Citywide Diabetes Reduction Plan

*New York City Department of Health and Mental Hygiene
(NYC Health Department)*

April 10, 2024

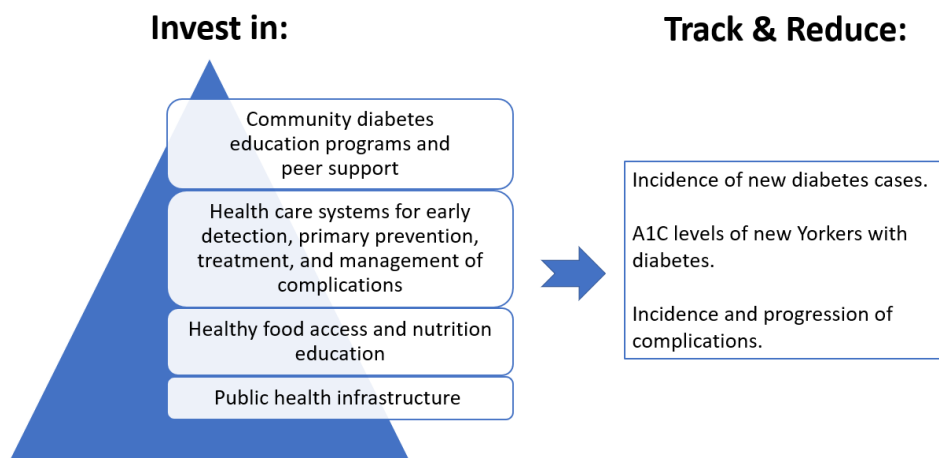**NYC**
Health

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The Ongoing Public Health Toll of the Diabetes Epidemic

Diabetes is a chronic disease that has become epidemic in New York City (NYC). Its prevalence has increased over the past 10 years leading to significant social, psychological, physical, and financial hardship New Yorkers, from vision loss and blindness, kidney and nerve damage, heart disease, stroke, and lower limb amputation.[1,2,3] Similar to other chronic disease such as hypertension, diabetes is largely preventable. Evidence shows that participation in a comprehensive lifestyle intervention can reduce the risk for type 2 diabetes in persons who are at increased risk.[4,5] Likewise, it has been demonstrated that the onset of diabetes-related complications can be prevented or delayed through optimal management of blood glucose levels achieved through medication adherence and adoption of healthy lifestyle behaviors [6].

As of 2020, an estimated 773,000 New Yorkers reported having diabetes (12%). Of the nearly 590,000 New Yorkers with diabetes who had an A1C test reported to the NYC A1C Registry in 2021, close to one in six had an A1C greater than 9% as of their latest test *(Appendix C, Table 3)*. Data reported previously by the NYC Health Department underscore the disproportionate burden that diabetes and related complications create for communities of color in NYC and communities experiencing high poverty. The structural and social drivers of health – systemic racism, poverty, housing instability, nutrition access, built environment – have been significantly associated with premature mortality, and racial inequities.[7]

As the NYC Health Department-convened working group articulated in *The Fierce Urgency of Now* report,[8] the diabetes epidemic requires urgent actions in the following domains:

Invest in: **Track & Reduce:**

Community diabetes education programs and peer support

Health care systems for early detection, primary prevention, treatment, and management of complications

Healthy food access and nutrition education

Public health infrastructure

Incidence of new diabetes cases.

A1C levels of new Yorkers with diabetes.

Incidence and progression of complications.

As required by Local Law 221 of 2019, the NYC Health Department produced data on diabetes and diabetes-related health problems during 2018-2020. These data have been disaggregated by geographic area and demographic characteristics. These data tables, and a description of data sources are included as appendixes for reference.

High A1C levels increase the risk of diabetes-related complications.[9] Across NYC, inequities in the burden of high A1C are persistent by race, ethnicity, geography, and neighborhood poverty (see map). By 2021, there was a very wide range in the prevalence of A1C greater than 9% by United Hospital Fund neighborhood, with Hunts Point-Mott Haven having a prevalence of 20.7% compared to Greenwich Village-Soho with a prevalence of 8.5%, well over a two-fold difference *(Appendix D, Table 4)*. Amongst those residing in ZIP codes with a high proportion (30% or greater) of the population living below the federal poverty level, one in five adults with diabetes had an A1C greater than 9%, versus one in eight adults with diabetes residing in ZIP codes with the lowest proportion living below the federal poverty level (10% or less).

Prevalence of diabetes by United Hospital Fund neighborhood New York City, 2019 - 2020

Prevalence Rate
(Age-adjusted / 100,000)
1.9 - 6.8
>6.8 - 11.5
>11.5 - 14.2
>14.2 - 22.3
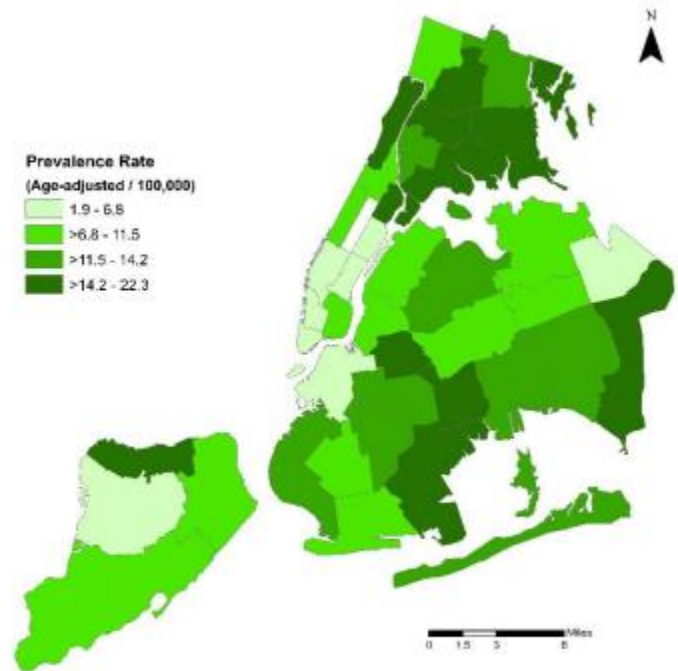
Data source: Community Health Survey, NYC DOHMH, 2019 - 2020

End-stage renal disease (ESRD) is a devastating complication of diabetes requiring dialysis or transplant. As of 2018, 13 out of every 1,000 adult New Yorkers with diabetes had ESRD (*Appendix B, table 2*), with the number of Black New Yorkers afflicted more than double that of white, non-Latinx New Yorkers (3,608 versus 1,605). Lower-extremity amputation is another complication of diabetes that has significant negative impact on those affected[10]. Stark disparities have been similarly observed in this outcome, with the age-adjusted rate per 100,000 adults in 2016 being three-fold higher in neighborhoods with the highest proportion of residents living below the federal poverty limit versus neighborhoods with the lowest proportion (76.5 versus 22.5). A wide range is also seen at the borough level, with the Bronx having two times the rate of lower-extremity amputation per 100,000 adults compared to Queens with the lowest rate (75.2 versus 34.0) *(Appendix E, Table 5)*.

We also wanted to note that COVID-19 amplified the toll of diabetes. Across the United States, including in NYC, COVID-19 bore a disproportionate impact on people living with diabetes. People living with diabetes were at an increased risk of severe disease and dying from COVID-19[11]. Poor health outcomes were higher among those with higher blood sugar. This unacceptable reality is further reason why diabetes and other chronic diseases are a priority for the Department under *HealthyNYC*.

