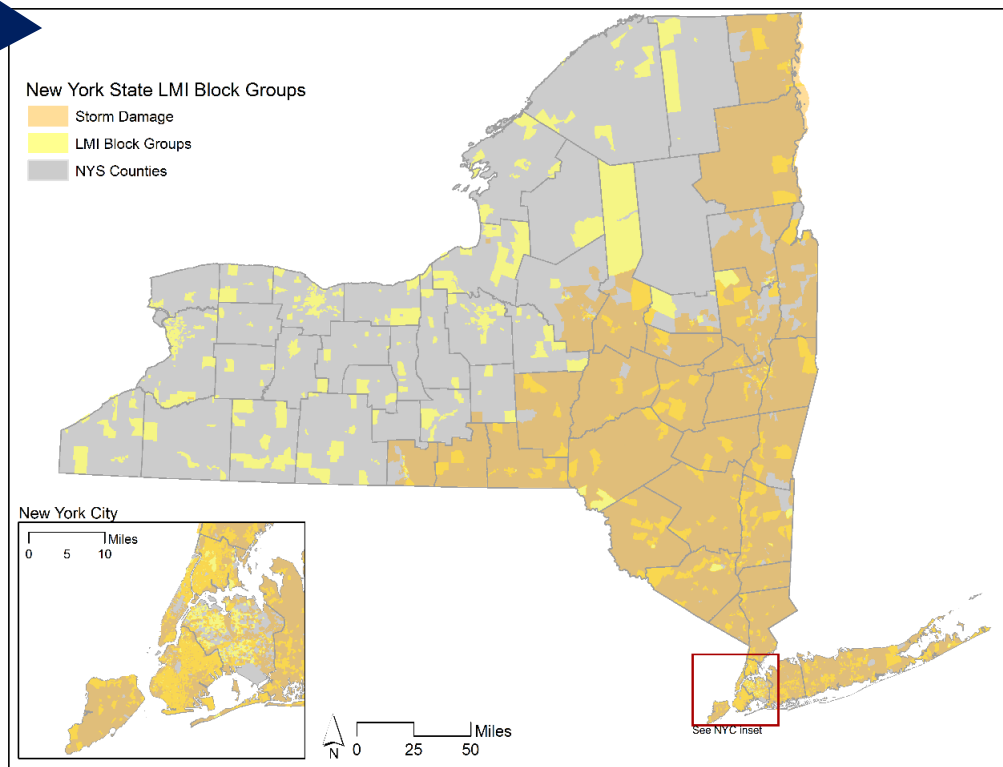


Source: HUD 2015 LMISD; U.S. Census Bureau 2015 TIGER/Line County Boundaries.

We also had access to data from the FEMA Individual Assistance program (FEMA IA), which provides information on individual properties damaged by Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee as of December 2014, aggregated to the Census block group level. The FEMA IA data enable us to estimate damage to all housing units that applied for individual assistance. All applicants are classified into one of six damage categories, from 0 for no damage to 5 for “severe” damage, based on FEMA’s initial property damage assessment and flood level (New York State 2017). We believe that these data provide the most accurate proxy for damaged areas⁷ and enable us to set up a proxy measure for the block group level of damage. [Figure 4](#) displays the broadest estimate of storm-impacted block groups (those with at least one damaged property), overlaid with LMI block groups.

Figure 4. Map of the Affected Block Groups Across New York State (All Storms)

Source: HUD 2015 LMISD; U.S. Census Bureau 2015 TIGER/Line County Boundaries; FEMA IA Data as of December 2014.



Geographic Definitions

We focus our attention on the following geographic definitions:

- a) New York State;
- b) New York State without New York City, since the city is an independent DR grantee with a separate allocation (see Appendix B);
- c) Most-Impacted and Distressed (MID) areas; excluding New York City, as defined by HUD, namely Nassau, Rockland, Suffolk, and Westchester Counties as a whole, because New York State is focusing most of its recovery efforts outside of New York City; and
- d) Each of the above counties individually or combined, e.g., Nassau and Suffolk together as Long Island and also separately.

For each of these geographic definitions, we consider three particular focus areas in order to account for HUD's requirement that eligible areas need to be tied back to one of the three storms. Those focus areas are defined as:

- 1) *Affected Areas*: This definition includes only block groups with at least one FEMA IA recorded damage property. Overall, 9,632 of New York State's 15,464 block groups are in this category.
- 2) *Top Quartile of Affected Areas*: Including only block groups with eighteen or more damaged properties (the top quartile of the distribution of damaged properties). There are 2,495 of these block groups across the state.

- 3) *Top Quartile of Major- or Severely Affected Areas*: A simplified definition of a major- or severely damaged property, as designated by HUD, is having received at least one foot of flood water and/or \$8,000 of property loss (New York State 2017). This definition includes block groups with eleven or more major- or severely damaged properties, of which there are 875 across the state. This geographic definition serves as a proxy for areas with most concentrated damage.

[Table 1](#) lays out the number and proportion of LMI block groups in various geographies and areas of focus.

Table 1. Summary of Geographic Regions of Analytical Focus, Populations, and LMI Characteristics			
<i>Geographic Area</i>	<i>Population (Million)</i>	<i>Block Groups</i>	<i>LMI Block Groups</i>
New York State (regardless of damage)	18.6	15,464	6,047 (39.10%)
New York State excluding New York City	10.7	8,970	2,652 (29.57%)
New York State <i>Affected Areas</i> (excluding NYC)	6.5	5,239	1,303 (24.87%)
MID Counties	3.96	3,049	765 (25.09%)
MID Counties <i>Affected Areas</i>	3.94	2,998	755 (25.18%)
Top Quartile of the MID Counties' <i>Affected Areas</i>	1.6	1,121	294 (26.23%)
Top Quartile of the MID Counties' <i>Major- or Severely Affected Areas</i>	0.34	271	51 (18.82%)
Source: Authors' calculations based on 2015 HUD LMISD and FEMA-IA universe of applicants as of Dec 2014.			

