

Prediabetes Among Teens up More Than 75% Since 2018

Team A: Kersten Bartelt, RN; Emily Higgs

Team B: Blaine Franklin, DPT, PT; Jacob Gasser

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Key Findings:

- HbA1c screening for teens at increased risk of developing type 2 diabetes has risen from 1.4% of patients in 2018 to more than 2% of patients in the first quarter of 2025. The proportion of these screening results that indicate prediabetes has risen 84% for males and 75% for females since 2018.
- More than half of teens with a prediabetic level HbA1c have a BMI in the obese range, with an additional 10% having a BMI in the overweight range.

Prediabetes is a condition associated with increased blood sugar levels that increases a patient's risk for future type 2 diabetes and other chronic illnesses.¹ While the United States Preventive Services Task Force (USPSTF) screening guidelines recommend beginning prediabetes screening at age 35,² earlier screening is recommended by the American Diabetes Association when there is increased risk such as obesity or family history.³

We aimed to understand trends in HbA1c testing and prediabetes among teenage patients. We studied 18,182,111 teens aged 13–18 who had at least one healthcare visit between Q1 2018 and Q1 2025, with 1,000,628 receiving an HbA1c test.

We found that HbA1c testing rates have increased since 2018. In the first quarter of 2018, 1.4% of male teens had their HbA1c tested, compared to 2.2% in the first quarter of 2025, as seen in Figure 1. Similarly, the HbA1c testing rate for female teens rose from 1.4% to 2.5% over the same period. Rising testing rates may indicate that there are more teens considered at increased risk of developing diabetes. It may also indicate better screening of teens who are at increased risk.

