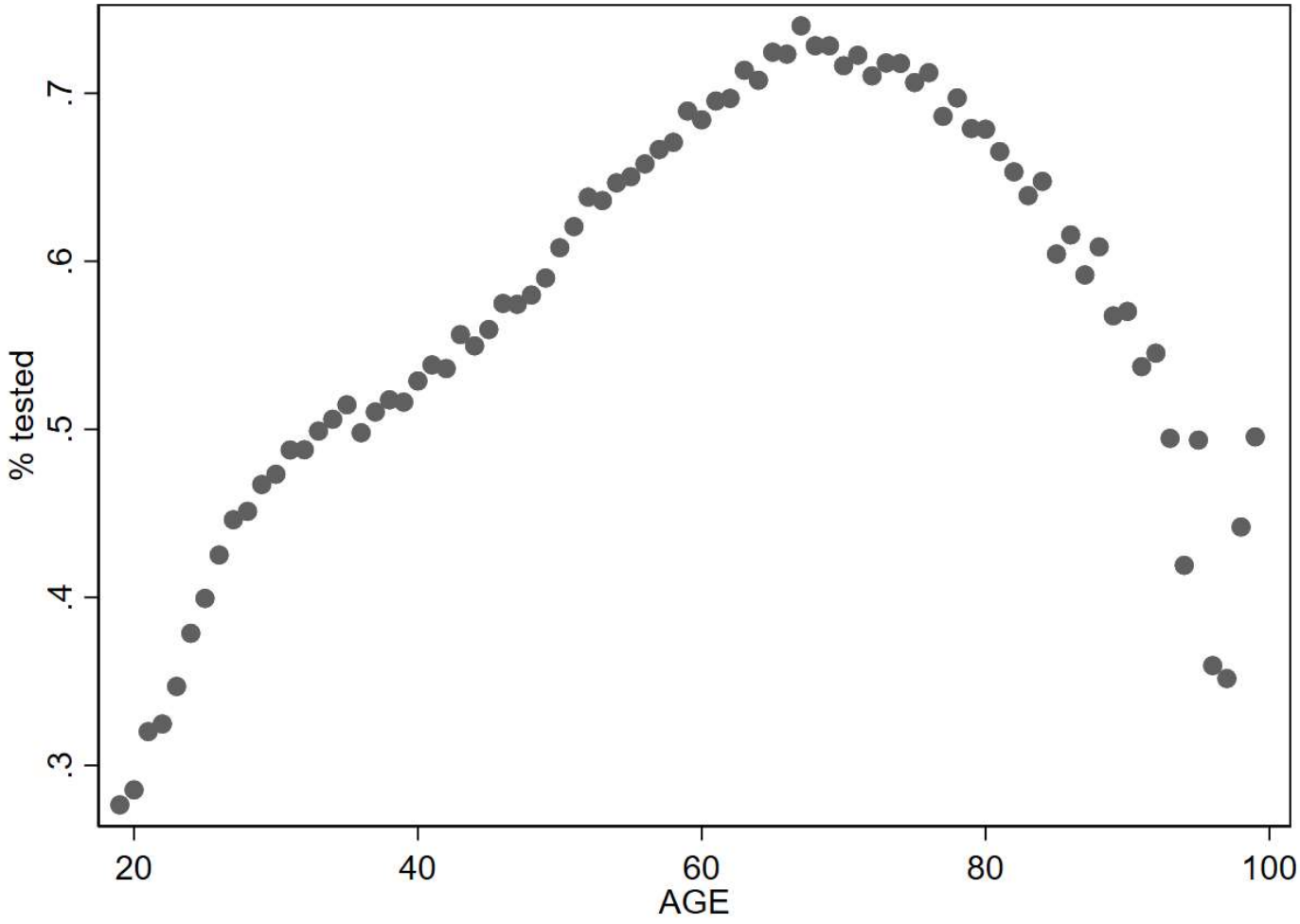
Supplemental Material: The Diabetes Prevention Gap and Opportunities

Table A-1. Risk factors for T2DM from The National Health Interview Survey (NHIS)

