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Healthier Homes, Healthier Childhoods: How Medicaid Can Address the Housing Conditions Contributing to Pediatric Asthma

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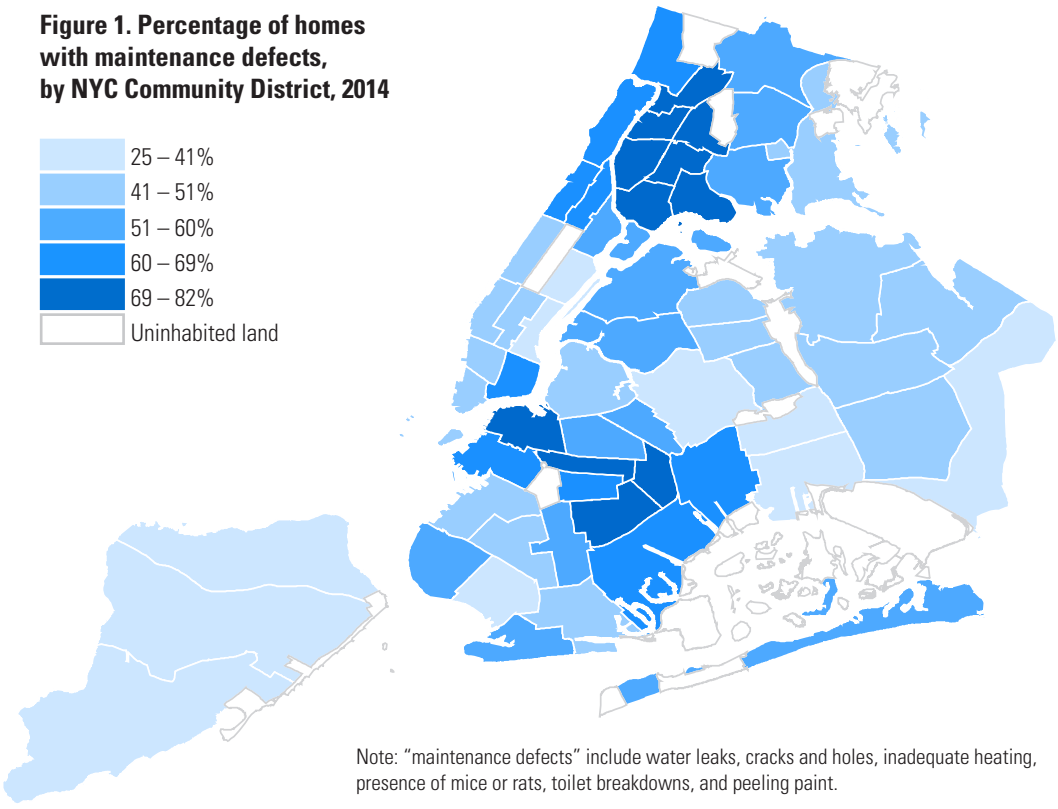
Increasingly, health policymakers and health professionals are addressing social needs and social determinants of health as a way to make tangible improvements in the health of patients and their communities. Echoing the World Health Organization, the New York State Department of Health defines social determinants of health as the conditions in which people are born, live, grow, work, and age, which can affect a wide range of health risks and outcomes.[1] The lack of stable housing, as United Hospital Fund (UHF) has shown previously, can have a powerful impact on health.[2] But the *quality* of housing has considerable health effects as well; this brief illustrates why housing quality is a high-priority social need that some Medicaid plans and providers are actively working to address.

Substandard housing affects many New Yorkers and can contribute to health problems such as pediatric asthma and other respiratory conditions. Examining indoor air quality as a key aspect of substandard housing in New York City (NYC), the brief identifies neighborhoods that Medicaid providers and health plans might target to reduce asthma-related health care utilization through housing interventions—particularly for children enrolled in Medicaid—and suggests where interventions might be most needed. The brief then explores several innovative models for designing and delivering such housing interventions—and key challenges faced by such models.

Figure 1. Percentage of homes with maintenance defects, by NYC Community District, 2014



Note: "maintenance defects" include water leaks, cracks and holes, inadequate heating, presence of mice or rats, toilet breakdowns, and peeling paint.