Percentage of Teens with an HbA1c Test

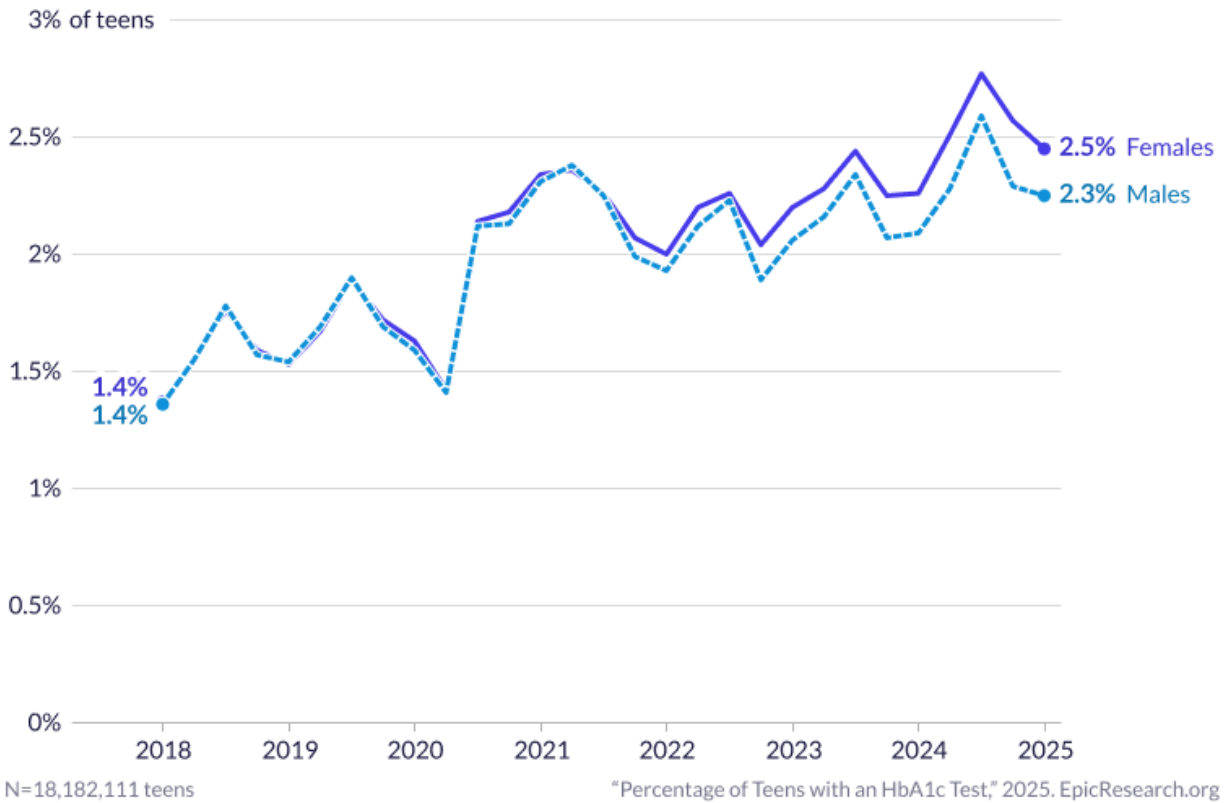


Figure 1. The percentage of teens with an HbA1c tests by quarter from 2018 to the first quarter of 2025.

Over the study period, the proportion of HbA1c tests for male teens that met prediabetic HbA1c thresholds (5.7–6.4%) rose from 14% in the first quarter of 2018 to 16% in the first quarter of 2025. HbA1c tests for female teens, on the other hand, had steady positivity rates of around 12% in the same period.