The NYC Health Department has leveraged data, scientific evidence, and lived experiences to articulate its citywide diabetes reduction plan.

The Role of the NYC Health Department in Addressing Diabetes Inequities

The NYC Health Department is a convener and strategic advisor for NYC, an implementor of initiatives both upstream and downstream, both place-based and citywide, and a conductor, analyzer, and reporter of surveillance in addressing diabetes inequities. As a strategic advisor, the NYC Health Department is working with other city agencies and Mayoral offices to implement upstream approaches to change the trajectory of diabetes outcomes in NYC. HealthyNYC outlines the City's vision for concerted, collaborative action on diabetes and other drivers of premature mortality and improved life expectancy. Cross-sectoral action is necessary to shift the environments in which New Yorkers live, work, play, and gather while improving disease management and linking people to the right interventions sooner. Such action requires collaboration and alignment across public and private sectors and new ways of working across City agencies.

Aligned to the broader HealthyNYC and Citywide chronic disease planning efforts[12] the NYC Health Department takes collaborative and collective action to address:

1) **Material needs** by increasing access to financial supports, food resources, health care prevention and treatment, social support services, and addressing structural inequities that affect access to care, uptake and quality;
2) **Commercial determinants of health** by reducing exposure to unhealthy products that most increase chronic disease risks such as tobacco, fast foods, and alcohol, as well as high prices of healthcare, and low accountability of non-profit healthcare organizations to provide meaningful public benefit to low income, Black, Indigenous, and people of color, and uninsured New Yorkers; and
3) **Opportunities for healthy living** by making it easier for New Yorkers to be physically active, eat well, and access tailored information about health and community health resources.

In the fall of 2023, the NYC Health Department along with the Mayor's Office of Food Policy, launched a Task Force to reduce chronic disease as part of the HealthyNYC initiative to improve life expectancy in NYC. Staff from a wide range of City agencies came together through a series of workgroup meetings focused on three domains (material needs, commercial determinants of health, and opportunities for healthy living) and developed proposals for how to address chronic disease. The plan developed by this Task Force will be released in 2024.

Investments in diabetes, like any public health issue, come from city, state, federal, and private sources. To address health inequities, the NYC Health Department will track both public health measures and investments that specifically address diabetes-related inequities. A key approach for prioritizing resources is place-based public health. The NYC Health Department has identified neighborhoods where the burden of disease is highest; focusing investments on those neighborhoods is an equity strategy. Place-based public health also involves proactively listening to community members and those directly impacted by the epidemic. This approach is called centering the margins.

In late 2022 and early 2023, the NYC Health Department convened key community stakeholders to identify the most effective community, clinical and policy strategies to reduce the direct impact of diabetes in NYC. Core recommendations are summarized in the recent *The Fierce Urgency of Now* report[1].

Informed by community stakeholders and the Chronic Disease Task Force, the NYC Health Department identified four key goals for improving diabetes inequities. All address structural racism, align to the Board of Health's Resolution on Racism as a Public Health Crisis, and focus on priority neighborhoods that have disproportionately borne the burden of diabetes:[13]

1. Expand well-supported Peer Leaders, and Community Health Workers (CHWs) among priority communities.
2. Saturate high-burden neighborhoods with evidence-based group interventions.
3. Support safety net primary care and hospitals to address health inequities and advance racial justice.
4. Increase investment in health-related social needs and nutrition security in neighborhoods most highly impacted by under-investment.

The NYC Health Department will conduct surveillance to ensure plans to address the citywide chronic disease priorities are implemented in a timely fashion. The NYC Health Department will collect, analyze, and interpret data from clinical and community-based organizations (CBOs) and other entities monitoring diabetes in NYC. Data analysis will inform the NYC Health Department's efforts to ensure New York State Medicaid, Medicare reimbursement and other policies support the wide availability of local, community-delivered self-management programs in neighborhoods disproportionally impacted by diabetes.

Proposed Place-Based Strategies to Reduce Diabetes

NYC Health Department programs to combat diabetes range from technical assistance (TA) on diabetes care to more than 1,500 medical practices in the NYC REACH network to the Health Bucks program, which provides redeemable vouchers for fresh fruits and vegetables at farmers markets throughout NYC's five broughs. Expanding these and other proven existing efforts will serve as core components of the new, focused fight against diabetes.

The NYC Health Department will achieve its four goals above by expanding and enhancing the place-based initiatives in the table below within priority neighborhoods which have experienced disinvestment. The NYC Health Department recognizes that initiatives may be limited in reach because they are not resourced at the level needed to address the current state of diabetes in NYC. These initiatives complement the work of other City agencies such as NYC Health + Hospitals, CBOs, and health care providers, that implement programs and policies to improve diabetes care in NYC.

Peer Leader and CHWs Interventions	Evidence-Based Group Interventions	Support Safety Net Primary Care and Hospitals	Health-Related Social Needs and Nutrition Security
• Provide advanced training to Peer Leaders and CHWs on diabetes prevention and management, lifestyle coaching, Health related social needs assessment and referral • Integrate CHWs into primary care practices' day-to-day workflows	• Provide training and assistance to increase enrollment and retention in the National Diabetes Prevention Program (NDPP). • Provide training and assistance to support implementation of Diabetes Self-management Education and Support (DSMES) • Provide training and assistance to Diabetes Self-Management Program (DSMP) through the NYC Health Department Self-Management Resource Center license.	• Establish an Office of Healthcare Strategy and Accountability that integrates Medicaid payment innovation and efforts at greater accountability to private hospitals • Provide practice facilitation to NYC REACH primary care practices	• Implement multi-directional e-referral systems (MDERS). • Expand current NYC Health Department food and nutrition security initiatives

Expand Peer Educators, Leaders and Community Health Workers (CHWs)

The NYC Health Department will invest in Peer Leaders and CHWs. Historically, diabetes management was implemented through a patient's relationship with their primary care physician. While this relationship remains essential, studies show that diabetes management is most effective when furnished by a multidisciplinary team[14]. Multidisciplinary teams include healthcare professionals such as pharmacist, nurses, and dieticians, in addition to community health representatives such as CHWs and Peer Leaders. Peer Leaders and CHWs involvement in multidisciplinary team has become key in improving diabetes outcomes, especially among low-income and racial and ethnic minority populations[15][16]. They are trusted community members who possess a deep understanding of the communities they serve. Peer Leaders have lived experience with diabetes and may or may not be full-time workers; CHWs are full-time workers who may or may not have lived experience with diabetes[17]. Broadly, the CHW and Peer Leaders workforce enable the following public health goals:

- **Service Access & Experience**: help people receive person-centered, quality healthcare and social services.
- **Health Goals**: help people achieve their health goals through coaching and accomplishment.

Following the National Standards for Diabetes Self-Management Education[18], and with funding from the Centers for Disease Control, the NYC Health Department will improve the capacity of Peer Leaders and CHWs by providing:

1) Education on patient coaching, group facilitation and the impact of SDOH on diabetes outcomes;
2) Training on applying social determinants of health screening tools and screening approaches that are culturally responsive and tailored to the needs of the targeted populations; and
3) Assistance on integrating social determinants of health identification, support, and referral into diabetes management.

The NYC Health Department expects to train Peer Leaders and CHWs from 150 clinical organizations serving over 401,000 adults, 40,000 of which have diabetes.