NHIS Questionnaire items	Variable names*	Component score
What is your age?	AGE	0: 18-39y 1: 40-49y 2: 50-59y 3: ≥ 60y
Are you male or female?	SEX	0: Female 1: Male
Has your mother, father, brother, or sister EVER been told by a doctor or other health professional that they have diabetes or sugar diabetes?	DIADIAGFAM	0: No 1: Yes
Were you EVER told by a doctor or other health professional that you had diabetes, sugar diabetes, or gestational diabetes during pregnancy?	DIADIAGPREG	0: No 1: Yes
Have you EVER been told by a doctor or other health professional that you had hypertension, also called high blood pressure?	HYP2TIME	0: No 1: Yes
How often do you do VIGOROUS leisure-time physical activities for AT LEAST 10 MINUTES that cause HEAVY sweating or LARGE increases in breathing or heart rate? How often do you do LIGHT OR MODERATE LEISURE-TIME physical activities for AT LEAST 10 MINUTES that cause ONLY LIGHT sweating or a SLIGHT to MODERATE increase in breathing or heart rate?	VIG10FWK, MOD10FWK	0: No 1: Never (both items)
How much do you weigh without shoes? How tall are you without shoes?	WEIGHT, HEIGHT	0: BMI <25, BMI<23 if Asian 1: BMI>=25 BMI<30, BMI>=23 BMI<30 if Asian 2: BMI>=30 BMI<40 3: BMI>=40

Notes: *Variable names are those available via the Integrated Public Use Microdata Series https://nhis.ipums.org/nhis-action/variables/group