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MAPPING POOR INDOOR AIR QUALITY AND ASTHMA IN NYC

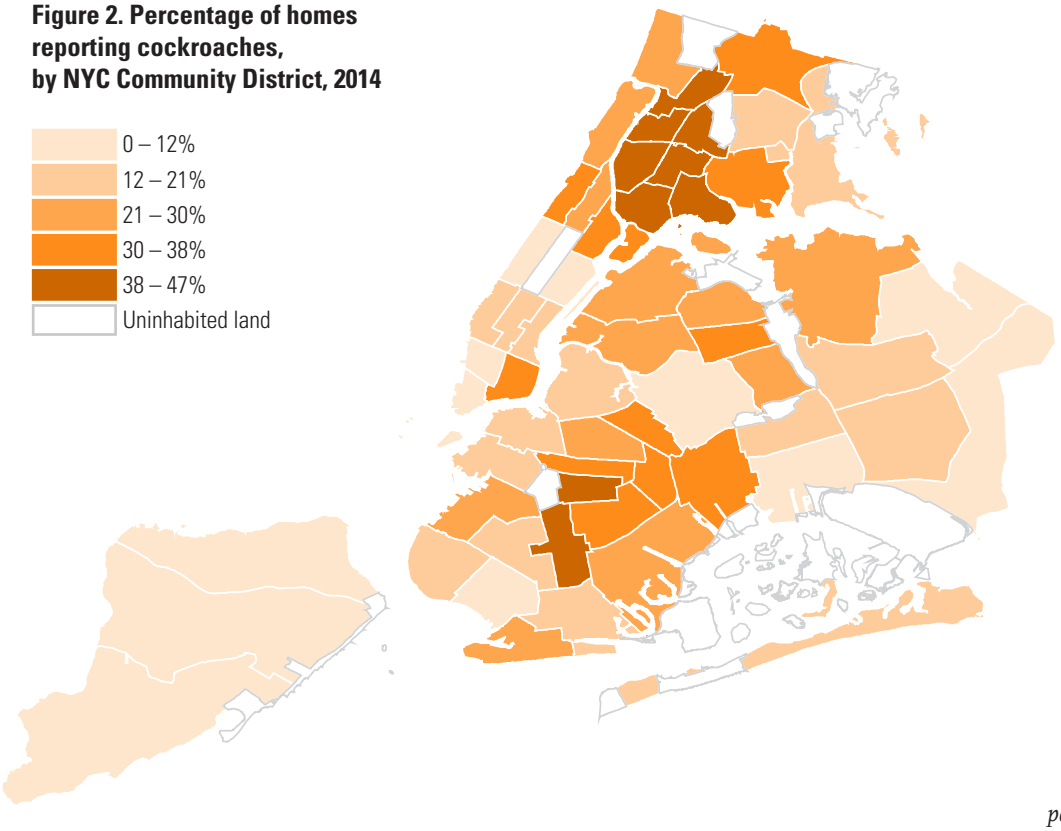
Substandard housing can reflect a wide range of factors: pest infestations, mold in homes, dilapidated structures, lead paint, a lack of sufficient heating, and more. Living in homes affected by such circumstances can contribute to negative health outcomes such as asthma and other respiratory problems, injuries, complications from lead poisoning and exposure to other toxic substances, and general anxiety about the housing itself.[3] Substandard housing is particularly problematic for New York's low-income children enrolled in Medicaid, whose families may have fewer resources to address the environmental factors endangering their physical and mental health and their long-term development.[4] Previous studies have shown that the South Bronx, Central Brooklyn, and Harlem are particularly prone to high asthma rates exacerbated by more prevalent housing deficiencies that lead to poor indoor air quality—which in turn contributes to asthma-associated emergency department (ED) use.[5]

The maps in this brief illustrate the relationship between indicators capturing potentially poor indoor air quality and pediatric asthma across New York City. The first three maps display, at the Community District level, relevant indicators derived from the 2018 New York City Community Health Profiles, including:

- the percentage of homes with maintenance defects (water leaks, cracks and holes, inadequate heating, presence of mice or rats, toilet breakdowns, or peeling paint), many of which are closely associated with indoor air problems that trigger asthma
- the percentage of homes reporting cockroaches, which can also contribute to asthma triggers
- asthma-related ED visits among all children 5–17 years old (including, but not limited to, Medicaid-enrolled children)

Although the most recent public data on maintenance defects and cockroach exposure are from 2014, research suggests that factors contributing to such housing problems are

Figure 2. Percentage of homes reporting cockroaches, by NYC Community District, 2014



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likely to persist over time (e.g., older buildings, and proximity to subways and open public spaces, which intensifies rodent presence).[6]

These maps indicate that maintenance defects are most prevalent in the Central and South Bronx, Northern Manhattan and the Lower East Side, and Downtown, Central, and Eastern Brooklyn (Figure 1). Cockroach exposure is also most prevalent in the Central and South Bronx, Northern Manhattan and the Lower East Side, and Central and Eastern Brooklyn, though more tightly clustered when compared to maintenance defects (Figure 2). Asthma-related ED visits among children are most highly concentrated in the Central and South Bronx, Northern Manhattan, and Central Brooklyn (Figure 3). See "Data Notes" at the end of this brief for more information about each indicator and methods for defining Community Districts (also referred to as "districts" below).[7]

Pediatric asthma can be aggravated by factors outside of home environments, such as outdoor air pollution or poor air quality in schools or child care settings. However, in districts where substandard housing conditions overlap with higher asthma-related ED visit rates, residential indoor air quality may play a large role in exacerbating childhood asthma. To identify such districts, citywide median percentages were calculated for the Community District-level indicators above: maintenance defects, cockroach reports, and children's asthma ED rates. In Figure 4, "hotspot" districts, where two indicators were simultaneously above citywide median thresholds—asthma ED visits for children and either maintenance defects (Figure 4a) or cockroach reports (Figure 4b)—are indicated by darker shading. (See Appendix A for indicator values per Community District.) In addition, the white circles in Figure 4 display the relative number of Medicaid enrollees per Community District, showing how districts with both high rates of asthma-related ED use and either maintenance defects or cockroach exposure overlap with larger Medicaid populations.

Figure 3. Asthma-related ED visits per 10,000 children age 5-17, by NYC Community District, 2015