Furthermore, the NYC Health Department will leverage the Public Health Corps (PHC) a city-wide effort to expand the CHWs workforce. Through PHC, the NYC Health Department partnered with CBOs and CHWs to eliminate COVID-19 inequities through outreach and education. To advance public policies that support an ecosystem of Peer Leaders and CHWs who are well-trained, supported, supervised, and compensated, at scale, the NYC Health Department will fiscally and operationally support a proportion of CHWs who will be place in

primary care practices. NYC Health Department will support implementation of CHW programming to expand access to diabetes care, services, and resources in priority communities and neighborhoods and to conduct research on CHW reimbursement models that facilitate sustainability.

Saturate High-Burden Neighborhoods with Evidence-Based Group Interventions

To decrease population-level risk for type 2 diabetes and the proportion New Yorkers with diabetes that have an A1C>9%, the NYC Health Department will increase access to the following evidence-based interventions in high-burden neighborhoods:

a. **The National Diabetes Prevention Program (NDPP).** The NDPP is a yearlong lifestyle intervention recognized by the CDC. Overall, the goal of the program is to help participants lose 5-7% of their body weight by adopting healthier lifestyle behaviors. NDPP has been reported to lower the incidence of type 2 diabetes by 58% (71% for people over 60 years old) and 27% after 15 years of participation [ix]. Since 2015, the NYC Health Department has supported the implementation of 189 NDPP workshops across NYC, with 140 of those workshops held in priority neighborhoods. The NYC Health Department will continue to increase the enrollment and retention in the NDPP by 1) supporting program delivery in multiple languages, and tailoring programming to the cultural needs of the NYC's diverse communities; 2) providing training and technical assistance to create new and sustain existing NDPP providers, and 3) connecting referring organizations, NDPP providers, primary care providers and neighborhood resources to address how SDOH can impact enrollment, retention and the success of NDPP. With a recently awarded federal CDC grant, the NYC Health Department will work with 15 new organizations to add 75 new NDPP workshops in priority neighborhoods over five years. This expansion seeks to engage 750 participants in workshops in multiple languages. The NYC Health Department will also work with its 18 existing organizations that to engage about 900 participants.

b. **Diabetes Self-Management Education and Support (DSMES)**. Provision of DSMES is part of the standard of care for diabetes management[19]. Services are accredited by the American Diabetes Association (ADA) and the Association of Diabetes Care and Education Specialists (ADCES). Extensive literature demonstrates the positive effects of DSMES[20], such as improved glycemic control[21], and decreased diabetes-related healthcare utilization[22][23]. Despite these documented benefits, many New Yorkers in the priority neighborhoods have limited access to DSMES services.

In July 2021, the NYC Health Department was awarded accreditation for its own DSMES program through ADCES. Through the new DSMES Umbrella Accreditation Program, the NYC Health Department will provide technical assistance and accreditation as an Umbrella

Start Site to 10 organizations with new DSMES programs over five years. This will increase the number of DSMES sites in these regions by 48% and increase access for 6,750 adults in the priority neighborhoods. Technical assistance will help organizations overcome the challenges of accreditation, billing, and reporting. In addition, the NYC Health Department will engage neighborhood clinical and community partners to establish referral pathways to DSMES programs.

c. **Diabetes Self-Management Program (DSMP).** The NYC Health Department will increase access to and participation in DSMP, a six-week program that provides participants with the tools and knowledge to help manage their diabetes and has been shown to improve health outcomes and reduce all-cause health care utilization and costs (e.g direct cost savings are $815)[24][25]. The NYC Health Department will host a DSMP training annually to train 75 people to become certified Peer Leaders for five years. Further, the Health Department will offer 25 organizations within priority neighborhoods licenses for DSMP through the Department's umbrella license. The NYC Health Department will work with these organizations to create sustainable referral pathways, and provide education and messaging on diabetes risk, prevention, and management. Combined, 16 new and existing organizations will offer DSMP programs/services tailored for 2,000 adults with diabetes.

Additionally, the NYC Health Department will further expand its reach to people with diabetes through its telephonic self-management program NYC Care Calls. Telephonic delivery of diabetes self-management support (tele-SMS) has been shown to be associated with improved A1C levels by 0.4 points when compared to people randomized to receive standard care[26]. This service will fill a critical gap in the provision of DSMES among people with diabetes for whom access to current ADA/AADE programs (or the DSMP classes) is not feasible due to lack of transportation and logistical issues that preclude participation at those programs. The NYC Health Department will further target deployment of NYC Care Calls to the South Bronx, one of three NYC neighborhoods where the population density of people with poorly controlled diabetes (A1C levels greater than 9%) is highest. The NYC Health Department anticipates reaching 2,000 individuals with diabetes over five years.

Support Safety Net Primary Care to Address Health Inequities and Advance Racial Justice

The NYC Health Department will support investments in safety net providers and organizations to advance health equity through the following initiatives:

a. **Implementation of Local Law 78 of 2023.** Local Law 78, enacted in June 2023, establishes a new function of the NYC Health Department regarding healthcare accountability and price transparency. In implementing Local Law 78, NYC Health Department will bring public oversight and monitoring to the business practices and behaviors of 1) hospitals and 2) insurers to hold these entities accountable and to ensure equitable, affordable, and quality care for all New Yorkers.

   The NYC Health Department will aggregate, analyze, and publicly report on a wide range of relevant healthcare accountability data, including hospital financial statements and community benefit spending (including Medicaid and free and reduced-cost care, also known as charity care or financial assistance). Using findings from these analyses, the NYC Health Department will provide recommendations to city and state leadership on how to sustain funding for the city's safety net hospitals and ensure that all hospitals are doing their part to meet the healthcare needs of all New Yorkers.

b. **Practice Facilitation in Primary Care Settings.** Small Independent Primary Care Practices (SIPCPs) are critical access points to health care within priority populations. Practice facilitation (PF) is a strategy for supporting SIPCPs' efforts to improve the delivery of patient care and has been shown to help care settings overcome barriers to multiple system changes related to information systems, goal setting, data analysis, and practice redesign. To improve care and management of people with diabetes, the NYC Health Department will provide PF support to 126 SIPCPs serving priority neighborhoods over five years. Support will focus on 1) increasing diabetic retinopathy screening; 2) improving early detection of chronic kidney disease ; 3) increasing adoption or enhancement of team-based care to includes pharmacists, CHWs, Registered Dietitians, Patient Navigators , behavioral health professionals, and other culturally competent personnel, and 4) increasing adoption and use of clinical systems and care practices (e.g., Electronic Health Records, clinical decision support tools, learning collaboratives) to improve quality of care and health outcomes for people with diabetes.