Figure A-1. Testing for high blood sugar or diabetes by age

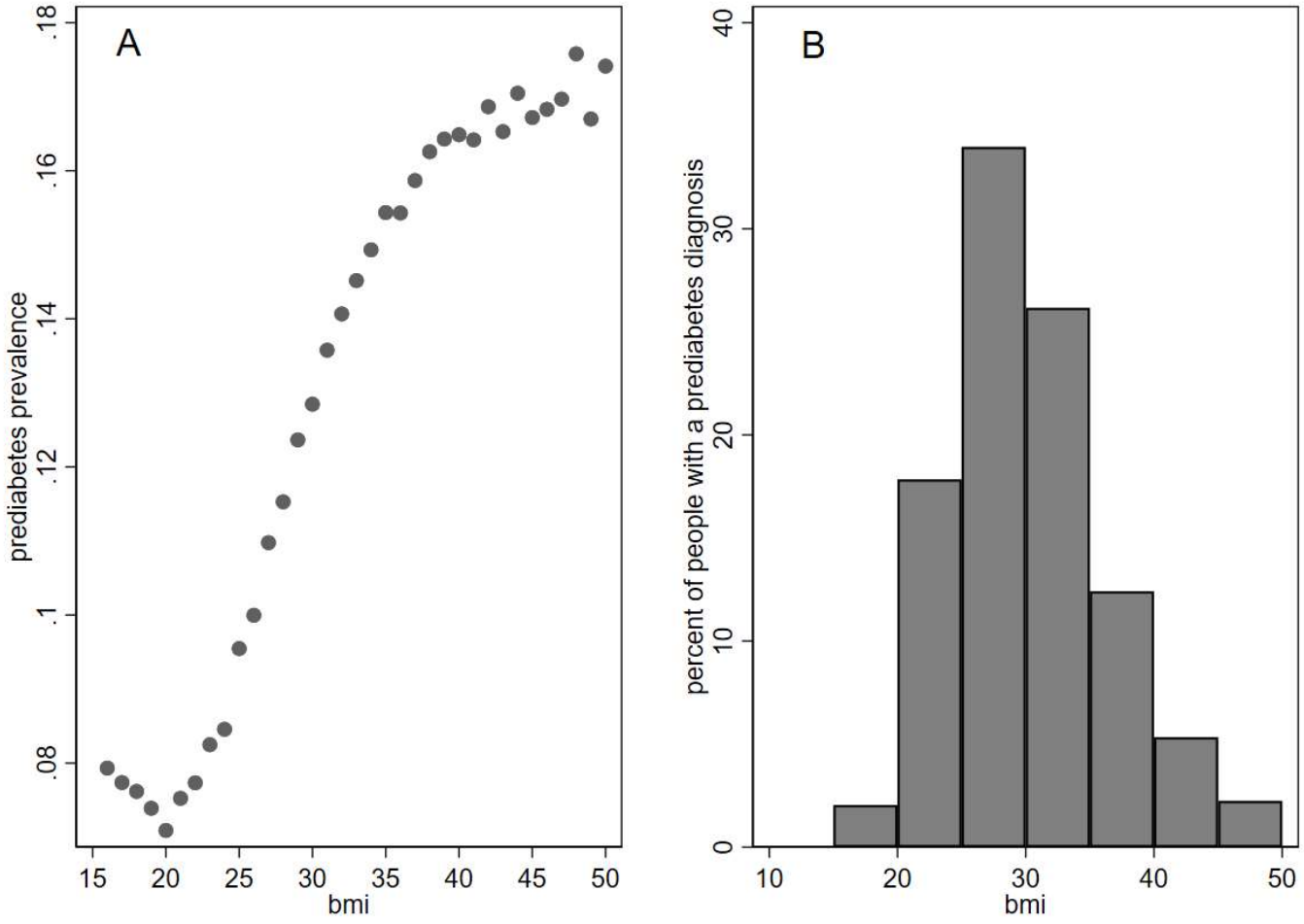


Source: CDC's United States Diabetes Surveillance System and Behavioral Risk Factor Surveillance System.

Figure A-2.

Panel A. Diabetes prevalence by BMI levels.

Panel B. BMI distribution among people diagnosed with prediabetes.



Source: CDC's United States Diabetes Surveillance System and Behavioral Risk Factor Surveillance System.

Note: Not all those with prediabetes have a BMI>25. 19.8% of those diagnoses with prediabetes are a BMI under 25.

Table A-2. NDPP availability across states

State	Number of organizations	accredited organizations (%)	organizations open to the public (%)	distance learning (%)
Alabama	34	29	35	29
Alaska	10	30	40	40
Arizona	28	25	39	32
Arkansas	17	29	47	12
California	153	41	40	34
Colorado	38	42	45	21
Connecticut	23	26	26	30
Delaware	7	43	29	29
D.C.	10	20	60	20
Florida	88	39	48	32
Georgia	70	31	44	20
Hawaii	18	44	50	11
Idaho	18	44	56	17
Illinois	67	39	48	22
Indiana	41	44	51	32
Iowa	47	38	55	36
Kansas	25	36	64	36
Kentucky	34	56	56	35
Louisiana	27	15	52	37
Maine	20	50	60	20
Maryland	119	22	59	50
Massachusetts	28	36	64	36
Michigan	59	51	47	27
Minnesota	41	76	61	10
Mississippi	32	22	72	19
Missouri	27	7	41	15
Montana	30	43	63	20
Nebraska	42	45	62	21
Nevada	14	50	71	14
New Hampshire	10	60	70	30
New Jersey	37	24	51	38
New Mexico	14	36	57	21
New York	144	39	55	28
North Carolina	88	49	60	11
North Dakota	18	33	56	39
Ohio	46	54	54	20
Oklahoma	36	56	50	11
Oregon	33	48	67	18
Pennsylvania	108	35	54	19
Rhode Island	9	44	56	11
South Carolina	50	36	56	28
South Dakota	16	31	44	44
Tennessee	49	29	41	37
Texas	82	28	50	32
Utah	28	39	46	25
Vermont	2	50	0	50
Virginia	54	46	43	31
Washington	25	56	60	12
West Virginia	22	41	59	18
Wisconsin	43	51	51	26
Wyoming	17	18	35	18

Source: NDPP https://dprp.cdc.gov/Registry.