Overview of the Study Areas

New York State is home to about 18.6 million people. In the entire state, about 44 percent of the population and 39.1 percent of block groups are defined as LMI. These proportions are mainly driven by New York City, where 54.6 percent of its nearly 8 million residents (per this dataset) and 51.4 percent of its block groups are LMI. When we exclude New York City, the percentage of LMI block groups in the remainder of the state drops to just under 30 percent.

Looking only at the affected areas clearly illustrates how the geographic constraints of the tie-back requirement can impact a grantee's ability to successfully target and document LMI communities. In all affected areas (including New York City), 39.5 percent of the 9,632 block groups are LMI, but when we exclude NYC, only one quarter of the block groups are LMI. The percentage of LMI block groups in the affected areas of the MID counties remains close to that of the state without NYC, at about 25.2 percent.

We also restrict the sample to the top quartile of the distribution of damaged block groups as explained above, defined as block groups with eighteen or more damaged properties. Across the state, about 28 percent of these block groups are LMI, but after

excluding NYC the percentage drops to 24.2 percent. A second level of focus restricts the sample to the top quartile of the distribution of major- or severely damaged block groups, i.e., those with eleven or more FEMA IA major- or severely damaged properties.⁸ In these areas, 26.9 percent of block groups are LMI, which again drops to 20 percent after excluding NYC, and further down to 18.8 percent in the MID Counties.

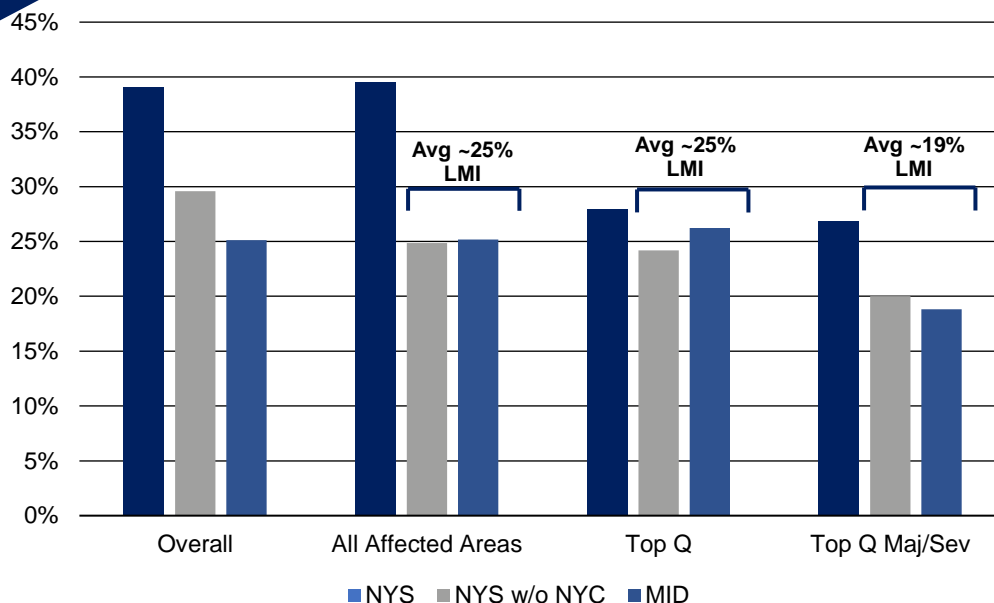
[Table 2](#) and [Table 3](#) below summarize this information.

Table 2. Block Groups With Eighteen or More FEMA IA Applications and Their LMI Status			
	<i>Population</i>	<i>Block Groups</i>	<i>LMI Block Groups</i>
All Affected Areas	3,529,530	2,495	697 (27.94%)
Affected Areas Excluding NYC	2,401,085	1,729	418 (24.18%)
MID Counties	1,644,555	1,121	294 (26.23%)
Source: Authors' calculations based on 2015 HUD LMISD and FEMA-IA universe of applicants as of Dec 2014.			

Table 3. Block Groups with Eleven or More Major/Severe FEMA IA Applications and Their LMI Status			
	<i>Population</i>	<i>Block Groups</i>	<i>LMI Block Groups</i>
All Affected Areas	1,133,155	875	235 (26.86%)
Affected Areas Excluding NYC	694,155	575	115 (20.00%)
MID Counties	344,295	271	51 (18.82%)
Source: Authors' calculations based on 2015 HUD LMISD and FEMA-IA universe of applicants as of Dec 2014.			

The description above reveals somewhat similar results for different geographies: after taking NYC out of the equation, approximately a quarter of all affected block groups are LMI, with comparable results for the MID and Long Island counties, even when accounting for the lower LMI thresholds in many of these areas. We observe a very similar pattern when we consider the top quartile of damage distribution, which is confirmed by considering the top two quartiles and the top decile of damage.⁹ [Figure 5](#) shows the percentage of LMI block groups for each focus area.

**Figure 5.
Focus Areas
and LMI
Proportions**



Source: HUD 2015 LMISD; U.S. Census Bureau 2015 TIGER/Line County Boundaries.

Given that block groups are the building blocks of service areas, at least from a data perspective, these relatively low percentages imply that attaining LMI service areas inside of the storm-affected areas will likely be difficult, especially for projects with larger service areas. To demonstrate why that is the case, we employ a semirandom sampling model in the following section to estimate the probability of service areas of various sizes being LMI.