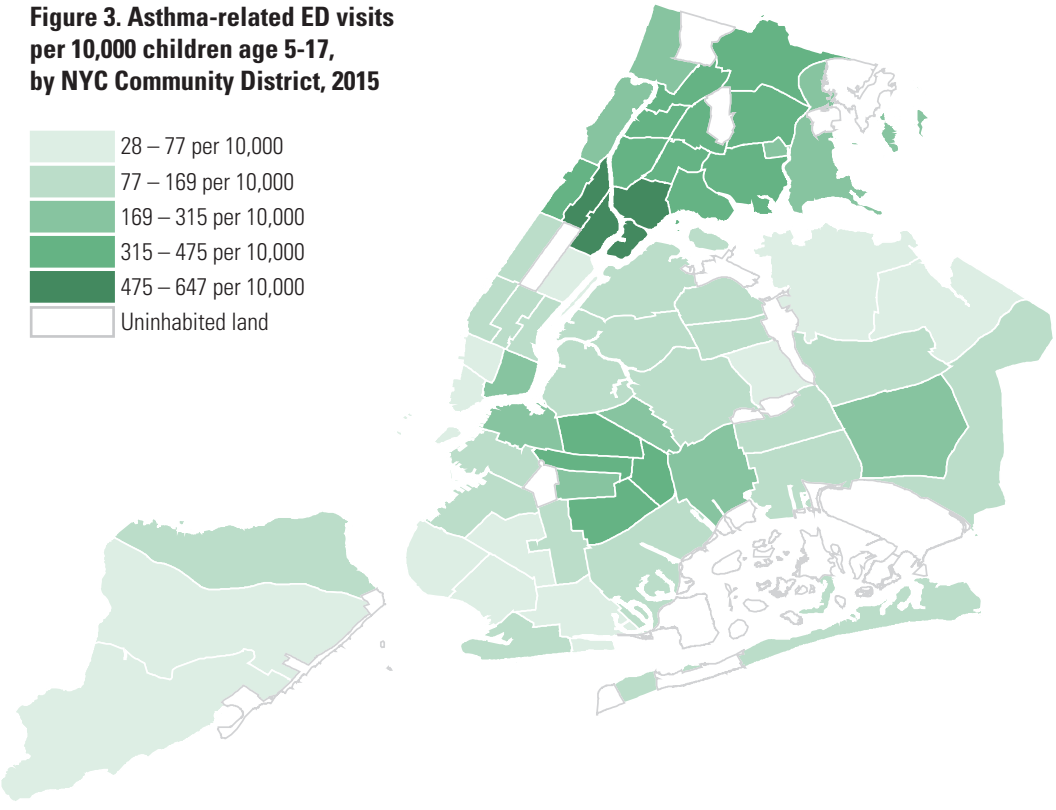

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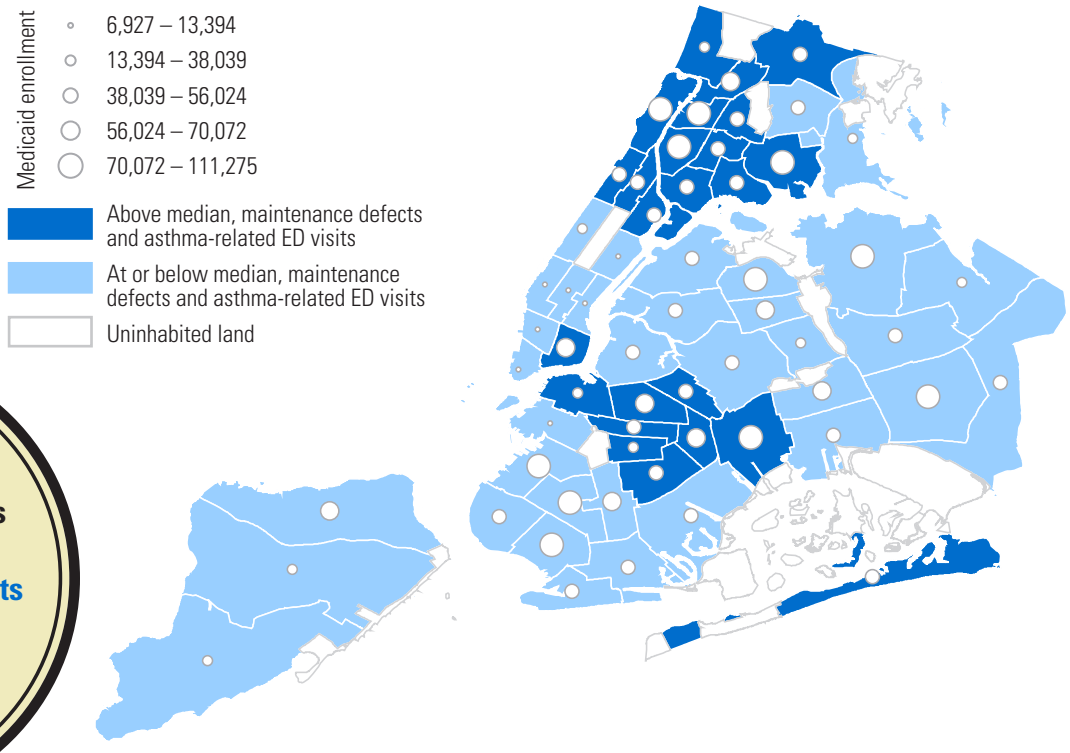
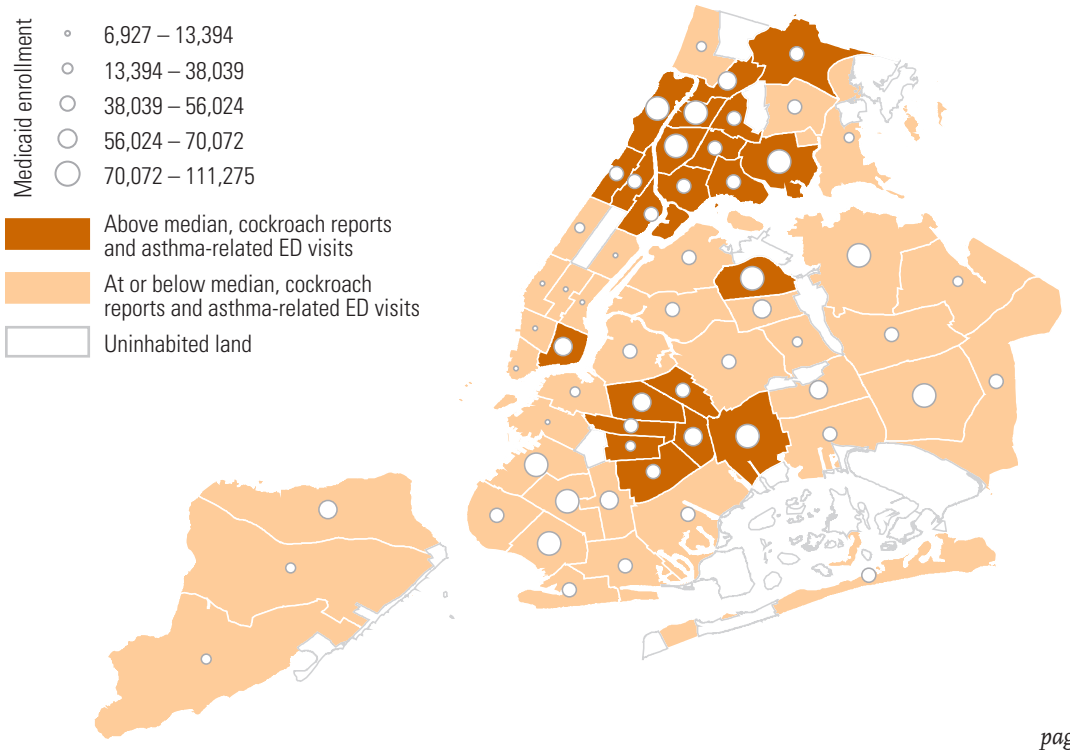
Figure 4a. Community Districts with both maintenance defects and asthma-related ED visits for children above citywide median values (dark blue), versus Medicaid enrollment (white circles)



Community Districts with above-average **asthma-related ED visits** *and* above-average **home maintenance defects** or **cockroach reporting** generally have **larger Medicaid populations**.