Increase Investment in Health-Related Social Needs and Nutrition Security

The NYC Health Department will expand investment in resources to address social determinants of health that impacts diabetes prevention and self-management through the following initiatives:

a. **Implementation of Multi-Directional E-referral Systems (MDERS).** Since 2018, the NYC Health Department has supported the development of a multi-directional e-referral systems (MDERS). MDERS, such as Unite Us, support electronic exchange of information

between clinical providers, CBOs, including organizations offering NDPP and DSMES services, and community programs/services that address social determinants of health /social need. Through funding from the CDC, the NYC Health Department will expand the availability of MDERS to 163 additional clinical organizations (e.g., SIPCPs, FQHCs, CHCs) and 16 CBOs in priority neighborhoods. Organizations will be provided with Unite Us license and offered technical assistance and training to start or continue use of MDERS. The goal is to help community and clinical partners integrate workflows for identifying the health and social needs of priority populations, refer to programs and services, and use MDERS-generated reports (e.g., programs with the highest rates of attendance or critical social needs) to better tailor programs and services. Support provided has the potential to increase access to community and clinical resources that use MDERS for over 770,000 adults in priority neighborhoods.

b. **Expansion of Nutrition Security Initiatives.** The NYC Health Department implements a wide range of programs and initiatives to increase access to and promote healthy foods, such as whole and minimally processed fruits, vegetables, whole grains, and beans, and to reduce exposure to and consumption of foods high in salt, sugar, and fat, and highly processed foods. Because cost is one of the biggest barriers to healthy eating, the NYC Health Department supports New Yorkers with financial resources to access healthier foods through nutrition incentive programs such as Health Bucks and Get the Good Stuff. In addition, the NYC Health Department implements Groceries to Go, a program in which eligible NYC Health + Hospital NYC Care members receive monthly credits to purchase groceries through an online platform. In fiscal year 2024, the NYC Health Department will distribute over $4.25M in produce incentives and $6.5M in grocery credits.

The NYC Health Department also promotes plant-forward diets and whole and minimally processed plant foods through media campaigns, public health messaging and nutrition education programming that reaches tens of thousands of children and adults at child care centers and farmers markets that serve New Yorkers with low incomes. In fiscal year 2024, the NYC Health Department will conduct nutrition education workshops for at least 17,000 participants to improve knowledge and access to nutritious foods.

The NYC Health Department shifts the food environment to offer healthier foods through multiple initiatives: 1) drafting and updating NYC's Food Standards, nutrition criteria that apply to all foods and beverages served by City agencies and distributed by their subcontractors, 2) nutrition regulations in childcare centers and day camp, 3) setting sugar-reduction targets for packaged foods and beverages and 4) partnering with the food industry to meet such standards through the National Salt and Sugar Reduction Initiative.

In addition to promoting plant-forward diets and nutrition education, NYC integrates Lifestyle Medicine Programs into primary care settings, emphasizing holistic approaches to combat diabetes and address health inequities, particularly among low-income and uninsured New Yorkers. To put this into practice, NYC is advancing a 5.5-hour training for every health care practitioner across NYC through a partnership with the Mayor's Office and the American College of Lifestyle Medicine.[27] To date, more than 2,500 practitioners have signed up for the course that provides instruction on the principles of Lifestyle Medicine with a particular focus on plant-based nutrition education. The Health Department also supports referrals to NYC Health + Hospitals Lifestyle Medicine Programs, which are now available in every borough of the city.[28] NYC H+H's Lifestyle Medicine Programs mark the largest clinical expansion of such programs anywhere in the United States and set out to help adults with common diet-related chronic diseases including type 2 diabetes to treat and potentially bring their condition into remission.

The NYC Health Department also implements policies in the restaurant environment to help customers make informed decisions and advocates to the federal government on a wide range of nutrition security-related topics from federal food supports such as the Supplemental Nutrition Assistance Program (SNAP), to Food and Drug Administration policies to address sodium and sugar in the food supply.

Targeted Goals and Timeline

Through Citywide chronic disease strategies outlined in the HealthyNYC initiative, the NYC Health Department seeks to reduce deaths due diabetes by 5% by 2030. Over the next five years, the NYC Health Department expects to reach nearly 802,000 adults, of whom over 87,000 have diabetes, and live in priority neighborhoods, to achieve a wide range of outcomes related to reducing diabetes cases, complications, deaths, and health inequities including:

1. 150 Peer Leaders, Lifestyle Coaches and CHWs will complete advanced training as part of their professional development.
2. 41 organizations will implement DSMES, DSMP, and the NDPP tailored to meet the needs of priority populations in high-burden neighborhoods.
    a. 10 new organizations, an increase of 48% in priority neighborhoods, delivering ADA/ADCES accredited DSMES services tailored for priority populations with diabetes.
    b. 16 new organizations and nine existing organizations offering complimentary tailored diabetes support programs/services (DSMP).

c. 15 new organizations delivering the NDPP, an increase of 29%, and 18 existing organizations delivering the NDPP to adults at risk of for diabetes.
3. 12,400 adults will have access to DSMES, diabetes support programs (DSMP and NYC Care Calls) and NDPP programs/services tailored for priority populations.
4. 150 more clinical organizations serving priority populations and neighborhoods will screen for SDOH providing increased access to screenings for 401,553 adults, over 40,000 of which have diabetes, in priority neighborhoods.
5. 126 primary care practices will adopt and actively use team-based care and clinical systems to offer tailored care to 22,768 adults with diabetes.
6. 179 community and clinical organizations serving priority populations will gain access to and actively use multidirectional e-referral systems (MDERS), providing increased access to clinical and community resources that use multi-directional communication for over 770,000 adults, of which over 84,000 have diabetes, in priority neighborhoods.

Overall, CBOs will link with each other and with clinical organizations to help connect priority populations to resources to address the social determinants of health and to improve the self-management and prevention of diabetes.

Potential Paths Forward

Diabetes in NYC requires public responses and proven measures that have been successful against other epidemics. This requires public and private support. There is more to be done, including:

- Building the NYC Health Department's capacity to lead and coordinate targeted public education campaigns to promote evidence-based diabetes prevention, detection and management and connection to available resources.
- Modernizing citywide data collection for tracking and timely reporting of diabetes incidence and complications, to help inform and course-correct the progress of interventions.
- Expanding the diabetes workforce development by training additional Peer Leaders and Community Health Workers in priority neighborhoods.
- Increasing delivery of Diabetes Self-Management Education and Support (DSMES) in priority neighborhoods by assisting additional clinical organizations to become Umbrella Sites under The NYC Health Departments' Diabetes Self-Management Education and Support Umbrella Accreditation.
- Expanding training and technical assistant to implement new community-led diabetes programs such as the National Diabetes Prevention Program and the Diabetes Self-Management Program.

- Expanding NYC Health Department's telephonic diabetes self-management support program (NYC Care Calls) to serve additional eligible individual living with diabetes.

Appendix A

Table 1. Prevalence and incidence of end-stage renal disease (ESRD) and dialysis among adults due to diabetes, New York City, 2017
Source: United States Renal Data System. 2017, restricted to NYC residents ages 18 and older.
Rate of cases per 1,000 adults with diabetes are crude estimates based on point estimates of the NYC population with diabetes from the NYC Community Health Survey, 2017.
Age-adjusted rates not presented because of censoring of available data due to small cell counts.