5. Using Probability Analysis to Estimate the Likelihood of Service Areas Being LMI

More than \$1.5 billion — or about 35 percent — of New York State’s CDBG-DR allocation is budgeted to activities that are typically measured using the area benefit approach. As these activities vary drastically in size and scope, it is likely that the number and extent of service areas also vary widely. For instance, in the state’s Community Reconstruction program, service areas can range from one block group to a few dozen.¹⁰

To supplement the damaged-area characteristics presented above, we conduct a series of probability analyses to estimate the likelihood of a hypothetical representative service area meeting the LMI national objective. Based on the descriptive observations in the previous section, we hypothesize that when NYC is not included, larger service areas are less likely to be LMI. To test that, we draw sample service areas of various sizes in the storm-affected areas. Each sampled service area is then tested to see if it meets the appropriate LMI threshold. We repeat this analysis separately for New York City and the rest of the state, given their different characteristics.

Methodology

As noted, our initial study sample is the universe of 9,632 affected block groups across New York State, and some of those block groups are in exception counties with lower LMI thresholds. In our first approach, Scenario I, we randomly select block groups from among all affected areas to construct sample service areas. For this scenario, we ignore the fact that, in reality, service areas are coherent boundaries made of adjacent block groups, and let the sample block groups be randomly drawn from all areas. For this analysis, only county-level exception thresholds are applied.¹¹

In Scenario II we impose a geographical constraint by drawing only adjacent block groups — those that are within the same and/or neighboring parent Census tracts. This allows us to more closely approximate what an actual service area looks like.

In order to account for variation in the size of real service areas, we randomly select samples of five, ten, and twenty block groups to construct hypothetical service areas. We repeat random sampling 10,000 times for each service area size. In each sample, we calculate the LMI population proportion using the following equation:

$$P_i = \frac{\sum_1^n lowmod}{\sum_1^n lowmoduniv}$$

where i is any hypothetical service area, n is the number of block groups it contains (i.e., five, ten, or twenty), $lowmod$ is the number of LMI persons, and $lowmoduniv$ is the total population of each block group. We assign values of 1.00 to the LMI service areas using the following equation:

$$LMI_i = 1 \text{ if } P_i \geq .51 \text{ (or specified exception threshold)}$$

By adding the number of LMI service areas across all 10,000 samples and dividing them by 10,000, we estimate the probability of a service area of a given size being LMI:

$$Prob_{(LMI)} = \frac{\sum_1^{10000} LMI_i}{10000}$$

As explained, we conduct the probability analysis using two scenarios:

- I. Selecting the block groups randomly from across the state and applying county-level exception thresholds when applicable.
- II. Geographically constraining service areas by selecting clusters of neighboring block groups, in the form of two, three, five, or ten adjacent Census tracts, and applying the county-level exception thresholds.

In order to account for different county-level eligibility thresholds, we present the results for each of the four MID counties individually as well.

Results

Scenario I: Geographically Random Block Groups

1.1) Five Spatially Random Block Groups (Approximate Population: 6,000)

Our random sampling of five block groups, including NYC, results in about 29.3 percent of the sample service areas being LMI. After excluding NYC, the share of LMI

service areas drops to just 6 percent. On average, about 35 percent of the population of these areas is LMI. In Nassau, Rockland, and Suffolk Counties, where the exception LMI thresholds are lower than 51 percent, about 16, 23, and 11 percent of service areas, respectively, are LMI. The LMI populations of these service areas range between 29 and 34 percent in the three counties. The probability of a service area of five block groups being LMI in Westchester County is about 15 percent, while the average LMI population is 38 percent.

New York City alone has about 57 percent of its affected block groups as LMI. Out of 10,000 rounds of drawing samples of five block groups from this universe, about 67 percent of service areas are LMI, containing an average of 56 percent LMI persons. As the following results will show, NYC has a great impact on the probability of capturing LMI service areas in New York State.

1.2) Ten Spatially Random Block Groups (Approximate Population: 12,000)

Enlarging the representative service area size to ten block groups results in a marked decrease in the percentage of draws that meet the LMI requirement. Including NYC, LMI service areas represent fewer than 24 percent of draws. Without NYC, the repeated simulations yield only 1.7 percent of service areas as LMI, despite an average 35 percent LMI percentage in the service areas. Limiting the analysis to the four MID counties separately, the percentage drops to under 10 percent in Nassau, 4.5 percent in Suffolk, 15.7 percent in Rockland, and 7.5 percent in Westchester County, despite between 29 and 37 percent of the average service area populations being LMI.

In contrast, three quarters of the service areas with ten block groups in NYC are LMI.

1.3) Twenty Spatially Random Block Groups (Approximate Population: 24,000)

The results are magnified for service areas of twenty block groups: fewer than 16 percent of service areas, including NYC, are LMI. Without NYC, the percentage drops to less than 0.2 percent of samples. This, again, is while about 35 percent of the population in these areas is LMI. Less than 4 percent of service areas in Nassau County and under 1 percent in Suffolk County are LMI. Rockland County shows a higher — but still declining — LMI percentage of 7.4 percent, while Westchester, a county not eligible for an exception threshold, produces LMI service areas for under 3 percent of the samples. Again, the percentages of LMI persons in these service areas are nearly identical to those of smaller service areas.

Following the same contrasting pattern, the proportion of LMI service areas in NYC increases to 82.6 percent when they are made of twenty block groups.