Table A-3. The Medicare Diabetes Prevention Program by state

State	MDPP suppliers*	Prevalence (Diagnosed) of prediabetes 65+ (%)**	Total population 65+ (1,000s)***
Alabama[a]	10	11.4	874
Alaska[a]	2	16.5	96
Arizona[a]	2	16.7	1,374
Arkansas[d]	7	7.4	536
California[a]	64	19.5	5,976
Colorado[a]	40	16.3	876
Conneticut[a]	1	13.8	646
Delaware[a]	15	15.5	198
D.C.[b]	1	15.5	86
Florida[a]	45	13.0	4,638
Georgia[a]	3	15.4	1,575
Hawaii[a]	13	26.4	275
Idaho[a]	25	13.8	306
Illinois[a]	18	12.1	2,089
Indiana[a]	22	14.7	1,115
Iowa[a]	33	13.0	566
Kansas[a]	7	11.4	488
Kentucky[a]	6	12.4	771
Louisiana[d]	2	11.1	764
Maine[a]	8	14.0	294
Maryland[a]	30	18.0	987
Massachusetts[a]	25	15.6	1,198
Michigan[a]	180	14.1	1,812
Minnesota[a]	4	15.8	949
Mississippi[a]	3	10.8	500
Missouri[a]	4	12.8	1,090
Montana[a]	9	11.5	213
Nebraska[a]	4	11.4	319
Nevada[a]	0	17.9	519
New Hampshire[a]	5	13.9	263
New Jersey[a]	6	14.9	1,510
New Mexico[a]	1	18.1	390
New York[a]	33	14.6	3,370
North Carolina[b]	16	13.8	1,815
North Dakota[a]	5	15.3	123
Ohio[a]	68	13.3	2,098
Oklahoma[a]	7	13.9	653
Oregon[a]	68	17.2	790
Pennsylvania[a]	38	13.8	2,448
Rhode Island[d]	0	10.4	192
South Carolina[c]	11	12.0	976
South Dakota[b]	0	12.1	157
Tennessee[b]	18	11	1,181
Texas[b]	12	13.8	3,874
Utah[a]	18	16.2	382
Vermont[b]	0	11.9	129
Virginia[a]	6	13.4	1,401
Washington[b]	25	13.3	1,248
West Virginia[a]	12	11.0	374
Wisconsin[a]	6	14.7	1,048
Wyoming[a]	2	12.6	104

Sources:

* Medicare Diabetes Prevention Program,https://data.cms.gov/cms-innovation-center-programs/alternative-payments-medicare-diabetes-prevention-program/medicare-diabetes-prevention-program

** CDC's United States Diabetes Surveillance System and Behavioral Risk Factor Surveillance System (BRFSS). Data is not available annually for all states. Letters represent the latest available year:

[a] Data from 40 states are from 2020.

[b] Data from 7 states are from 2019.

[c] Data from 1 states are from 2018.

[d] Data from 3 states are from 2017.

Based on the state and year we have used different sample weights, _LLCPWT _LCPWTV1 _LCPWTV2, _LCPWTV3, as recommended by BRFSS.

***U.S. Census Bureau, 2020: https://www.census.gov/programs-surveys/popest/data/tables.html

Table A-4. Overview of Medicaid DPP Eligibility Criteria and Reimbursement for approved states

States	Maximum reimbursement amount*	Reimbursement rate	Eligibility Criteria*
California[a]	$536 (2-year total)	Core Sessions Months 1-6: (G9873) 1st session attended – $20 (G9874) 4 sessions attended – $40 (G9875) 9 sessions attended – $72	
Delaware[b]			Medicaid members who have been referred through a physician referral or self-referral.
Illinois[b]	$670		Medicaid members who are overweight and have elevated blood glucose level or history of gestational diabetes; referral is not required.
Kentucky[b]			Online questionnaire based on CDC risk screener (does not require A1C).
Maryland[a]	$670	(G9873) Session 1, 1st core session attended: $100 (G9874) Sessions 2-4, 4 total core sessions attended: $120 (G9875) Sessions 5-9, 9 total core sessions attended: $140	Medicaid beneficiaries must receive services through a HealthChoice MCO, be between 18-64 years old, be overweight or obese, and have an elevated blood glucose level OR history of gestational diabetes mellitus (GDM)
Michigan[b]	$1000		
Minnesota[a]	$300	$13.62 per hour per beneficiary, approximately $300 for 22 sessions	Medicaid beneficiaries must have a diagnosis of prediabetes by a qualified physician.
Missouri[b]	$577		Services require a referral or prescription from a physician or other licensed practitioner.
Montana[a]	$640	$29.10 per individual per group session (for both in-person visits and those offered via telehealth)	Self-referral with physician approval before starting the program.

New York[a]	$554	$22.00 per-member, per-session reimbursement $70.00 incentive payment - 5% weight loss from baseline	A referral must be written by a physician, physician assistant (PA), nurse practitioner, or midwife to participate in the National DPP.
Oregon[a]	$1,196 (2-year total in-person), $1,176 (2-year total online)	In-person/ Distance Learning: $23 per session. Online: $49 per 30-day period	Blood test required (only for those without an overweight or obese diagnosis).
Pennsylvania[b]	MCOs determine reimbursement rate		Medicaid beneficiaries may need to have a referral from a physician to be eligible for the National DPP lifestyle change program. Each MCO determines whether a referral is required.
Virginia[b]	MCOs determine reimbursement rate		
Wyoming[a]	$418	$19.00/session (core and maintenance) $418 for 22 sessions	Allowing individuals under 18 years of age to participate. Participants must meet pre-diabetes criteria. Blood test required.