Percentage of HbA1C Tests Among Teens Reaching a Prediabetic HbA1c Level

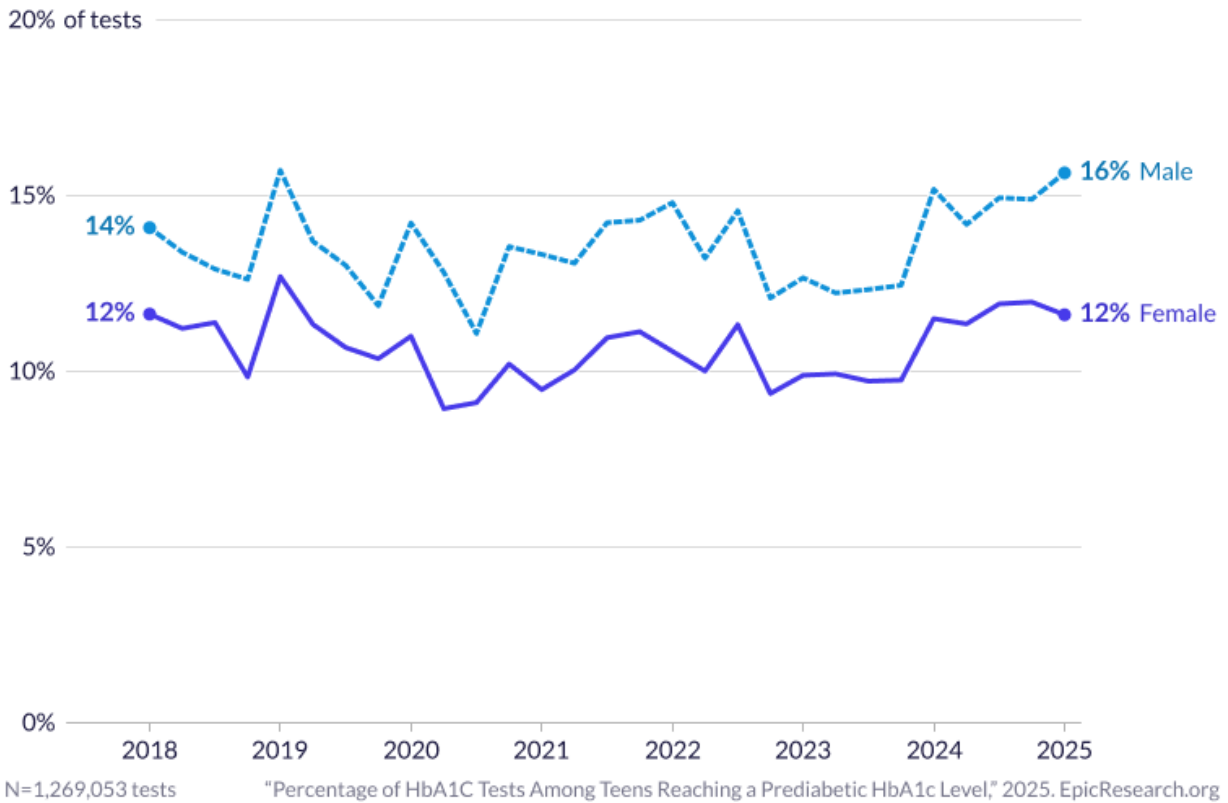


Figure 2. The percentage of HbA1c results for teens that reached a prediabetes threshold (5.7-6.4%) among those without existing prediabetes or diabetes.

Because testing rates have increased, the absolute incidence of newly identified prediabetic-level HbA1c results has also risen, as shown in Figure 3. Among male teens, 19 per 10,000 had a prediabetic HbA1c in the first quarter of 2018, compared to 35 per 10,000 in the first quarter of 2025—an 84% increase. For female teens, the incidence rose from 16 to 28 per 10,000 over the same period, marking a 75% increase.