Figure 4b. Community Districts with both cockroach reports and asthma-related ED visits for children above citywide median values (dark orange), versus Medicaid enrollment (white circles)



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These hotspots reveal several noteworthy patterns. Certain areas in the Bronx, Central and Eastern Brooklyn, and Northern Manhattan have consistent and clustered districts with overlapping indicators of poor indoor air quality (maintenance defects or cockroaches) and high rates of children's asthma ED visits. In contrast, Queens and Lower Manhattan have more isolated districts with similarly overlapping indoor air quality factors and children's asthma ED visits. Generally speaking, most of the hotspot neighborhoods with potentially poorer indoor air quality and higher rates of children's asthma ED visits also have larger numbers of Medicaid enrollees, suggesting that these may be high-priority areas for Medicaid to improve asthma management by addressing triggers in home environments.

Although more precise data are not available for the indoor air quality indicators used to identify these hotspots, asthma prevalence data are available for smaller NYC areas, like Neighborhood Tabulation Areas (NTAs, also referred to as "neighborhoods" below). These data reveal important variation within these Community District hotspots—as well as potential pockets of concern outside of highlighted districts. Figure 5 displays NTA-level data from the NYC Neighborhood Health Atlas, showing the rate of asthma diagnoses per 100,000 children age 2–17 enrolled in Medicaid. NTAs displayed in color indicate which neighborhoods were located within the Community District hotspots identified in Figure 4.[8] (Appendix B reports specific NTA-level data.)

The NTA data reveal that neighborhoods like Hunts Point and Longwood (Bronx) and East Harlem South (Manhattan) have some of the highest rates of asthma diagnoses among Medicaid children. As Figure 5 reveals, these NTAs are located in the same Community District hotspots shown above, with higher rates of both residential maintenance defects and asthma ED visits among all children—suggesting that such housing deficiencies may contribute to more prevalent asthma diagnoses among Medicaid-enrolled children in these neighborhoods. Many of these NTAs with high Medicaid rates of pediatric asthma diagnoses are also located in the Community District hotspots of overlapping cockroach exposure and children's asthma ED visits, suggesting that residential pest problems may also contribute to increased asthma prevalence in these neighborhoods.

It should be noted, however, that some NTAs with high Medicaid rates of pediatric asthma diagnoses lie outside the Community District hotspots identified above, such as Seagate-Coney Island in Brooklyn. In some of these cases, the more precise NTA data may be revealing pockets of higher asthma prevalence—potentially exacerbated by poor housing conditions within those pockets—that are otherwise concealed within the Community District data summarizing housing conditions and asthma-related ED use across larger geographies. In other cases, these outlier NTAs may primarily result from factors other than indoor air quality that potentially contribute to pediatric asthma, such as outdoor air pollution, environmental tobacco smoke, psychological stress, preterm birth, or other prenatal and childhood risk factors.[9,10]

These data are suggestive but have some limitations. For example, Figures 4 and 5 do not account for other factors that may be associated with childhood asthma, as noted above. Further, the indoor air quality indicators UHF worked with (maintenance defects and cockroach exposure) and children's asthma ED visit rates are only limited proxies for measuring indoor air quality and its potential impacts on health outcomes. Finally, as noted above: because the Community Districts encompass geographically and demographically large units of New York City, some hotspot districts may contain smaller neighborhoods with substantially better indoor air quality or lower rates of children's asthma ED visits. Similarly, some Community Districts not flagged as hotspots may contain pockets of poorer indoor air quality or higher rates of children's asthma ED visits.

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Many neighborhoods with **high pediatric asthma rates** among Medicaid-enrolled children are in districts with overlapping high levels of asthma-related ED visits for all children and **housing maintenance defects** or **cockroach reports**.

Figure 5a. Neighborhood prevalence of asthma among Medicaid children, within Community District hotspots of asthma-related ED use and housing maintenance defects

Asthma Diagnoses per 100,000 Medicaid Children (2–17 Years) within Neighborhood Tabulation Areas (NTAs)

- 2.6 – 8.2
- 8.2 – 11.0
- 11.0 – 13.9
- 13.9 – 17.4
- 17.4 – 24.7

Blue shading of NTAs indicates overlap with NYC Community District hotspots that have above-citywide-median values for maintenance defects and asthma-related ED visits for children (from Figure 4a).