	Overall				Male				Female			
	Incident cases due to diabetes N	Prevalent cases due to diabetes N	Rate of incident cases due to diabetes - per 1,000 adults with diabetes N	Rate of prevalent cases due to diabetes - per 1,000 adults with diabetes N	Incident cases due to diabetes N	Prevalent cases due to diabetes N	Rate of incident cases due to diabetes - per 1,000 adults with diabetes N	Rate of prevalent cases due to diabetes - per 1,000 adults with diabetes N	Incident cases due to diabetes N	Prevalent cases due to diabetes N	Rate of incident cases due to diabetes - per 1,000 adults with diabetes N	Rate of prevalent cases due to diabetes - per 1,000 adults with diabetes N
All ESRD												
Overall	1676	9017	2.3	12.2	973	5291	3.0	16.2	703	3726	1.7	9.0
Age group												
18-44	116	601	1.0	5.0	62	314	1.0	5.1	54	287	0.9	4.8
45-64	724	3836	2.1	11.2	455	2479	2.8	15.4	269	1357	1.5	7.5
65+	836	4580	3.0	16.6	456	2498	4.3	23.8	380	2082	2.2	12.2
Sex												
Female	703	3726	1.7	9.0								
Male	973	5291	3.0	16.2								
Race/ethnicity												
White, Non-Latino	353	1534	2.0	8.5	230	1016	2.7	12.0	123	518	1.3	5.5
Black, Non-Latino	608	3557	2.9	16.9	300	1844	3.6	22.2	308	1713	2.4	13.4
Latino	477	2677	1.9	10.8	292	1661	2.9	16.6	185	1016	1.3	6.9
Asian/Pacific Islander	235	1223	2.9	14.9	150	761	2.9	14.9	85	462	2.7	14.9
Borough												
Bronx	409	2149	2.3	12.2	235	1231	3.7	19.2	174	918	1.6	8.2
Brooklyn	499	2666	2.3	12.1	288	1507	3.1	16.2	211	1159	1.6	9.1
Manhattan	209	1247	2.2	13.4	107	711	2.5	16.5	102	536	2.0	10.7
Queens	477	2541	2.3	12.0	291	1571	2.7	14.8	186	970	1.8	9.2
Staten Island	82	414	2.1	10.4	52	271	2.4	12.3	30	143	1.6	7.5
Dialysis Only												
Overall	1626	7413	2.2	10.0	938	4238	2.9	13.0	688	3175	1.7	7.7
Age group												
18-44	108	452	0.9	3.7	58	245	1.0	4.0	50	207	0.8	3.5
45-64	699	3004	2.0	8.7	438	1920	2.7	11.9	261	1084	1.4	6.0
65+	819	3957	3.0	14.3	442	2073	4.2	19.7	377	1884	2.2	11.0
Sex												
Female	688	3175	1.7	7.7								
Male	938	4238	2.9	13.0								
Race/ethnicity												
White, Non-Latino	339	1179	1.9	6.6	220	757	2.6	8.9	119	422	1.3	4.5
Black, Non-Latino	593	3056	2.8	14.5	292	1559	3.5	18.8	301	1497	2.4	11.7
Latino	468	2153	1.9	8.7	286	1306	2.9	13.1	182	847	1.2	5.8
Asian/Pacific Islander	222	1003	2.7	12.2	138	608	2.7	11.9	84	395	2.7	12.7
Borough												
Bronx	401	1693	2.3	9.6	231	936	3.6	14.6	170	757	1.5	6.8
Brooklyn	487	2308	2.2	10.4	279	1269	3.0	13.6	208	1039	1.6	8.1
Manhattan	202	976	2.2	10.5	103	535	2.4	12.4	99	441	2.0	8.8
Queens	462	2119	2.2	10.0	278	1296	2.6	12.2	184	823	1.8	7.8
Staten Island	74	317	1.9	7.9	47	202	2.1	9.2	27	115	1.4	6.1

Appendix B

Table 2. Prevalence and incidence of end-stage renal disease (ESRD) and dialysis among adults due to diabetes, New York City, 2018
Source: United States Renal Data System. 2018, restricted to NYC residents ages 18 and older.
Rate of cases per 1,000 adults with diabetes are crude estimates based on point estimates of the NYC population with diabetes from the NYC Community Health Survey, 2018.
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	Incident cases due to diabetes N	Prevalent cases due to diabetes N	Rate of incident cases due to diabetes - per 1,000 adults with diabetes N	Rate of prevalent cases due to diabetes - per 1,000 adults with diabetes N	Incident cases due to diabetes N	Prevalent cases due to diabetes N	Rate of incident cases due to diabetes - per 1,000 adults with diabetes N	Rate of prevalent cases due to diabetes - per 1,000 adults with diabetes N	Incident cases due to diabetes N	Prevalent cases due to diabetes N	Rate of incident cases due to diabetes - per 1,000 adults with diabetes N	Rate of prevalent cases due to diabetes - per 1,000 adults with diabetes N
All ESRD												
Overall	1795	9401	2.5	13.0	1074	5551	3.2	16.5	721	3850	1.9	10.2
Age group												
18-44	140	616	1.2	5.1	84	316	1.5	5.6	56	300	0.9	4.8
45-64	762	4006	2.3	12.2	495	2596	3.0	15.5	267	1410	1.7	8.8
65+	893	4779	3.2	17.4	495	2639	4.4	23.4	398	2140	2.6	13.8
Sex												
Female	721	3850	1.9	10.2								
Male	1074	5551	3.2	16.5								
Race/ethnicity												
White, Non-Latino	368	1605	2.1	9.3	256	1085	2.6	11.0	112	520	1.6	7.4
Black, Non-Latino	616	3608	3.1	18.1	321	1871	4.5	26.0	295	1737	2.3	13.8
Latino	526	2805	2.1	11.4	323	1742	3.1	16.9	203	1063	1.5	7.6
Asian/Pacific Islander	278	1354	3.5	16.9	174	843	3.8	18.3	104	511	3.1	15.0
Borough												
Bronx	441	2251	2.6	13.4	274	1320	4.0	19.4	167	931	1.7	9.4
Brooklyn	488	2736	2.2	12.4	269	1538	3.0	16.9	219	1198	1.7	9.4
Manhattan	215	1264	2.2	13.2	123	715	2.8	16.3	92	549	1.9	11.4
Queens	563	2733	2.8	13.6	355	1703	3.3	15.9	208	1030	2.3	11.2
Staten Island	88	417	2.4	11.3	53	275	2.0	10.6	35	142	3.2	12.9
Dialysis Only												
Overall	1718	7422	2.4	10.3	1027	4276	3.0	12.7	691	3146	1.8	8.3
Age group												
18-44	126	425	1.1	3.5	76	222	1.4	4.0	50	203	0.8	3.2
45-64	728	3036	2.2	9.3	472	1959	2.8	11.7	256	1077	1.6	6.7
65+	864	3961	3.1	14.4	479	2095	4.2	18.5	385	1866	2.5	12.0
Sex												
Female	691	3146	1.8	8.3								
Male	1027	4276	3.0	12.7								
Race/ethnicity												
White, Non-Latino	340	1163	2.0	6.7	237	775	2.4	7.8	103	388	1.5	5.5
Black, Non-Latino	588	2990	3.0	15.0	304	1520	4.2	21.1	284	1470	2.3	11.7
Latino	512	2185	2.1	8.8	316	1321	3.1	12.8	196	864	1.4	6.2
Asian/Pacific Islander	269	1058	3.4	13.2	169	652	3.7	14.2	100	406	2.9	11.9
Borough												
Bronx	423	1703	2.5	10.1	262	964	3.9	14.2	161	739	1.6	7.5
Brooklyn	469	2281	2.1	10.3	254	1242	2.8	13.6	215	1039	1.7	8.1
Manhattan	204	953	2.1	9.9	119	518	2.7	11.8	85	435	1.8	9.1
Queens	542	2184	2.7	10.9	344	1357	3.2	12.7	198	827	2.2	9.0
Staten Island	80	301	2.2	8.1	48	195	1.8	7.5	32	106	2.9	9.6