Portion of Teens Newly Reaching a Prediabetic HbA1c Level

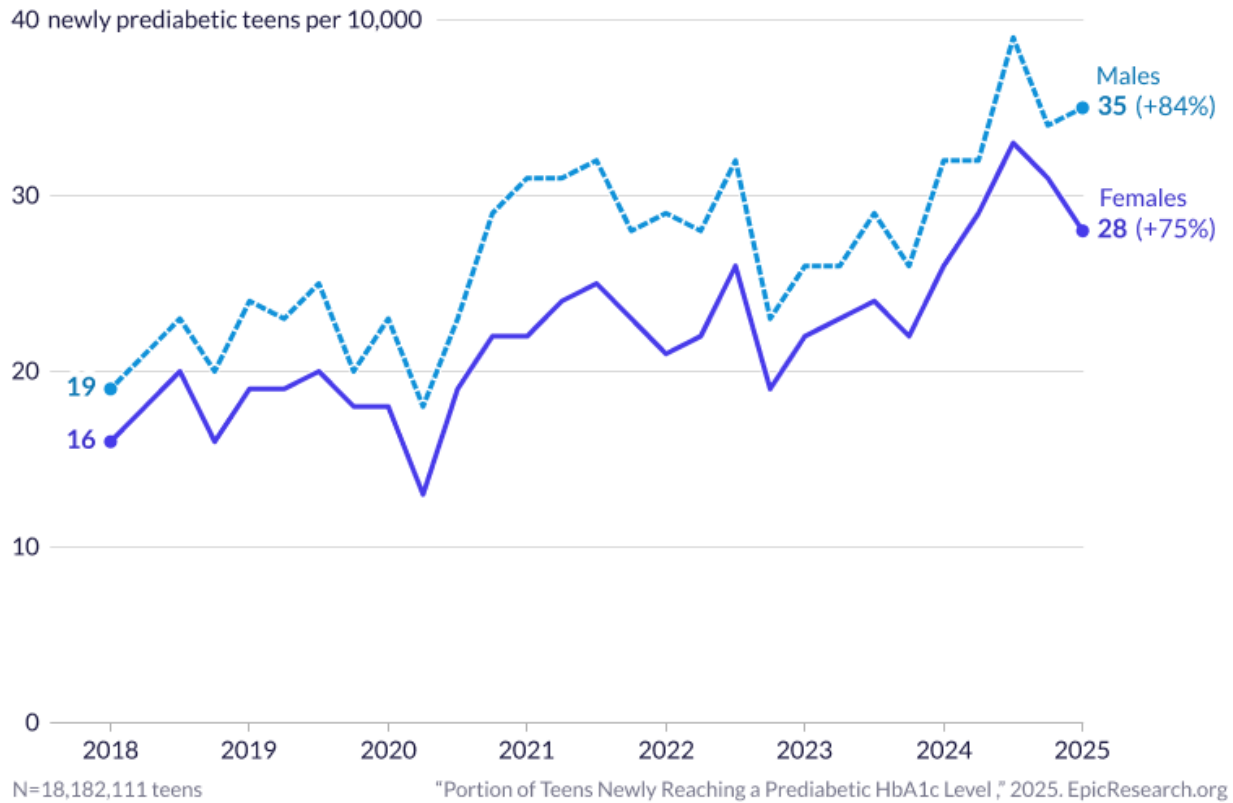


Figure 3. The portion of teens with HbA1c results reaching prediabetes thresholds (5.7-6.4%) among those without existing prediabetes or diabetes.

Previous research shows that obesity is a strong modifiable risk factor for insulin resistance in youth, so we stratified teens with a prediabetic HbA1c by their BMI classification.⁴ We found that more than half had a BMI classifying them as obese, while an additional roughly 10% were classified as overweight. These proportions were consistent across patient sex and time.

BMI Classification Among Teens with Prediabetic HbA1c Level

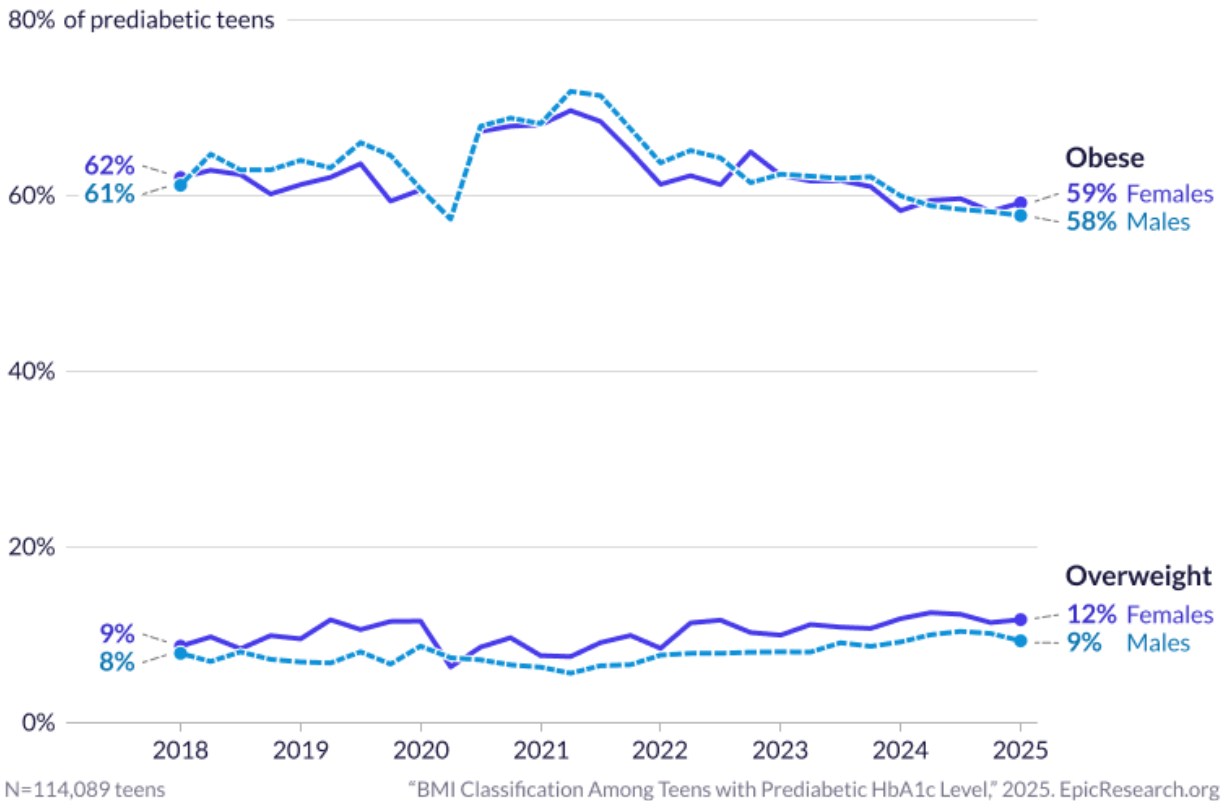


Figure 4. The BMI classification among teens with a prediabetic HbA1c level.