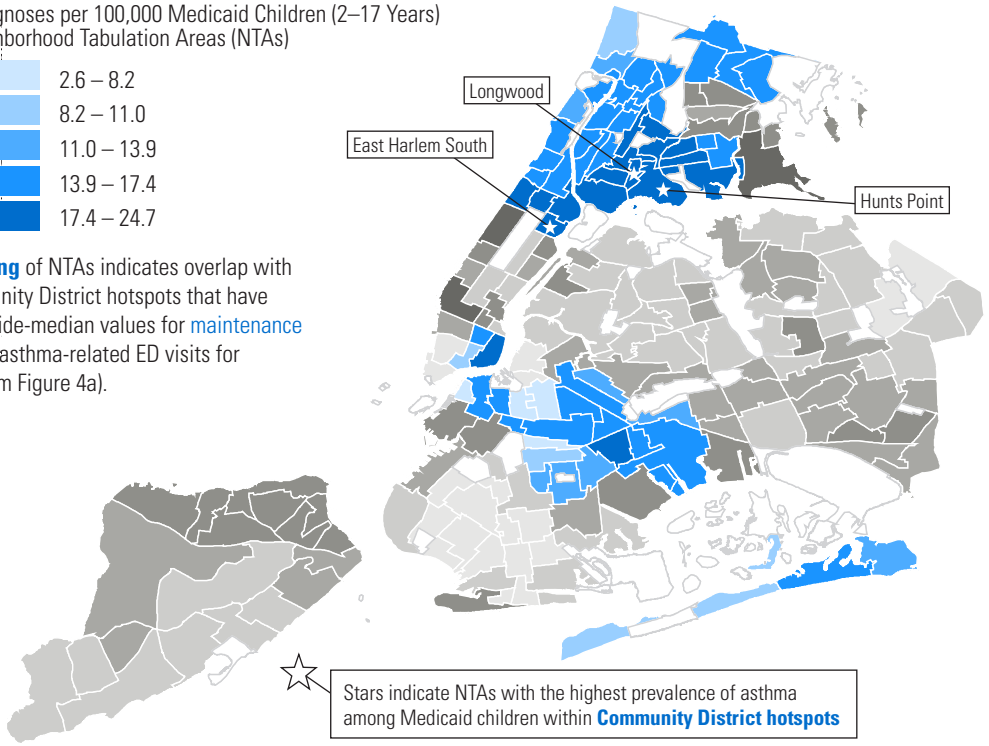
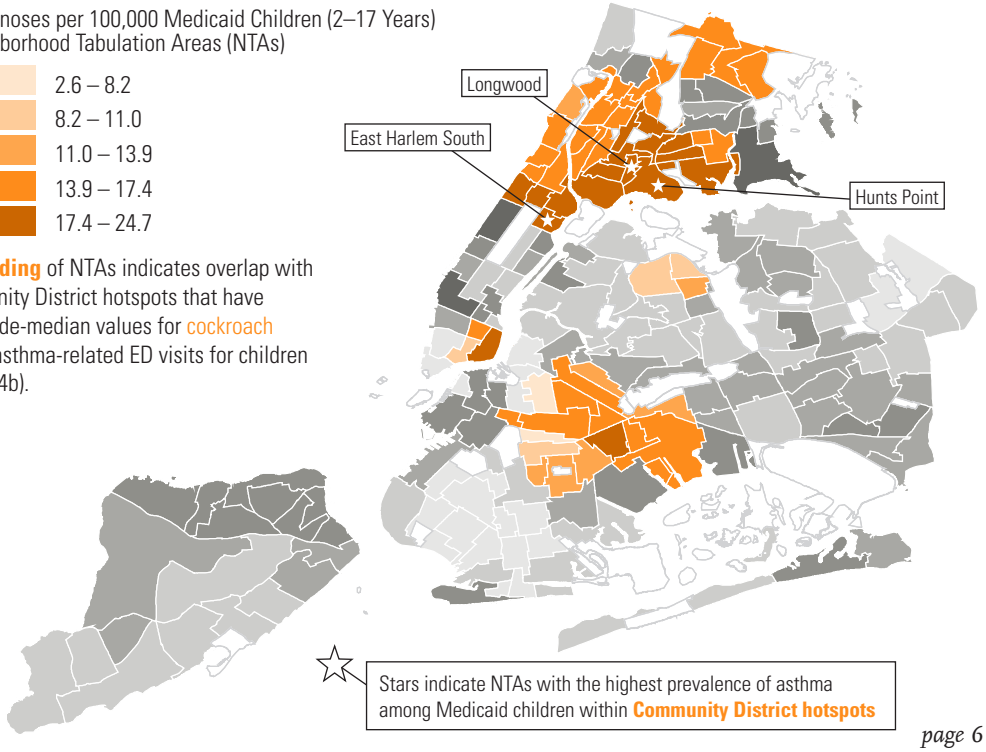


Figure 5b. Neighborhood prevalence of asthma among Medicaid children, within Community District hotspots of asthma-related ED use and cockroach reports

Asthma Diagnoses per 100,000 Medicaid Children (2–17 Years) within Neighborhood Tabulation Areas (NTAs)

- 2.6 – 8.2
- 8.2 – 11.0
- 11.0 – 13.9
- 13.9 – 17.4
- 17.4 – 24.7

Orange shading of NTAs indicates overlap with NYC Community District hotspots that have above-citywide-median values for cockroach reports and asthma-related ED visits for children (from Figure 4b).



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MEDICAID STRATEGIES FOR ADDRESSING HOUSING CONDITIONS CONTRIBUTING TO ASTHMA

The maps in Figures 4 and 5 identify New York City neighborhoods with high degrees of overlap between proxy measures of poor indoor air quality, children's asthma-related ED use, and Medicaid pediatric asthma diagnoses. In these communities, opportunities may exist for Medicaid providers and health plans to address the underlying housing conditions that may be driving asthma-related health care utilization, through targeting clusters of individual cases or delivery of place-based, community-wide interventions. New York Medicaid's value-based payment (VBP) initiative may support such efforts. For instance, the State's VBP Roadmap requires that VBP contractors (Level 2 or higher) implement at least one social determinants of health intervention; this could include housing quality-related services such as home environmental assessments, mold abatement, or pest management.[11,12] In a VBP context, these interventions may also offer compelling returns on investment because of their potential to generate net shared savings for VBP contractors and managed care organizations (MCOs) by reducing costly ED visits and hospitalizations for pediatric asthma.

The following New York models and pilot programs provide several potentially promising strategies for tackling the underlying housing conditions contributing to pediatric asthma. These few examples were selected to illustrate the diversity of possible approaches that exists within the larger array of promising strategies across the state.