Appendix C

Table 3. Blood sugar control among adults with diabetes who received medical care in 2021, by demographic characteristics, New York City
Source: New York City A1C Registry, 2021; restricted to NYC residents ages 18 and older
Rates are based on registrants reported to the A1C Registry in 2021 with likely diabetes (based on a history of at least two A1C test values of 6.5% or greater).

| | Number (n) | | | | | | Percent (%) | | | |
| | | | | | Latest A1C value | | | | | |
	<7.0%	7.0-7.9%	8.0-9.0%	>9%	Total		<7.0%	7.0-7.9%	8.0-9.0%	>9%
Overall	281,979	145,150	75,405	92,359	594,893		47.4	24.4	12.7	15.5
Age group										
18-44	19,511	9,940	6,428	13,626	49,505		39.4	20.1	13.0	27.5
45-64	104,986	60,850	34,356	48,099	248,291		42.3	24.5	13.8	19.4
65+	157,482	74,360	34,621	30,634	297,097		53.0	25.0	11.7	10.3
Sex[1]										
Female	154,927	76,632	38,677	45,406	315,642		49.1	24.3	12.3	14.4
Male	126,863	68,421	36,690	46,890	278,864		45.5	24.5	13.2	16.8
Neighborhood poverty[2]										
30 to <100% (very high poverty)	36,981	19,949	11,255	16,294	84,479		43.8	23.6	13.3	19.3
20 to <30% (high poverty)	55,173	28,018	14,911	19,543	117,645		46.9	23.8	12.7	16.6
10 to <20% (medium poverty)	125,399	65,433	34,089	40,574	265,495		47.2	24.6	12.8	15.3
0 to 10% (low poverty)	64,125	31,546	15,056	15,862	126,589		50.7	24.9	11.9	12.5
Borough[3]										
The Bronx	47,131	25,437	14,581	20,498	107,647		43.8	23.6	13.5	19.0
Brooklyn	84,630	42,522	22,552	28,228	177,932		47.6	23.9	12.7	15.9
Manhattan	42,543	20,477	10,251	12,512	85,783		49.6	23.9	11.9	14.6
Queens	89,427	48,493	24,235	27,227	189,382		47.2	25.6	12.8	14.4
Staten Island	18,000	8,122	3,729	3,811	33,662		53.5	24.1	11.1	11.3

1. There were 387 individuals where sex was missing or listed as Other.
2. There were 685 individuals whose address information could not be resolved to a corresponding neighborhood poverty level.
3. There were 487 individuals whose address information could not be resolved to a corresponding borough.

Appendix D

Table 4. Number and percent of adults with diabetes in New York City who received medical care in 2021
with last A1C > 9%, by United Hospital Fund (UHF) neighborhood
Source: New York City A1C Registry, 2021; restricted to NYC residents ages 18 and older
Results are based on registrants reported to the A1C Registry in 2021 likely with diabetes
(based on a history of at least two A1C test values of 6.5% or greater)

| | A1C greater than 9% | | |
	Number (n)	Percent (%)	Number of people with diabetes with result in 2021
Overall	92,359	15.5	594,893
UHF neighborhood			
Bronx			
Kingsbridge - Riverdale	792	15.0	5,282
Northeast Bronx	2,468	17.7	13,941
Fordham - Bronx Park	3,405	19.9	17,148
Pelham - Throgs Neck	4,272	18.1	23,572
Crotona-Tremont	3,505	19.9	17,579
High Bridge - Morissania	3,638	19.7	18,445
Hunts Point - Mott Haven	2,418	20.7	11,680
Brooklyn			
Greenpoint	749	14.0	5,334
Downtown - Heights - Park Slope	1,372	14.9	9,213
Bedford Stuyvesant - Crown Heights	4,501	18.5	24,364
East New York	3,331	19.1	17,402
Sunset Park	1,346	14.3	9,422
Borough Park	2,744	13.5	20,317
East Flatbush - Flatbush	4,615	17.9	25,829
Canarsie - Flatlands	2,947	16.5	17,824
Bensonhurst - Bay Ridge	1,450	11.3	12,864
Coney Island - Sheepshead Bay	2,539	12.0	21,151
Williamsburg - Bushwick	2,634	18.5	14,212
Manhattan			
Washington Heights - Inwood	3,715	17.3	21,450
Central Harlem - Morningside Heights	2,135	17.5	12,200
East Harlem	1,936	18.0	10,728
Upper West Side	1,029	12.1	8,526
Upper East Side	543	9.4	5,773
Chelsea - Clinton	814	13.4	6,095
Gramercy Park - Murray Hill	400	10.7	3,734
Greenwich Village - Soho	191	8.5	2,242
Union Square - Lower East Side	1,557	11.9	13,114
Lower Manhattan	192	10.0	1,921
Queens			
Long Island City - Astoria	1,748	15.3	11,432
West Queens	5,448	15.0	36,289
Flushing - Clearview	2,180	9.5	23,040
Bayside - Little Neck	509	8.7	5,837
Ridgewood - Forest Hills	1,742	11.6	15,012
Fresh Meadows	731	9.8	7,428
Southwest Queens	4,773	16.6	28,711
Jamaica	5,649	16.8	33,635
Southeast Queens	2,858	14.8	19,337
Rockaway	1,589	18.3	8,661
Staten Island			
Port Richmond	832	15.8	5,276
Stapleton - St. George	1,192	13.0	9,159
Willowbrook	649	9.5	6,841
South Beach - Tottenville	1,138	9.2	12,386

There were 487 individuals likely with diabetes who had A1C tests in 2021 that could not be resolved to a UHF neighborhood, including 83 individuals whose latest A1C result was > 9%.

Table 5. Hospitalizations for lower-extremity amputation (including foot and toe) among adults with diabetes and rate per 100,000 adults, New York City, 2012-2016
Source: Statewide Planning and Research Collaborative System (SPARCS) 2012-2016; restricted to NYC residents ages 18 and older.
The diabetes related lower-extremity amputation case definition is based on the Agency for Healthcare Research and Quality Prevention Quality Indicator metric
PQI-16 version 6.0 (https://www.qualityindicators.ahrq.gov/Archive/), with the addition of ICD-9 and 10 procedure codes for all toe or foot amputations.
Rates are per 100,000 adults and age-adjusted data are adjusted to the 2000 U.S. Standard Population.
Use crude estimates when reporting prevalence for a specific population; use age-adjusted estimates when making comparisons between groups that may have varying age distribution.