Sources:

[a] **Reimbursement Models for Medicaid Agencies and MCOs - National DPP Coverage Toolkit**

[b] **https://coveragetoolkit.org/participating-payers/**

* **https://coveragetoolkit.org/participating-payers/**

Table A-5. Interventions for T2DM prevention

Intervention	Description
The National Diabetes Prevention Program (DPP)	Congress authorized the CDC to establish and lead the National DPP in 2010. The programs are an adaptation of the 2002 NIH-funded DPP trial. It aims for participants to achieve a weight loss equivalent to 5-7% of baseline body weight via moderate changes in diet and physical activity, emphasizing self-efficacy and social support in overcoming common challenges to sustaining weight loss and behavioral changes. The program comprises 16 core classes throughout 4 to 6 months, followed by monthly maintenance sessions in months 7-12. The year-long program is taught by a trained and accredited lifestyle coach.
Medical Nutrition Therapy	MNT is a nutritional diagnostic, therapy, and counseling service for disease management, administered by a registered dietitian or nutrition professional[1]. The intervention consists in teaching the patient to plan meals and carbohydrate intake using tools like the diabetes plate model. Individualization is a key characteristic of the program. A 60 minutes initial visit can be followed up by shorter one-to-one meetings.
Metformin	Metformin has been considered the first line oral medication for T2DM since the 1990s. Large randomized clinical trials, including the DPP, have shown that metformin can also reduce risk of T2DM. Metformin has also been shown to be safe, tolerable and lead to cost-savings when used for diabetes prevention. Although metformin does not have an FDA indication for prediabetes or diabetes prevention, national care guidelines include metformin as one of the evidence-based options for T2DM prevention, especially for adults who are younger than age 60, have BMI$\geq$35, fasting plasma glucose $\geq$110 mg/dL and women with a history of gestational diabetes.
Pioglitazone	Pioglitazone belongs to the thiazolidinedione class of T2DM medications which help increase insulin sensitivity. However, pioglitazone and other TZDs are much less commonly prescribed for T2DM given worrisome side effects including weight gain, heart failure, and fractures. While several studies have shown that pioglitazone can reduce risk of incident T2DM, it is generally not recommended for prediabetes or diabetes prevention because of safety concerns.
Phentermine/Topiramate	Phentermine/topiramate was approved by the FDA for weight loss in 2012 and is usually considered for patients with BMI$\geq$27 kg/m2 and one weight-related

[1] U.S. Department of Health and Human Services: Final MNT regulations. CMS-1169-FC. Federal Register, 1 November 2001. 42 CFR Parts 405, 410, 411, 414, and 415.

	condition. It is a controlled substance that has cardiac risk and can be teratogenic. Studies have shown that phentermine/topiramate is an effective weight loss drug and can reduce risk of T2DM. However, it is generally not used for T2DM because of safety concerns.

Table A-6. Effects on weight loss and fasting blood glucose by race among US studies that translated the Diabetes Prevention Program (N=33 for weight; N=15 for fasting blood glucose).

Race/ Ethnicity	Characteristics	Baseline weight (kg(SD))	Weight change in kg [95% CI]	% body weight lost [95% CI]	FBG change in mg/dL [95% CI]
African American[1-6] (N=237)	mean age 52 years, 77% female	95.4 (4.8)	-1.6 [-2.7; -0.6]	-1.7 [-2.7; -0.7]	-7.8 [-8.3; -7.3]
Asian American[7-9] (N=172)	mean age 51 years, 75% female	75.5 (14.4)	-2.0 [-3.7; -0.3]	-2.5 [-4.2; -0.8]	No data
Indigenous[10-11] (N=1,525)	mean age 42 years, 79% female	97.8 (1.6)	-4.0 [-7.1; -1.0]	-4.1 [-7.3; -0.9]	-1.7 [-4.1; 0.8]
Hispanic[12-18] (N=529)	mean age 44 years, 88% female	81.7 (7.8)	-1.9 [-3.4; -0.5]	-2.1 [-3.8; -0.3]	-1.2 [-2.8; 0.4]
Non-Hispanic White[19-33] (N=2,718)	mean age 52 years, 76% female	96.6 (14.3)	-5.5 [-6.2; -4.7]	-5.7 [-6.3; -5.0]	-2.3 [-5.7; 1.0]

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