Investing in a nonclinical workforce to provide home-based asthma services. Supported by New York's Delivery System Reform Incentive Payment (DSRIP) program, the NYC Health + Hospitals-sponsored performing provider system (PPS), OneCity Health, partnered with AIRnyc and seven other community-based organizations (CBOs) to implement a home visitation program for children with asthma. Under this initiative, community health workers (CHWs) are integrated into Health + Hospitals care teams, which leverage the CHWs' existing foundation of expertise; for example, AIRnyc provides CHWs with intensive training in areas such as motivational interviewing, medication adherence, and linking families to community resources. OneCity Health ensures all CHWs participating in the initiative have received standardized training in asthma basics, home environment assessments, and general CHW practices. Children receiving clinical treatment for asthma are then referred to these CHWs, who conduct home visits to support children's treatment plans by educating children and families about asthma management, performing home assessments for asthma triggers, and arranging integrated pest management visits for remediation of identified triggers.

The partnering CBOs' unique capacities have enhanced these activities in important ways. For example, AIRnyc's expertise in asthma management and data analytics helped them develop—in partnership with OneCity Health and MCOs such as Healthfirst and MetroPlus—new strategies for using managed care data to target at-risk families outside of primary care referrals, such as identifying children with asthma-related ED visits or inpatient admissions. AIRnyc also combined these capacities with community outreach expertise and staffing flexibility to develop new methods for engaging patients and clinical providers prior to home visitations, by placing CHWs within clinical sites. OneCity Health reports that, since full implementation, this program has been associated with marked decreases in pediatric hospital admissions for asthma.[13,14]

Partnering with community-based organizations on a place-based, population-oriented strategy. As a part of its DSRIP activities, the Bronx Partners for Healthy Communities (BPHC) PPS has expanded from a home-based asthma management strategy solely targeting patients in their own homes, to a multifaceted strategy tackling asthma drivers at the building- and community-level. Through DSRIP Innovation Funds, BPHC has supported the Northwest

Bronx Community and Clergy Coalition (NWBCCC) "Healthy Buildings" program, which deploys teams of community organizers to private and New York City Housing Authority (NYCHA) buildings identified as asthma hotspots by housing and hospital admissions data. In turn, these teams lead community organizing aimed at improving building infrastructure and provide asthma-related group education—referring individuals, when necessary, to home visits conducted by CHWs from AIRnyc, or to integrated pest management. Home-based services, while still a component of these activities, are reserved for patients with severe asthma, or those specifically requesting in-home services. This suite of approaches has begun to yield positive outcomes, such as reduced hospitalizations in three NWBCCC-partnering buildings and successful advocacy for $3 million in roof repairs at NYCHA's Bailey Houses.[15,16] The PPS reports that it plans to expand NWBCCC's work into eight additional buildings, totaling over 1,000 apartment units, in the project's second year.

BPHC's strategy also involves new modes for reaching patients, including subpopulations beyond children and parents. For example, BPHC has trained home care attendants in seven home care agencies to identify long-term care recipients with asthma who may need referrals to home visits, home-based education, or integrated pest management. They have also leveraged pharmacy delivery health workers to educate patients on asthma medication use upon delivery.

Tailoring practices to available reimbursement under Medicaid Managed Care. Health plans have also explored strategies for addressing the underlying housing conditions contributing to asthma. YourCare Health Plan (operated in Western New York by Monroe Plan for Medical Care) has implemented a pediatric asthma management strategy using teams of nursing and nonlicensed outreach workers to target patients with moderate to severe asthma, providing them with asthma management education and clinical follow-up, home assessments of asthma triggers, and discussion of trigger mitigation strategies.[17] However, because Medicaid does not directly reimburse MCOs for home remediation services, and only reimburses for home assessment in certain instances (discussed in "Potential Challenges," below), YourCare explored a social impact financing model through which private investors funded home-based asthma interventions for children, in partnership with the national Green & Healthy Homes Initiative.[18,19] Finding that this model lacked a sustainable funding mechanism and presented challenges with sufficient returns on investment, YourCare has since shifted to alternative strategies, such as providing Medicaid-reimbursable asthma education services through primary care providers and telehealth, and leveraging partnerships with local governments' housing remediation programs.

Addressing asthma through a comprehensive healthy housing strategy. The New York State Department of Health has partnered with the New York State Energy Research and Development Authority (NYSERDA) to pursue a Healthy Homes VBP Pilot, which addresses the impacts of asthma-related illnesses, home energy performance, and unintentional household injury among children and their families. Beginning in 2019, the program will work with Medicaid MCOs and health care providers partnering under VBP arrangements to target and refer Medicaid members age 0–17 with persistent and uncontrolled asthma for residential healthy homes interventions. These interventions will combine asthma management education and asthma trigger reduction services (such as in-home self-management education, mold remediation, and integrated pest management) with other home improvements (home energy efficiency, weatherization, and safety improvements). For the pilot, NYSERDA funding will support a range of asthma trigger reduction services and other home improvements delivered to approximately 500 Medicaid member homes in regions with a high asthma burden. The pilot aims to provide a validated model for Medicaid

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VBP arrangements that address substandard housing as a social determinant of health by assessing potential impacts on asthma-related quality metrics and on savings from reducing ED visits and hospitalizations.[20,21,22]

POTENTIAL CHALLENGES

Despite the promising models described above, several challenges may exist for Medicaid providers and plans wishing to improve asthma outcomes through a focus on healthier housing. These include legal restrictions, financial constraints, and a range of operational concerns.

Working within federal restrictions on financing nonclinical services. State Medicaid programs face some constraints on federal reimbursement for home improvements that can alleviate asthma triggers. Federal law generally prohibits reimbursement of state Medicaid spending on housing in community settings, which includes room and board as well as other "property-related costs" such as maintenance and utilities.[23,24] Direct federal Medicaid reimbursement for services such as pest management and home remediation is typically only available under Medicaid waivers.[25,26] Although New York provides DSRIP funds for such services under its current section 1115 waiver, new opportunities for Medicaid funding flexibility may need to be identified following the current DSRIP program's anticipated conclusion in 2020—including flexibility provided by a potential extension of DSRIP under a new waiver, as discussed below. Opportunities for leveraging non-Medicaid funds, such as the Healthy Homes VBP Pilot, may offer other opportunities to finance nonclinical services.