	Number of hospitalizations					Crude rate (per 100,000 adults)					Age-adjusted rate (per 100,000 adults)				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
Overall	2821	2930	3088	3126	3099	42.9	44.1	46.2	46.5	45.9	43.4	44.4	46.1	45.9	44.9
Age group															
18-24	8	4	7	6	3	0.9	0.5	0.8	0.7	0.4					
25-44	196	214	244	217	256	7.5	8.1	9.1	8.0	9.5					
45-64	1342	1400	1494	1532	1546	65.4	67.7	71.8	73.1	73.6					
65+	1275	1312	1343	1371	1294	121.9	122.3	122.4	121.7	112.0					
Sex															
Female	939	936	993	983	924	26.8	26.5	27.9	27.5	25.8	25.8	25.3	26.5	25.8	24.1
Male	1882	1994	2095	2143	2175	61.3	64.3	67.0	68.0	68.7	65.8	68.3	70.4	70.6	70.6
Neighborhood poverty (UHF level)															
30 to <100% (very high)	638	720	684	703	670	68.3	76.0	71.4	72.7	68.8	79.2	87.3	81.0	81.2	76.5
20 to <30% (high)	814	883	950	907	937	46.2	49.7	53.2	50.5	52.1	47.9	51.2	54.5	51.3	52.4
10 to <20% (medium)	1171	1116	1247	1285	1272	38.5	36.3	40.3	41.2	40.6	38.1	35.7	39.2	39.8	38.8
0 to <10% (low)	196	206	207	229	220	23.4	24.4	24.5	27.0	25.9	21.4	22.2	22.0	24.0	22.5
Borough															
Bronx	775	829	852	831	814	74.2	78.4	79.6	76.8	74.7	77.5	80.8	81.9	78.1	75.2
Brooklyn	839	887	914	973	964	42.6	44.5	45.5	48.2	47.6	44.3	46.1	46.7	49.0	48.0
Manhattan	434	489	520	486	490	31.6	35.5	37.6	35.0	35.2	33.3	36.9	38.6	35.9	35.6
Queens	647	610	686	675	680	35.4	33.1	36.9	36.1	36.3	34.4	32.0	35.3	34.2	34.0
Staten Island	126	115	116	161	151	34.6	31.4	31.5	43.5	40.6	31.4	28.5	28.5	38.5	35.5

Appendix F

The NYC Health Department Diabetes Data Sources

Data reported as per Law 221 of 2019, relied primarily on data collected and disseminated through the data sources listed below. The NYC Health Department will use these data sources to meet data requirements per Law 52 of 2023.

NYC Community Health Survey (CHS): The CHS is a survey of about 10,000 adults aged 18 and older from all five boroughs, conducted annually by the NYC Health Department. Estimates presented here are based on self-reported data and age-adjusted to the U.S. 2000 Standard Population. The CHS includes adults with landline phones and cell phones (since 2009). For survey details, visit www.nyc.gov/health/survey. Through CHS, the NYC Health Department collects data related to 1) the prevalence of diabetes among adults aged 18 and older in NYC, 2) the prevalence of diabetes among adults aged 18 and older in NYC, by United Hospital Fund (UHF) neighborhood, and 3) depression among individuals with diabetes by age, sex, race/ethnicity, neighborhood poverty and borough of residence.

NYC A1C Registry (Registry): The Registry was created in 2006 and contains all A1C tests sent by participating clinical laboratories for NYC residents. All data presented in this report are limited to NYC adults ages 18 and older who had at least two A1C test values of 6.5% or greater at any point in time since inception of the Registry in 2006 through 2019. Since the Registry does not contain diagnosis codes, these criteria are used as a proxy for diabetes diagnosis; the American Diabetes Association recommends an A1C cut-point of 6.5% for diabetes diagnosis. Among NYC residents who received medical care in the reporting year, 2022, as indicated by the presence of an A1c test result transmitted to the Registry in 2022, the NYC Health Department tabulates 1) blood sugar control among adults with diabetes, and 2) number and percent of adults with diabetes in NYC with last A1C >9%, stratified by key demographic characteristics (such as age group, sex) and geography (such as UHF neighborhood).

New York Statewide Planning and Research Cooperative System (SPARCS): SPARCS is an administrative database of all hospital discharges reported by New York State (NYS) hospitals to the NYS Department of Health. This report uses data from 2012 to 2016 included in the January 2018 data update. For more information on SPARCS, visit: https://www.health.ny.gov/statistics/sparcs/. Through SPARCS, The NYC Health Department collects data related to hospitalizations for lower-extremity amputation (including foot and toe) among adults with diabetes and rate per 100,000 adults and rate per 1,000 adults. The case definition used for measuring diabetes related lower-extremity amputations in NYC follows the methods used by the CDC.[29]

United States Data Renal System (USDRS): The USRDS, funded by the National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, is the national data registry that collects, analyzes, and distributes information on the end-stage renal disease (ESRD) population in the United States, including treatments and outcomes. Data for NYC residents reported in this report were obtained using the RenDER query system as of August 2019. The interpretation and reporting of these

data are the responsibility of the authors and in no way should be seen as an official policy or interpretation of the U.S. government. The RenDER query system is available at https://render.usrds.org/render/xrender.phtml. Through USDRS, the NYC Health Department collects data related to the prevalence and incidence of end-stage renal disease (ESRD) and dialysis among adults due to diabetes.

Current Data Limitations

The NYC Health Department is committed to providing data regarding metrics requested per Law 52 of 2023. When submitting report updates, the NYC Health Department will include considerations to interpret data based on current limitations of the following data resources:

NYC A1C Registry (Registry): The New York City A1c Registry is a population-based, citywide chronic disease surveillance system that collects hemoglobin A1c (HbA1c) laboratory test results of NYC residents. As a result, Information presented in this report does not account for persons with poor glycemic control who do not undergo HbA1c testing through a laboratory or who had an A1c testing outside of the clinical laboratory network, such as an in-office, point-of-care test. Yet, race and ethnicity information in the registry is highly unreliable due to incorrect, incomplete, or missing values. This poor-quality data issue prevents using the registry to monitor inequities by race and ethnicity more accurately.

To address the poor race/ ethnicity data quality and to support recommendations in the recent action report The Fierce Urgency of Now: Investments To Turn the Tide of the Diabetes Epidemic (nyc.gov)., the NYC Health Department is submitting a host site proposal to the CDC for an Epidemic Intelligence Service (EIS) officer to assess the causes of poor race and ethnicity data quality in the registry and to make recommendations to improve it. If the proposal is accepted, the EIS officer will start at the NYC Health Department in August 2024.

New York Statewide Planning and Research Cooperative System (SPARCS): Since some minor amputations likely occur as outpatient medical care settings, and are not captured as SPARCS inpatient procedures, these data may underestimate the total number lower extremity amputation (LEA) events in NYC. Also, since all diabetes-related LEA hospitalizations are counted, and not individual persons, data do not differentiate between first or possible subsequent LEA procedures. As such, the data represent the number of LEA events per population, and not the number of individual persons in the population hospitalized for LEA procedures. Also, the data do not differentiate between type 1 and type 2 diabetes-related LEA rates.

U. S. Data Renal System (USDRS): The data used for end-stage renal disease and dialysis among NYC adults is from the U. S. Data Renal System which does not provide data at geographic levels smaller than U.S. County or NYC borough.

References

[1] National diabetes statistics report: estimates of diabetes and its burden in the United States, 2014

[2] Thorpe LE, Kanchi R, Chamany S, Rodriguez-Lopez JS, Chernov C, Freeman A, Perlman SE. Change in Diabetes Prevalence and Control among New York City Adults: NYC Health and Nutrition Examination Surveys 2004-2014. J Urban Health. 2018 Dec;95(6):826-831. doi: 10.1007/s11524-018-0285-z. PMID: 29987771; PMCID: PMC6286282.

[3] Lee DC, Long JA, Sevick MA, Yi SS, Athens JK, Elbel B, Wall SP. The local geographic distribution of diabetic complications in New York City: Associated population characteristics and differences by type of complication. Diabetes Res Clin Pract. 2016 Sep;119:88-96. doi: 10.1016/j.diabres.2016.07.008. Epub 2016 Jul 28. PMID: 27497144.