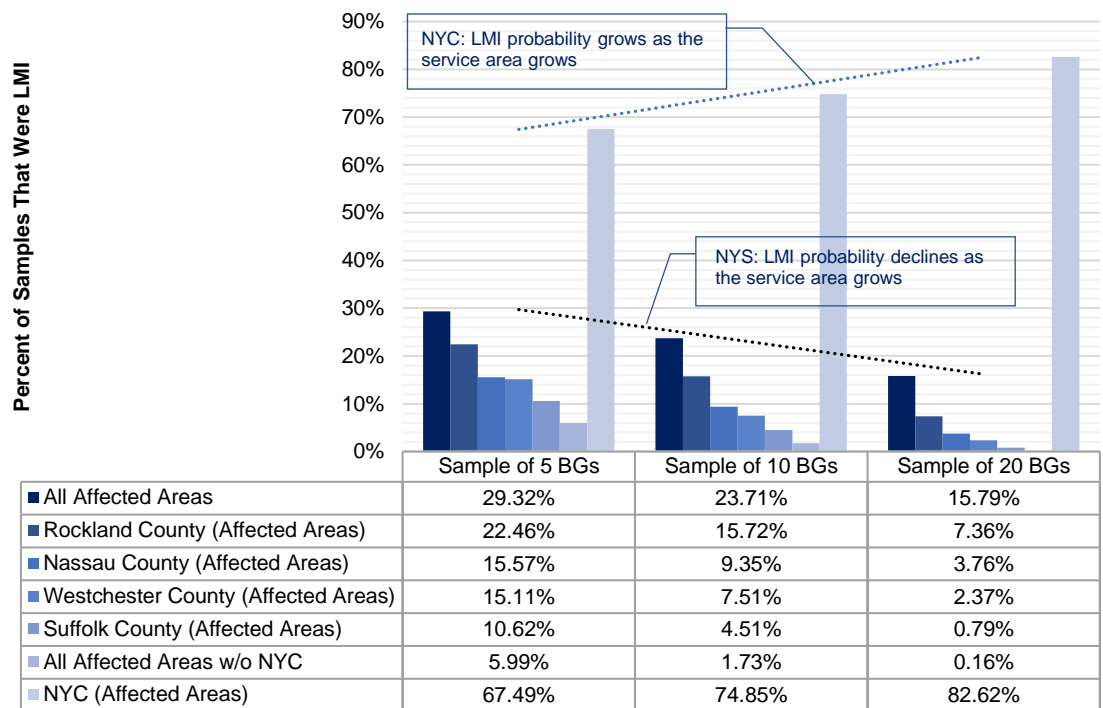
In general, these results strongly confirm the hypothesis that excluding NYC from the analysis, areas that host most of the storm damage demonstrate very low probabilities that a randomly drawn service area (of various sizes) is LMI. This is despite the fact that the LMI populations in these service areas are sizable. The results also show two diverging trends: in NYC, where the majority of block groups are LMI, larger service areas are more likely to be LMI. In the rest of the state, on the other hand, the probability drops as the service area size increases. [Table 4](#) and [Figure 6](#) summarize these results for New York State.

Table 4. Proportion of LMI Persons, Block Groups, and Service Areas With Exception Thresholds After 10,000 Rounds of Random Sampling

	Sample of 5 BGs			Sample of 10 BGs			Sample of 20 BGs		
	<i>LMI Persons</i>	<i>LMI BGs</i>	<i>Pct. Samples LMI</i>	<i>LMI Persons</i>	<i>LMI BGs</i>	<i>Pct. Samples LMI</i>	<i>LMI Persons</i>	<i>LMI BGs</i>	<i>Pct. Samples LMI</i>
All Affected Areas	44.72%	39.31%	29.32%	45.07%	39.50%	23.71%	45.01%	39.65%	15.79%
All Affected Areas w/o NYC	35.08%	25.12%	5.99%	35.04%	24.91%	1.73%	34.94%	24.86%	0.16%
NYC (Affected Areas)	56.24%	56.58%	67.49%	56.37%	56.94%	74.85%	56.47%	56.92%	82.62%
Suffolk County (Affected Areas)	34.32%	24.16%	10.62%	34.40%	24.23%	4.51%	34.43%	24.32%	0.79%
Nassau County (Affected Areas)	29.49%	24.07%	15.57%	29.60%	24.00%	9.35%	29.72%	24.01%	3.76%
Rockland County (Affected Areas)	34.04%	24.95%	22.46%	34.18%	24.95%	15.72%	34.30%	24.86%	7.36%
Westchester County (Affected Areas)	37.71%	27.90%	15.11%	37.86%	28.05%	7.51%	38.00%	28.13%	2.37%

Figure 6.
Proportion
of LMI
Service
Areas in
10,000
Rounds of
Random
Sampling
With
Exception
Thresholds

**Average Proportion of LMI Persons and Block Groups
10,000 Rounds of Sampling; 3 Sample Sizes; Exception Thresholds**



Scenario II: Adjacent Block Groups

Of course, real service areas consist of adjacent block groups rather than spatially random combinations. In order to account for that, we introduce geographic constraints in the probability analysis. We employ the same simulation strategy of 10,000 rounds, but this time using block groups that belong in the same (or neighboring) Census tracts, i.e., are adjacent. On average, a New York State Census tract is a cluster of four-to-five block groups with an average population of 4,000 to 5,000 people. By sampling two neighboring Census tracts, we are essentially developing a service area of eight to ten adjacent block groups. We replicate this analysis for two, three, five, and ten Census tracts.

II.1) Two Spatially Adjacent¹² Census Tracts (Approximate Population: 9,000)

In 10,000 simulations of sampling all block groups from two adjacent Census tracts in all affected areas in New York State, 35.4 percent of the draws meet the LMI threshold. Excluding NYC, the percentage drops to only 11.9 percent. This is while the proportion of LMI population remains at 35 percent. In Nassau and Suffolk Counties, 17.4 and 16.1 percent of simulated service areas, respectively, are LMI. Approximately 29 and 34 percent of the populations in the average service areas are LMI. Rockland and Westchester Counties, however, show higher proportions of LMI service areas (29.2 percent and 23.6 percent, respectively), largely driven by higher percentages of LMI persons (between 35 and 38 percent).