Securing long-term funding and flexibility to support housing-focused asthma interventions. As noted above, New York's current DSRIP program has used federal Medicaid funding flexibility to support an array of initiatives that address housing quality's effects on asthma, such as home-based asthma services built upon CHW models. This flexibility has supported the efforts at OneCity Health and BPHC, as well as asthma management initiatives at Suffolk Care Collaborative and other PPSs.[27] As of this writing, New York is pursuing federal approval to extend DSRIP until March 2024, with continuing opportunities to support nonclinical workforces for chronic disease management and efforts to address social determinants of health through community partnerships.[28] However, if the program is not extended beyond its current March 2020 end date, New York may need to pursue alternative strategies to pay for housing-based asthma interventions. Although New York's VBP initiative may provide opportunities for sustaining some efforts—by encouraging, for instance, provider and MCO investments in asthma interventions that reduce higher-cost utilization and yield shared savings—other strategies may become necessary. For example, New York could explore the opportunities afforded by the 2014 federal rule allowing Medicaid to pay for preventive health services provided in nonclinical settings by professionals outside of the State's clinical licensure program—such as community health workers, certified asthma educators, and healthy homes specialists—if those services are initially recommended by a physician or other licensed health professional.[29] There may also be opportunities for Medicaid reimbursement of home environmental assessments identifying asthma triggers, when the service is provided within a home skilled nursing visit for children with uncontrolled asthma and deemed medically necessary.[30]

Identifying a financially optimal approach for MCOs. Another strategy for financing housing-focused asthma interventions builds on Medicaid MCOs' flexibility to cover services beyond those covered in fee-for-service Medicaid.[31] However, the financial calculus of investing in such asthma interventions can be potentially complex for MCOs. For instance, under federal regulations, home remediation services (which are not covered by New York's Medicaid State Plan) are considered to be "value-added services," which cannot be included in the MCO capitation rates used to

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compensate MCOs for health care services covered by the State Plan.[32,33] Thus, these value-added services must yield other financial benefits for the MCO, such as savings from reducing higher-cost asthma hospitalizations or revenue from incentive payments tied to State quality goals. Although some evidence-based, housing-focused asthma intervention models have demonstrated at least modest returns on investment, any savings or revenue must offset both program expenditures (e.g., hiring and training staff) and any increases in primary care and medication costs associated with engaging more children in appropriate outpatient care.[34] Without sufficient returns on investment or new funding mechanisms, MCOs may choose to pursue strategies that achieve similar quality goals but have more direct and established paths toward compensation, such as broadened medication management or asthma education initiatives and assessments provided in clinical or home settings.

Tailoring program implementation to family and community needs. Separate from these financial hurdles, asthma home visitation programs may also face operational challenges with engaging families or resolving home- or building-wide asthma triggers. It can be difficult to accommodate families' school and work schedules—especially in low-income communities, where individuals may have less flexible, predictable, or conventional working hours. Home visitor staff may also have difficulty adequately addressing linguistic and cultural differences, or establishing enough trust for residents to let them enter their homes for assessment or education sessions. Moreover, in some instances, indoor air quality problems (e.g., pests or mold from a leaking roof) may occur systemically throughout an apartment building, rather than solely in an individual's unit—a scenario being addressed by the larger-scale, cross-sector collaboration exemplified by BPHC PPS and NWBCCC, as described above. Finally, families who are unstably housed in shelters, or in apartments shared with other families, may be less able or willing to complete home visitations or environmental modifications because they have less control over their living spaces. If home-based programs are to successfully prevent asthma exacerbation and contribute to more appropriate health care utilization for children with asthma, they must be tailored to family and community needs such as these.[35,36,37,38]

Fostering partnerships that effectively integrate community-based organizations within housing-focused asthma initiatives. CBO partnerships are important components within New York Medicaid's shift to VBP—and, as the innovative models described above demonstrate, CBOs can be key partners in delivering housing-focused asthma services that meet family and community needs. Yet it can be challenging to fully integrate CBOs within such initiatives. For example, establishing timely and effective data sharing between CBOs and partners like health care providers or MCOs may be difficult.[39] Some CBOs may not initially have sufficient internal capacity to meet partners' data privacy and security requirements. Even CBOs with more sophisticated data-driven operations may face interoperability challenges with clinical partners' information systems that impede optimal staff deployment and patient follow-up. In turn, insufficient data sharing and lack of alignment between separate CBO-, provider-, and MCO-driven care coordination efforts may also create duplicative or inconsistent processes for tracking at-risk families over time and coordinating asthma-focused interventions with other health or social services.[40] Beyond these kinds of operational challenges, integrating CBOs requires partnering organizations to overcome more general challenges, such as building trust, maintaining open communications, and developing financial contracts that fairly acknowledge the CBO's value.[41,42]

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CONCLUSION

Many opportunities exist across New York City for Medicaid to help address and ameliorate the substandard housing conditions that contribute to pediatric asthma. The innovative strategies described above represent only a small handful of the potential models for improving such housing conditions. Although these and other possible strategies face challenges—such as sustainable funding and alignment with family and community needs—New York Medicaid's value-based payment reforms and other initiatives may provide new opportunities for plans, providers, and community-based organizations to cultivate financially sustainable, community-tailored initiatives that address the underlying housing drivers of asthma. Such efforts could help New York's Medicaid program advance its goal of reducing avoidable hospitalizations while, more broadly, improving housing and health for children in New York City and across the rest of the state.

ACKNOWLEDGMENTS

The authors wish to thank the individuals and organizations who provided information on the promising strategies and challenges highlighted in the report, and who are working to address the drivers of pediatric asthma across New York State, including: OneCity Health PPS, AIRnyc, Bronx Partners for Healthy Communities PPS, Northwest Bronx Community and Clergy Coalition, YourCare Health Plan, New York State Department of Health, and New York State Energy Research and Development Authority.