[4] Diabetes Prevention Program (DPP) Research Group. The Diabetes Prevention Program (DPP): description of lifestyle intervention. *NIH external link Diabetes Care* 2002;25(12):2165–2171.

[5] Diabetes Prevention Program Research Group, Knowler WC, Fowler SE, et al. 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study *NIH external link. Lancet.* 2009;374(9702):1677–1686.

[6] Deshpande AD, Harris-Hayes M, Schootman M. Epidemiology of diabetes and diabetes-related complications. Phys Ther. 2008 Nov;88(11):1254-64. doi: 10.2522/ptj.20080020. Epub 2008 Sep 18. PMID: 18801858; PMCID: PMC3870323.

[7] Call to Action: Structural Racism as a Fundamental Driver of Health Disparities: A Presidential Advisory From the American Heart Association. Keith Churchwell, MD, FAHA, Chair, Mitchell S.V. Elkind, MD, MS, FAHA, Regina M. Benjamin, MD, MBA, April P. Carson, PhD, MSPH, FAHA, Edward K. Chang, BS, Willie Lawrence, MD, FAHA, Andrew Mills, MPH, Tanya M. Odom, EdM, Carlos J. Rodriguez, MD, MPH, FAHA, Fatima Rodriguez, MD, MPH, FAHA, Eduardo Sanchez, MD, MPH, Anjail Z. Sharrief, MD, MPH, FAHA, Mario Sims, PhD, MS, FAHA, Olajide Williams, MD, MS, On behalf of the American Heart Association

[8] The Fierce Urgency of Now: Investments To Turn the Tide of the Diabetes Epidemic (nyc.gov)

[9] Zhang X, Gregg EW, Williamson DF, Barker LE, Thomas W, Bullard KM, Imperatore G, Williams DE, Albright AL. A1C level and future risk of diabetes: a systematic review. Diabetes Care. 2010 Jul;33(7):1665-73. doi: 10.2337/dc09-1939. PMID: 20587727; PMCID: PMC2890379

[10] Creager, M. A., Matsushita, K., Arya, S., Beckman, J. A., Duval, S., Goodney, P. P., ... & American Heart Association Advocacy Coordinating Committee. (2021). Reducing nontraumatic lower-extremity amputations by 20% by 2030: time to get to our feet: a policy statement from the American Heart Association. *Circulation*, *143*(17), e875-e891. https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000967

[12] New York City Department of Health and Mental Hygiene. HealthyNYC: New York City's Campaign for Healthier, Longer Lives. https://www.nyc.gov/assets/doh/downloads/pdf/about/healthynyc.pdf

[13] nyc.gov/assets/doh/downloads/pdf/boh/racism-public-health-crisis-resolution.pdf

[14] Levengood TW, Peng Y, Xiong KZ, Song Z, Elder R, Ali MK, Chin MH, Allweiss P, Hunter CM, Becenti A; Community Preventive Services Task Force. Team-Based Care to Improve Diabetes Management: A Community Guide Meta-analysis. Am J Prev Med. 2019 Jul;57(1):e17-e26. doi: 10.1016/j.amepre.2019.02.005. PMID: 31227069; PMCID: PMC7373227.

[15] Michele Heisler; Overview of Peer Support Models to Improve Diabetes Self-Management and Clinical Outcomes. *Diabetes Spectr* 1 October 2007; 20 (4): 214–221. https://doi.org/10.2337/diaspect.20.4.214

[16] Shah M, Kaselitz E, Heisler M. The role of community health workers in diabetes: update on current literature. Curr Diab Rep. 2013 Apr;13(2):163-71. doi: 10.1007/s11892-012-0359-3. Erratum in: Curr Diab Rep. 2013 Aug;13(4):600. PMID: 23345198; PMCID: PMC3929361.

[17] Werfalli M, Raubenheimer PJ, Engel M, Musekiwa A, Bobrow K, Peer N, Hoegfeldt C, Kalula S, Kengne AP, Levitt NS. The effectiveness of peer and community health worker-led self-management support programs for improving diabetes health-related outcomes in adults in low- and middle-income countries: a systematic review. Syst Rev. 2020 Jun 6;9(1):133. doi: 10.1186/s13643-020-01377-8. PMID: 32505214; PMCID: PMC7275531.

18 Funnell MM, Brown TL, Childs BP, et al. National standards for diabetes self-management education. Diabetes Care. 2010;33 Suppl 1:S89-96.

[19] Joni Beck, Deborah A. Greenwood, Lori Blanton, et al. 2017 National Standards for Diabetes Self-Management Education and Support. Diabetes Care. 2017 Oct; 40 (10) 1409-1419.

[20] He X, Li J, Wang B, et al. Diabetes self-management education reduces risk of all-cause mortality in type 2 diabetes patients: a systematic review and meta-analysis. Endocrine 2017; 55:712–731.

[21] Chrvala CA, Sherr D, Lipman RD. Diabetes self-management education for adults with type 2 diabetes mellitus: a systematic review of the effect on glycemic control. Patient Educ Couns 2016; 99:926.

22 Center for Health Law and Policy Innovation of Harvard Law School. Reconsidering cost-sharing for diabetes self-management education: recommendation for policy reform [Internet], 2015. Available from https://www.diabeteseducator.org/docs/default-source/advocacy/reconsidering-cost-sharing-for-dsme-chlpi-paths-6-11-2015-(final-draf.pdf?sfvrsn=2. Accessed 3 June 2017.

23 Li R, Shrestha S, Lipman R, et al. MMWR Morbidity and Mortality Weekly Report. Weekly. 2014 Nov: 63 (46): 1045-1095.

24 Turner, R. M., Ma, Q., Lorig, K., Greenberg, J., & DeVries, A. R. (2018). Evaluation of a diabetes self-management program: claims analysis on comorbid illnesses, health care utilization, and cost.Journal of medical Internet research, 20(6), e207.

25 Lorig, K., Ritter, P. L., Turner, R. M., English, K., Laurent, D. D., & Greenberg, J. (2016). Benefits of diabetes self-management for health plan members: a 6-month translation study. Journal of medical Internet research, 18(6), e164.

26 Chamany S, Walker EA, Schechter CB, Gonzalez JS, Davis NJ, Ortega FM, Carrasco J, Basch CE, Silver LD. Telephone Intervention to Improve Diabetes Control: A Randomized Trial in the New York City A1c Registry. Am J Prev Med. 2015 Dec; 49(6):832-41.

[27] New York City Mayor's Office. Mayor Adams, American College of Lifestyle Medicine Announce $44 Million to Offer Lifestyle Medicine Foundational Training to Every NYC Health Care Practitioner. https://www.nyc.gov/office-of-the-mayor/news/879-22/mayor-adams-american-college-lifestyle-medicine-44-million-offer-lifestyle#/0

[28] New York City Mayor's Office. Mayor Adams Completes Citywide Expansion of Lifestyle Medicine Program, new Site Launches Today in South Bronx. https://www.nyc.gov/office-of-the-mayor/news/216-24/mayor-adams-completes-citywide-expansion-lifestyle-medicine-program-new-site-launches-today-in#/0

29 Geiss, L. S., Li, Y., Hora, I., Albright, A., Rolka, D., & Gregg, E. W. (2019). Resurgence of diabetes-related nontraumatic lower-extremity amputation in the young and middle-aged adult US population. *Diabetes Care*, *42*(1), 50-54. https://doi.org/10.2337/dc18-1380