Similar to the first scenario, NYC presents totally different results: out of 10,000 samples of all block groups within two adjacent Census tracts, about 61 percent are LMI.

II.2) Three Spatially Adjacent Census Tracts (Approximate Population: 13,500)

Increasing the service area size to incorporate block groups within three adjacent Census tracts reduces the percentage of LMI service areas in all affected areas (including NYC) down to 33.1 percent. Without NYC, only 8.3 percent of representative service areas are LMI. Again, over a third of persons in these service areas are LMI. In Nassau County, the percentage of LMI service areas drops to 15.2 percent; in Suffolk, it decreases to 11.7 percent, and in Rockland and Westchester to 24.9 and 19.8 percent, respectively. The LMI percentage of the average service area population in the four MID counties still remains between 29 and 38 percent.

In New York City, the likelihood of a service area with three Census tracts being LMI is 64 percent.

II.3) Five Spatially Adjacent Census Tracts (Approximate Population: 22,500)

Including NYC, the share of LMI service areas made of all block groups within five neighboring Census tracts falls below 30 percent. Excluding NYC, the share drops to only 3.8 percent; this, despite an average of over 35 percent LMI persons. In Nassau and Suffolk counties, the percentage of LMI service areas shrinks to 10.7 percent and 5.9 percent, respectively, while Rockland and Westchester Counties see declines to 20.4 and 12.5 percent, respectively. This, while the percentage of LMI populations remains largely constant.

In New York City, the likelihood of a service area made of five tracts being LMI increases again, to 68 percent.

II.4) Ten Spatially Adjacent Census Tracts (Approximate Population: 45,000)

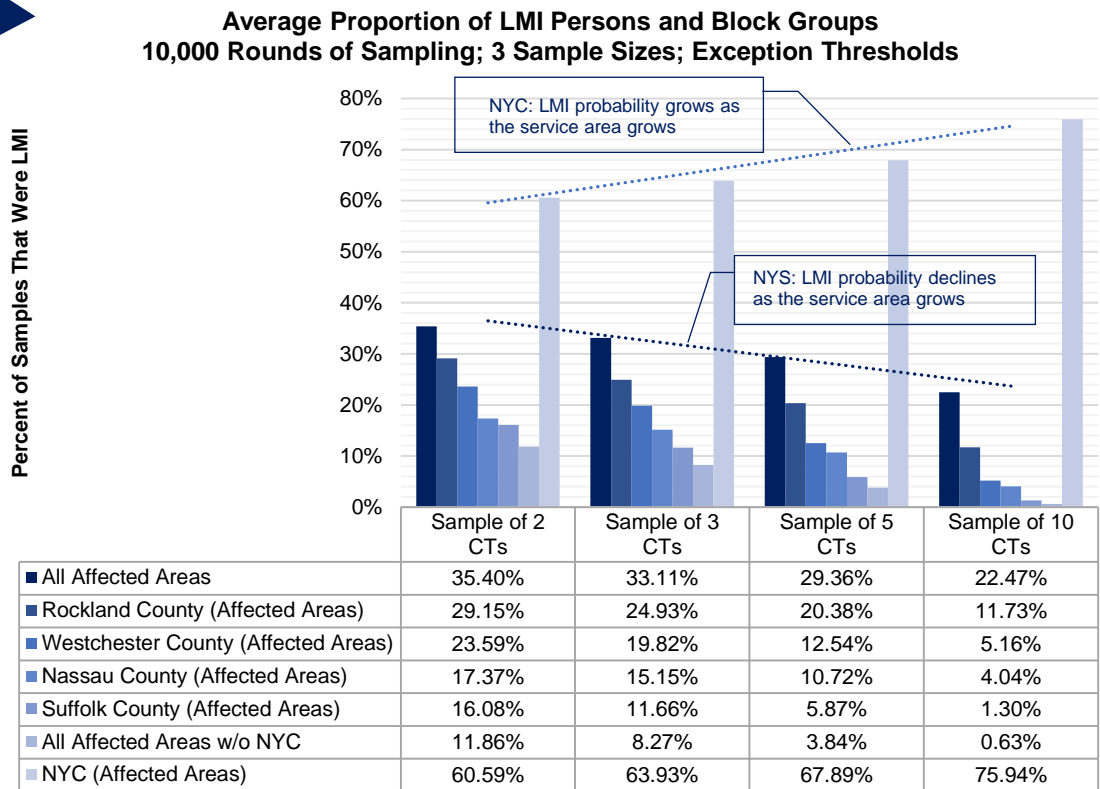
Including NYC, a service area of approximately 45,000 people will be LMI in only about a fifth of draws. Without NYC, less than one in a hundred service areas of this size are LMI. This is despite the fact that the average service area populations remain at about 35 percent LMI. In Nassau County, the percentage declines further to 4 percent, while in Suffolk only 1.3 percent of draws produces LMI service areas. In Rockland and Westchester, the percentages decline to 11.7 and 5.2 percent, respectively. In the four MID counties, the average service area is again home to between 29 and 38 percent LMI population.

In NYC, 76 percent of service areas of this size are LMI. [Table 5](#) and [Figure 7](#) below summarize the analysis for Census tracts.