These data come from Cosmos, a dataset created in collaboration with a community of Epic health systems representing more than 300 million patient records from 1,700 hospitals and more than 40,000 clinics from all 50 U.S. states, Lebanon, and Saudi Arabia. This study was completed by two teams that worked independently, each composed of a clinician and research scientists. The two teams came to similar conclusions. Graphics by Brian Olson.

References

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2. Prediabetes and type 2 diabetes: Screening. (2021, August 24). U.S. Preventive Services Task Force. <https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/screening-for-prediabetes-and-type-2-diabetes>. Accessed May 12, 2025.
3. American Diabetes Association. (2018). 2. Classification and diagnosis of diabetes: Standards of Medical Care in diabetes-2018. *Diabetes Care*, 41(Suppl 1), S13–S27. <https://doi.org/10.2337/dc18-S002>
4. Ouyang, A., Hu, K., & Chen, L. (2024). Trends and risk factors of diabetes and prediabetes in US adolescents, 1999-2020. *Diabetes Research and Clinical Practice*, 207(111022), 111022. <https://doi.org/10.1016/j.diabres.2023.111022>

Data Definitions

Term	Definition
Study period	Q1 2018 to Q1 2025
Study population	<p>Inclusion:</p> <ul style="list-style-type: none"> Patients aged 13 to 18 (inclusive) in the studied quarter A face-to-face encounter in the studied quarter <p>Exclusion:</p> <ul style="list-style-type: none"> History of type 1 diabetes: ICD-10-CM code E10* History of a conflicting condition
Censoring	<p>First of the following:</p> <ul style="list-style-type: none"> Type 2 diabetes diagnosis in the quarter or prior Conflicting medication in the quarter or prior Pregnancy started in the quarter or prior Prediabetes before the quarter
Face-to-face encounter	An encounter with a type of Office Visit, Hospital Encounter, Lab, Ancillary Procedure, Telemedicine, Well Child, Consult, Procedure visit, Walk-In, Hospital, Follow-Up, Urgent Care, Allied Health, Home Care Visit, Nursing Home, Assisted Living/Skilled Nursing
Stratifications	Legal sex
Prediabetes	<p>A diagnosis with ICD-10-CM code R73.03 (used for censoring only, not used in identifying new cases)</p> <p>HbA1c lab of 5.7-6.4%</p>
Conflicting condition	<p>Chronic pancreatitis: ICD-10-CM code K86.0 or K86.1</p> <p>Pancreatic cysts: ICD-10-CM code K86.2</p> <p>Pancreatic neoplasm: ICD-10-CM code C25* or D13.6</p> <p>History of pancreatectomy or partial removal: ICD-10-CM code Z90.41*</p> <p>Cystic fibrosis: ICD-10-CM code E84*</p> <p>Hemochromatosis: ICD-10-CM code E83.11*</p> <p>Cushing's syndrome: ICD-10-CM code E24*</p> <p>Acromegaly/gigantism: ICD-10-CM code E22.0</p> <p>Pheochromocytoma or adrenal tumors: ICD-10-CM code C74.1* or D35.00-D35.02</p> <p>Hyperthyroidism: ICD-10-CM code E05*</p> <p>Hyperparathyroidism: ICD-10-CM code E21.0</p> <p>PCOS: ICD-10-CM code E28.2</p>
Conflicting medication	<p>Meglitinides: pharmaceutical class of one of "ANTIHYPERGLYCEMIC, INSULIN-RELEASE STIMULANT TYPE" (simple generic nateglinide or repaglinide) or "ANTIHYPERGLYCEMIC,INSULIN-RELEASE STIM.-BIGUANIDE" (simple generic repaglinide HCl or metformin HCl)</p> <p>GLP-1: pharmaceutical class with "GLP-1;" "ANTI-OBESITY GLUCAGON-LIKE PEPTIDE-1 RECEPT AGONIST;" "ANTIHYPERGLYCEMIC - INCRETIN MIMETICS COMBINATION;" "ANTIHYPERGLY,INCRETIN MIMETIC(GLP-1 RECEPT.AGONIST);" or "ANTIHYPERGLY,INSULIN,LONG ACT-GLP-1 RECEPT.AGONIST"</p> <p>Insulins: pharmaceutical class of one of "INSULINS" (with a route of intravenous, injection, or subcutaneous) or "ANTIHYPERGLY,INSULIN,LONG ACT-GLP-1 RECEPT.AGONIST"</p> <p>DPP-4i: pharmaceutical class of "ANTIHYPERGLYCEMIC, DPP-4 INHIBITORS;" "ANTIHYPERGLYCEMIC, DPP-4 INHIBITOR-BIGUANIDE</p>