DATA NOTES

New York City Community Health Profiles (2018) Indicators. These data show, at the NYC Community-District level:

- the percentage of renter-occupied homes reporting maintenance defects like water leaks, cracks and holes, inadequate heating, presence of mice or rats, toilet breakdowns, or peeling paint, which UHF derived by inverting the original source indicator that provides the percentage of renter-occupied homes reporting no such maintenance defects (New York Housing and Vacancy Survey, 2014)
- the percentage of homes that reported seeing at least one cockroach daily over the last month (New York Housing and Vacancy Survey, 2014)
- the rate of asthma-related ED visits per 10,000 children age 5–17 (New York State Department of Health SPARCS, 2015)

For indicators in the NYC Community Health Profiles sourced from the Housing Vacancy Survey (i.e., maintenance defects and cockroaches), data were available at a "sub-borough" level, meaning that four pairs of Community Districts were combined to protect the confidentiality of survey respondents. (These pairs are the Financial District and Greenwich Village/SoHo in Manhattan, Clinton/Chelsea and Midtown in Manhattan, Mott Haven/Melrose and Hunts Point/Longwood in the Bronx, and Morrisania/Crotona and Belmont/East Tremont in the Bronx.) For these four areas, the same estimate was applied to both Community Districts making up the sub-borough area. See the technical notes in the NYC Community Health Profiles public use dataset for more information: https://www1.nyc.gov/site/doh/data/data-publications/profiles.page

NYC Neighborhood Health Atlas Indicators. These data show, at the NYC Neighborhood Tabulation Area (NTA) level:

- Medicaid enrollment (Salient New York State Enterprise System, continuously enrolled for 11 months or more in 2015)
- the rate of asthma diagnosis per 100,000 children age 2–17 enrolled in Medicaid (Salient New York State Enterprise System, continuously enrolled for 11 months or more in 2015)

Medicaid enrollment shown at the Community District (CD) level was estimated by UHF, first by multiplying the percent of the population enrolled in Medicaid by the total NTA population, then by summing NTA-level Medicaid enrollment into larger Public Use Microdata Areas (PUMAs). Medicaid enrollment was then translated directly to the Community District, except for four PUMAs with multiple CDs within their bounds; in these cases, enrollment was distributed evenly across each CD within the PUMA: PUMA 3710 was distributed evenly between CD 1 and 2, PUMA 3705 between CD 3 and 6, PUMA 3810 between CD 1 and 2, and PUMA 3807 between CD 4 and 5. For information on the relationship between NTAs, CDs and PUMAs, see "Tools and Geographic References" from the New York City Department of City Planning: https://www1.nyc.gov/site/planning/data-maps/nyc-population/geographic-reference.page

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ENDNOTES

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7 Local law established New York City's 59 Community Districts (CDs) across the city in 1975. The CDs correspond to New York City (NYC) Community Boards, which are local representative bodies.

8 Because Neighborhood Tabulation Areas (NTAs) and Community Districts have different geographic boundaries that are not perfectly overlapping, NTAs were determined to be located within a Community District if the geometric center (i.e., centroid) of the NTA was located within that Community District.

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23 Direct federal Medicaid reimbursement for housing is generally limited to housing provided through institutional services, such as nursing home stays, and certain other housing-related services focused on transition services, housing and tenancy sustaining services, and housing-related planning and coordination.

24 "Room means hotel or shelter type expenses including all property related costs such as rental or purchase of real estate and furnishings, maintenance, utilities, and related administrative services." Centers for Medicare & Medicaid Services. 2012. *State Medicaid Manual*, section 4442.3.B.12. https://www.cms.gov/regulations-and-guidance/guidance/manuals/paper-based-manuals-items/cms021927.html

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26 Medicaid and CHIP Payment and Access Commission. October 2018. *Medicaid's Role in Housing*. https://www.macpac.gov/wp-content/uploads/2018/10/Medicaid%E2%80%99s-Role-in-Housing.pdf

27 Suffolk Care Collaborative's Promoting Asthma Self-Management Program involves home visits by trained community health workers (CHWs) from the existing Pediatrics Keeping Family Healthy program at Stony Brook University Hospital. The CHWs provide children and young adults with coaching on self-monitoring and self-management of asthma symptoms, education on proper asthma medication use, and periodic follow-up, particularly after ED or hospital visits. Most relevant to housing conditions, the CHWs also provide, coordinate, or link the client to resources for evidence-based trigger reduction interventions.

For more information, see: Suffolk Care Collaborative PPS. November 2015. *Promoting asthma self-management program (PASP): 3.d.ii expansion of asthma home-based self-management program, project charter*. https://suffolkcare.org/pubfiles/SCC%20PASP%20Project%20Charter-%20FINAL%20DRAFT_0.pdf

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30 Information provided by correspondence with the New York State Department of Health indicates that the State's Medicaid managed care Model Contract permits Certified Home Health Agencies (CHHAs) to provide, within reimbursable home skilled nursing visits, home environmental assessments for identification of asthma triggers and related asthma education when such home health services are determined to be medically necessary.

In addition, the Department of Health has indicated that home environmental assessments for asthma triggers may be provided to children within Medicaid fee-for-service home skilled nursing visits, when determined to be medically necessary, via New York Medicaid State Plan home health services for children under 21 (and as included within Early and Periodic Screening, Diagnostic, and Treatment services).

For descriptions of New York's Medicaid coverage in these areas, see:

New York State Department of Health. October 2015. *Medicaid Managed Care/Family Health Plus/HIV Special Needs Plan/ Health and Recovery Plan Model Contract*. https://www.health.ny.gov/health_care/managed_care/docs/medicaid_managed_care_fhp_hiv-snp_model_contract.pdf

New York State Department of Health. *State Plan Under Title XIX of the Social Security Act Medical Assistance Program*. https://www.hcrapools.org/medicaid_state_plan/DOH_PDF_PROD/nys_medicaid_state_plan.pdf

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33 National Center for Healthy Housing and Milken Institute School of Public Health, George Washington University. March 2016. *Case studies in healthcare financing of healthy homes services: Medicaid reimbursement for home-based asthma services in New York*. http://nchh.org/resource-library/case-study_healthcare-financing-of-hh-services_asthma_ny.pdf

34 Importantly, "value-added services" can be included in a plan's medical loss ratio numerator as a service that improves health care quality, allowing MCOs to avoid financial penalties for excessive administrative expenditures.

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