**Table 5. Proportion of LMI Persons, Block Groups, and Service Areas (Census Tracts)
With Exception Thresholds After 10,000 Rounds of Random Sampling**

	<i>Sample of 2 Census Tracts</i>			<i>Sample of 3 Census Tracts</i>			<i>Sample of 5 Census Tracts</i>			<i>Sample of 10 Census Tracts</i>		
	<i>LMI Persons</i>	<i>LMI BGs</i>	<i>Pct. Samples LMI</i>	<i>LMI Persons</i>	<i>LMI BGs</i>	<i>Pct. Samples LMI</i>	<i>LMI Persons</i>	<i>LMI BGs</i>	<i>Pct. Samples LMI</i>	<i>LMI Persons</i>	<i>LMI BGs</i>	<i>Pct. Samples LMI</i>
All Affected Areas	45.16%	39.97%	35.40%	45.11%	39.94%	33.11%	45.13%	39.91%	29.36%	45.06%	39.77%	22.47%
All Affected Areas w/o NYC	35.32%	25.20%	11.86%	35.31%	25.28%	8.27%	35.18%	24.89%	3.84%	34.97%	24.89%	0.63%
NYC (Affected Areas)	55.21%	54.95%	60.59%	55.81%	55.91%	63.93%	56.00%	56.27%	67.89%	56.37%	56.59%	75.94%
Suffolk County (Affected Areas)	33.97%	23.96%	16.08%	34.27%	24.03%	11.66%	34.27%	23.95%	5.87%	34.30%	24.15%	1.30%
Nassau County (Affected Areas)	29.39%	24.11%	17.37%	29.58%	24.33%	15.15%	29.73%	24.41%	10.72%	29.69%	24.12%	4.04%
Rockland County (Affected Areas)	34.53%	26.35%	29.15%	34.32%	25.57%	24.93%	34.45%	25.34%	20.38%	34.48%	25.21%	11.73%
Westchester County (Affected Areas)	38.37%	29.11%	23.59%	38.41%	28.96%	19.82%	38.10%	28.41%	12.54%	38.08%	28.28%	5.16%

**Figure 7.
Proportion
of LMI
Service
Areas
(Census
Tracts) in
10,000
Rounds of
Sampling
With
Exception
Thresholds**



Overall, introducing the geographic-proximity restriction to the analysis confirms the general conclusions that the block-group-level analysis established: outside of New York City, the probability of producing a service area that qualifies as LMI declines as we increase the size of the service area. This, again, is while there are relatively large and consistent proportions of LMI people living in these service areas. However, since the areas do not meet the required threshold, any DR investment in them will not meet the LMI objective and therefore needs to meet a different national objective. On the contrary, New York City service areas become more likely to be LMI as their size grows — a function of the relatively high proportion of LMI persons in the city. The various scenarios we present uniformly confirm that it is extremely difficult to produce service areas outside of NYC that would be considered LMI by HUD definitions, and that this difficulty only increases as the service area size increases. This, as we have noted, has potentially profound implications for the state’s recovery efforts.

6. Conclusions and Policy Recommendations

In this paper, we provide evidence that New York State faces challenges in addressing the unmet recovery needs while meeting the LMI national objective using area benefit. Our analyses of the LMI characteristics of the storm-impacted areas show that in New York State, excluding New York City, Superstorm Sandy and the preceding storms had the most impact on areas where the proportion of LMI block groups and populations are relatively low. In all of the affected areas (excluding NYC), only 25 percent of block groups are LMI. If we focus only on areas with concentrated major or severe damage (excluding NYC), the percentage of LMI block groups drops to 20

percent, compared to nearly 27 percent statewide. Block groups are the building units for identifying beneficiaries within a given service area. The low proportions of LMI block groups that we identify may limit the state's ability to conduct recovery and resiliency work that benefits communities as a whole (i.e., infrastructure investments), especially since most of the state's recovery investments are outside of New York City — the largest pool of LMI persons in the state. While the state still has the option to conduct these activities under other national objectives, we predict challenges in meeting even the lower targeting requirement of 50 percent (already reduced from the standard 70 percent).

To test this hypothesis more systematically, we employ a series of probability analyses. We observe that the likelihood of any hypothetical service area being LMI within the affected areas drops markedly once NYC is excluded, and that those probabilities drop further as the size of the service area increases. This can have profound implications for funding critical infrastructure projects in storm-impacted areas.

We present these analyses to demonstrate that meeting the LMI area benefit objective can potentially hinder the recovery response in New York State. While our analyses and results are specific to New York State, the takeaways have broader implications for future CDBG-DR grantees.

Of course, these results do not come in a policy vacuum. The very existence of the CDBG program as a tool to combat poverty has come into question recently (Theodos, Stacy, and Ho 2017). Our findings do not lead us to question the primary goal of the CDBG program, or its disaster recovery offshoot, to prioritize assistance to LMI populations. Quite the opposite: research shows that LMI individuals — and communities — are most vulnerable to shocks and have the least resources to recover effectively (e.g., see Pearce 2003). Our results indicate that CDBG-DR, with its mandate to prioritize the LMI while addressing recovery needs, requires a more transparent and data-driven approach to setting requirements with regard to LMI than currently exist.

Recommendation 1: Link LMI Targeting Requirements for CDBG-DR Grantees to Results of Standardized Demographic Analyses of Disaster-Impacted Areas

Our demographic analyses highlight one of the important differences between CDBG and CDBG-DR, that the latter is restricted to certain geographic areas, defined regardless of their income characteristics. The former allocates funding to grantees largely *based* on income characteristics. In the context of CDBG-DR, we observe a potential mismatch between even the reduced LMI targeting requirement and the demographic realities of disaster-impacted areas in New York State. This disconnect is currently recognized in an ad-hoc way through modification of requirements in the initial allocation, and may be recognized further through subsequent waivers in the future. However, at least in the case of the initial target setting, there is little evidence as to how alternative requirements were determined, why they are the same across Sandy grantees, or why subsequent DR grantees have received different targeting requirements.