	<p>COMBS.;" "ANTIHYPERSGLY-SGLY-2 INHIB,DPP-4 INHIB,BIGUANIDE CB;" "ANTIHYPERSGLYCEMIC, SGLT-2 AND DPP-4 INHIBITOR COMB;" "ANTIHYPERSGLYCEMIC, DPP-4 INHIBITORS;" or "ANTIHYPERSGLYCEMIC, DPP-4 INHIBITOR-BIGUANIDE COMBS."</p> <p>Sulfonylurea: pharmaceutical class of one of "ANTIHYPERSGLYCEMIC, INSULIN-RELEASE STIMULANT TYPE (excluding nateglinide or repaglinide);" "ANTIHYPERSGLYCEMIC,THIAZOLIDINEDIONE-SULFONYLUREA;" or "ANTIHYPERSGLYCEMIC,INSULIN-RELEASE STIM.-BIGUANIDE (excluding repaglinide HCl and metformin HCl)"</p> <p>SGLT2i: pharmaceutical class of one of: "ANTIHYPERSGLYCEMIC-SOD/GLUC CONTRANSPORT2(SGLT2) INH;" "ANTIHYPERSGLYCEMIC-SGLT2 INHIBITOR-BIGUANIDE COMBS.;" "ANTIHYPERSGLY-SGLT-2 INHIB,DPP-4 INHIB,BIGUANIDE CB;" or "ANTIHYPERSGLYCEMIC, SGLT-2 AND DPP-4 INHIBITOR COMB"</p> <p>Thiazolidinedione: pharmaceutical class of one of "ANTIHYPERSGLYCEMIC,THIAZOLIDINEDIONE(PPARG AGONIST);" "ANTIHYPERSGLYCEMIC, THIAZOLIDINEDIONE AND BIGUANIDE;" "ANTIHYPERSGLYCEMIC,THIAZOLIDINEDIONE-SULFONYLUREA;" or "ANTIHYPERSGLY, DPP-4 ENZYME INHIB.-THIAZOLIDINEDIONE"</p>
Pregnancy Start	<p>The earliest date of the following:</p> <ul style="list-style-type: none"> • Pregnancy record with an estimated start date • Birth record with a noted conception date • Diagnosis date with O00*-O48* approximates early pregnancy • Diagnosis date with O60*-O9A* approximates late pregnancy or birth, remove 9 months from this date for an estimated pregnancy start
HbA1c	A lab with LOINC code 17856-6, 17855-8, 4548-4, or 4549-2

Table 1: Percentage of Teens with an HbA1c Test

Quarter	2018				2019				2020			
Females	1.37%	1.56%	1.76%	1.59%	1.53%	1.67%	1.89%	1.72%	1.63%	1.42%	2.14%	2.18%
Males	1.36%	1.55%	1.78%	1.57%	1.54%	1.69%	1.90%	1.69%	1.59%	1.41%	2.12%	2.13%