We recommend that a more data-driven and transparent solution would be to set overall LMI targeting requirements for each individual CDBG-DR grantee based on

standardized demographic analysis of the disaster-impacted areas as part of the allocation process. To do that, HUD would combine estimates of unmet recovery needs with LMI characteristics of persons and communities that were impacted, in order to weight the targeting requirement. This approach would have important benefits for HUD, grantees, and disaster-impacted communities:

1. Under the existing allocation and waiver structure, it is not clear how the overall benefit targeting requirements are determined. Standardizing the process of determining the LMI targeting requirement, and basing it on data that reflect the actual LMI characteristics of an impacted area, provides more transparency than the existing alternative requirement or waiver process.
2. The analysis holds grantees accountable to the primary goal of CDBG, i.e., targeting LMI persons and communities. And while it may serve to lower the overall LMI targeting requirement in areas with smaller LMI populations that still lack the resources to recover from a disaster, it can also result in raising the requirement in areas with higher concentrations of poverty, thus improving the effectiveness and equity of targeting LMI populations with DR funds.
3. By requiring this relatively simple analysis and integrating it in the grant's allocation process, HUD can reduce the administrative burden and avoid potential future delays that might result from the need to modify or waive the LMI requirements, or recapture expended funds.

Recommendation 2: Consider Alternative Area Benefit Methodologies, Such as a Proportional Approach, for Determining Which Expenditures Meet the LMI National Objective

Our probability analysis highlights another challenge at the project level. Current HUD documentation requirements for area benefit activities dictate that each service area must meet the 51 percent (or alternative exception) threshold for the associated dollars to be counted toward the overall LMI column. If the proportion of LMI persons in that community falls even 1 percent short, none of the funding can be counted as LMI. This is despite the fact that a project such as a wastewater treatment plant or a hospital can potentially benefit a large number of LMI individuals in absolute terms. These types of projects, with service areas potentially encompassing tens or hundreds of thousands of people, can also represent very large financial investments on a scale such that municipal governments are unable or unwilling to fund them. In fact, the larger the investment, the larger the likely pool of beneficiaries. The risk under the current “all-or-nothing” approach is that projects benefiting large numbers of LMI individuals, but not meeting LMI thresholds, are foregone in favor of smaller and perhaps less consequential projects where the demographic data conforms to the documentation requirements. For example, the average service area of three Census tracts on Long Island is home to between 1,600 and 2,100 LMI persons, who may not benefit the DR investments in their communities since those service areas are far from meeting the LMI threshold. And yet we know these populations are more vulnerable than others to shocks such as large-scale disasters, and could benefit disproportionately from community-wide investments. In such cases, we would argue for a more nuanced approach.

The overall goal of the CDBG program is to prioritize investments that improve LMI communities. The existing documentation requirements for area benefit, as we show, sometimes serve to disincentivize such investments, particularly in the context of disaster recovery. One solution to this conundrum is to apply a proportional approach to determining how much of an area benefit activity's funding meets the LMI national objective, based on the proportion of LMI individuals residing in that activity's service area. This approach could be applied across the board to area benefit activities, or only to "large" projects and/or projects that meet a minimum LMI beneficiary threshold. How these criteria are defined remains a topic for future research. Regardless, a proportionality approach more accurately reflects how a grantee's recovery investments benefit LMI populations. As an example, a project that is 55 percent LMI under the all-or-nothing approach has 100 percent of its dollars count towards the LMI objective, whereas only 55 percent of dollars count towards LMI using the proportional approach. Conversely, a project that falls just below the threshold receives some credit for the percentage of LMI persons it benefits.

Appendix

Appendix A: Exception Grantees in New York State for FY 2015

Table A. Exception Grantees in New York State for FY 2015	
Exception Grantee Name	Exception Grantee LMI Percentage Threshold
Amherst Town, Erie County, New York	35.85%
Babylon Town, Suffolk County, New York	48.34%
Cheektowaga Town, Erie County, New York	46.79%
Colonie Town, Albany County, New York	43.05%
Greece Town, Monroe County, New York	42.41%
Hamburg Town, Erie County, New York	32.10%
Huntington Town, Suffolk County, New York	32.61%
Irondequoit Town, Monroe County, New York	48.48%
Islip Town, Suffolk County, New York	49.23%
Saratoga Springs City, Saratoga County, New York	46.88%
Tonawanda Town, Erie County, New York	43.89%
Dutchess County, New York	40.74%
Erie County, New York	38.52%
Monroe County, New York	34.05%
Nassau County, New York	38.05%
Onondaga County, New York	38.59%
Orange County, New York	39.73%
Rockland County, New York	42.52%
Suffolk County, New York	44.58%

Appendix B: CDBG-DR Allocations to New York State

Under the first allocation, New York State was allocated \$1,713,960,000 to facilitate the recovery and long-term rebuilding of its impacted communities. The state's initial Action Plan was approved by HUD on April 25, 2013. In June 2013, New York State established the Governor's Office of Storm Recovery (GOSR) to coordinate the recovery and rebuilding efforts. On November 23, 2013, HUD published Federal Register Notice 5696-N-06, which outlined the requirements governing the management of the \$5,109,000,000 of the second allocation of CDBG-DR resources to continue disaster recovery efforts from Superstorm Sandy and the events of 2011. New York State was allocated an additional \$2,097,000,000 in funds under the second allocation, increasing the state's allocation to \$3,810,960,000. On May 27, 2014, HUD approved the state's sixth Action Plan Amendment (APA6), outlining the state's intended use for the second allocation of funds. Federal Register Notice 5696-N-11, published October 16, 2014, outlined the requirements governing another allocation of the Disaster Relief Appropriations Act. It allocated an additional \$420,922,000 for the state's storm recovery programs and \$185,000,000 to provide resources for projects developed through Rebuild by Design (RBD) projects. On April 13, 2015, HUD approved the state's eighth Action Plan Amendment (APA8). As of APA8, New York State's allocation of CDBG-DR funds, including RBD-related allocations, totaled \$4,416,882,000. On March 30, 2016, HUD approved the revised APA12 allocation of \$4,516,882,000 to account for \$100 million of anticipated Program Income resulting from the sale of Acquisition properties.

HUD identified Nassau, Rockland, and Suffolk Counties as *most impacted* counties in the March 5, 2013, Federal Register Notice and required that a minimum of 80 percent of the state's total allocation must be expended in these counties. The November 25, 2013, Federal Register Notice updated the counties to include the counties of Bronx, Kings, New York, Queens, Richmond, and Westchester. Since NYC received its own allocation of CDBG-DR funds, only a few of the state's disaster recovery programs are targeted to the five boroughs. Additionally, the November 25, 2013, Federal Register Notice added four more Presidentially Declared Disasters (1957, 1993, 4111, and 4129) to be eligible for CDBG-DR funding.

Endnotes

- 1 As amended in 24 CFR 570 (<https://www.hudexchange.info/resources/documents/24-CFR-Part%20-570-CDBGs.pdf>); more information available in “Chapter 21: Disaster Recovery (CDBG-DR), <https://www.hudexchange.info/resources/documents/Basically-CDBG-Chapter-21-CDBG-DR.pdf>
- 2 The program was originally developed by the White House and HUD on two separate tracks, and each allocation scheme gave a different weight to the three factors. In the final formula, poverty received double weight compared to population and overcrowding (Nathan, Dommel, Liebschutz, Morris, and Associates 1977).
- 3 Also see HUD’s video presentation, min 9:00, available at <https://www.youtube.com/watch?v=CW3GwKSOuTM>; see also “Redistribution Effect of Introducing 2010 Census and 2005-2009 ACS Data Into the CDBG Formula.” https://www.huduser.gov/portal//publications/pdf/cdbg_redis_eff_v2.pdf.
- 4 HUD lowers this threshold in communities with “no or very few areas in which 51 percent of the residents are low and moderate income.” For example, Nassau County block groups in 2015 qualified as LMI if at least 38.05 percent of their population, rather than 51, earn less than 80 percent of AMI. The detailed table is available in Appendix A. The most recent version of the table is available in “FY 2017 Exception Grantees,” HUD Exchange, n.d., <https://www.hudexchange.info/programs/acs-low-mod-summary-data/acs-low-mod-summary-data-exception-grantees/>
- 5 These notices are published in the Federal Register. Examples include the Gulf Coast hurricanes in 2005 (GPO 2006, 7666); the multiple disasters in 2008 (GPO 2008, 52870) and 2011 (GPO 2012, 22583); the severe storms and flooding that happened in 2010 (GPO 2010, 69097); Hurricane Sandy in 2012 (GPO 2013, 14329); and Hurricane Joaquin in 2015 (GPO 2016, 39687).
- 6 Due to a sequestration order from the president on March 1, 2013, pursuant to Section 251A of the Balanced Budget and Emergency Deficit Control Act, funding was reduced to \$15,180,000,000. The Act is available at <https://www.congress.gov/bill/114th-congress/house-bill/4512/text>.
- 7 We also had access to the FEMA Public Assistance (FEMA PA) data, which provide information on community-level recovery activities such as debris removal; emergency protective measures; and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Nonprofit (PNP) organizations. However, the geographic information accompanying this dataset has reliability issues; therefore, we decided to use the FEMA IA data because of the greater reliability and accuracy of its geographic data.
- 8 As a robustness check for both of these categories, we also considered (1) the top two quartiles, and (2) the top decile of both general and major/severe damage. The results, confirming the same general point, are provided in the following endnote.
- 9 Our robustness analysis indicates that the percentage of damaged properties located in LMI areas with concentrated damage ranges between 16 and 21, and the proportion of LMI block groups ranges between 15 and 24 percent depending on geographic scale and damage concentration:

Focus Area	Region	% LMI Block Groups
Top Two Quartiles of the Damage Distribution	All Affected Areas w/o NYC:	22.64%
	MID Counties:	23.67%
Top Decile of the Damage Distribution	All Affected Areas w/o NYC:	20.63%
	MID Counties:	21.56%
Top Two Quartiles of the Major and Severe Damage Distribution	All Affected Areas w/o NYC:	19.94%
	MID Counties:	19.73%
Top Decile of the Major and Severe Damage Distribution	All Affected Areas w/o NYC:	15.31%
	MID Counties:	15.92%

- 10 An example is the village of Babylon Carlls River Tributary project, which entails a comprehensive study of the watershed and implementation of the improvements identified. This project serves an area of over seventy block groups in Babylon, Suffolk County. In contrast, the service area for the

Municipal Complex in the town of Blenheim, Schoharie County, which houses the Fire Department, Emergency Operation Center (EOC), Town Hall, Highway Department, and an emergency shelter, in only one block group. This information is obtained from the state's Q2 2017 Quarterly Performance Report, on pp. 61 and 79, respectively,

https://stormrecovery.ny.gov/sites/default/files/crp/community/documents/Q2_2017_QPR_Sandy_NYS.pdf.

- 11 The exception thresholds are only applied when all five, ten, or twenty block groups belong in the same county. In cases where the service area consists of block groups from exception and nonexception counties, the higher threshold of 51 percent is applied. In cases where service areas consist of block groups from different exception counties, the highest of all thresholds is applied.
- 12 It should be noted that by "spatially adjacent" we refer to Census tracts with consecutive eleven-digit Federal Information Processing Standard (FIPS) codes, which in rare cases may not be immediate neighbors. The methodology entails selecting random Census tracts and then selecting the next one, two, four, or nine Census tracts that immediately follow it in the data.