Quarter	2021				2022			
Females	2.34%	2.36%	2.26%	2.07%	2.00%	2.20%	2.26%	2.04%
Males	2.31%	2.38%	2.25%	1.99%	1.93%	2.12%	2.23%	1.89%

Quarter	2023				2024				2025
Females	2.20%	2.28%	2.44%	2.25%	2.26%	2.51%	2.77%	2.57%	2.45%
Males	2.06%	2.16%	2.34%	2.07%	2.09%	2.28%	2.59%	2.29%	2.25%

Table 2: Percentage of HbA1C Tests Among Teens Reaching a Prediabetic HbA1c Level

Quarter	2018				2019				2020		
Female	11.63%	11.22%	11.39%	9.84%	12.70%	11.34%	10.68%	10.36%	11.00%	8.94%	
Male	14.09%	13.39%	12.91%	12.62%	15.72%	13.70%	13.02%	11.87%	14.22%	12.82%	

Quarter	2021				2022					
Female	9.11%	10.21%	9.48%	10.04%	10.96%	11.13%	10.57%	10.01%	11.33%	9.37%
Male	11.08%	13.55%	13.33%	13.08%	14.23%	14.30%	14.80%	13.22%	14.57%	12.09%

Quarter	2023				2024				2025		
Female	9.89%	9.93%	9.72%	9.75%	11.50%	11.35%	11.92%	11.97%	11.61%		
Male	12.66%	12.23%	12.33%	12.45%	15.18%	14.18%	14.94%	14.90%	15.65%		

Table 3: Portion of Teens Newly Reaching a Prediabetic HbA1c Level

	2018				2019				2020				2021			
Females	16	18	20	16	19	19	20	18	18	13	19	22	22	24	25	23
Males	19	21	23	20	24	23	25	20	23	18	23	29	31	31	32	28

	2022				2023				2024				2025		
Females	21	22	26	19	22	23	24	22	26	29	33	31	28		
Males	29	28	32	23	26	26	29	26	32	32	39	34	35		

Table 4: BMI Classification Among Teens with Prediabetic HbA1c Level

	2018				2019				2020		
Obese Females	62.05%	62.88%	62.40%	60.18%	61.26%	62.10%	63.63%	59.39%	60.64%	57.45%	
Overweight Females	8.72%	9.78%	8.42%	9.92%	9.56%	11.72%	10.62%	11.53%	11.58%	6.37%	
Obese Males	61.19%	64.72%	62.93%	62.94%	64.02%	63.17%	66.03%	64.60%	60.78%	57.34%	
Overweight Males	7.91%	6.98%	8.07%	7.22%	6.93%	6.82%	8.07%	6.68%	8.73%	7.40%	

	2021				2022					
Obese Females	67.32%	67.90%	68.07%	69.69%	68.44%	65.01%	61.29%	62.27%	61.26%	64.98%
Overweight Females	8.62%	9.68%	7.65%	7.53%	9.13%	9.95%	8.49%	11.37%	11.68%	10.28%
Obese Males	67.90%	68.84%	68.20%	71.87%	71.38%	67.61%	63.75%	65.14%	64.29%	61.48%
Overweight Males	7.16%	6.59%	6.34%	5.65%	6.50%	6.61%	7.71%	7.90%	7.91%	8.03%

	2023				2024				2025	
Obese Females	62.34%	61.67%	61.70%	61.03%	58.29%	59.47%	59.67%	58.22%	59.19%	
Overweight Females	9.99%	11.19%	10.88%	10.74%	11.85%	12.54%	12.35%	11.41%	11.74%	
Obese Males	62.45%	62.22%	61.96%	62.15%	59.99%	58.85%	58.45%	58.17%	57.74%	
Overweight Males	8.08%	8.05%	9.11%	8.70%	9.21%	10.02%	10.41%	10.17%	9.34%	