

A Profile of Undiagnosed Diabetics

*Results from the Boston Area Community
Health (BACH) III Survey*

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- ❖ Type 2 diabetes mellitus (T2DM) can present with subtle (or no) symptoms
- ❖ 4- to 7-year time lag between the onset of T2DM and eventual diagnosis
- ❖ Delay in initial diagnosis results in
 - ↑ **greater** diabetes-related complications
 - ↓ **poorer** patient outcomes
 - ↓ **reduced** quality of life
 - ↑ **greater** health care costs

From the American Diabetes Association (ADA)

Table 4—Criteria for testing for diabetes in asymptomatic adult individuals

1. Testing should be considered in all adults who are overweight (BMI ≥ 25 kg/m²*) and who

Routine screening should be conducted on all adults who are:

- overweight
- physically inactive
- have a family history of diabetes
- are African American or Hispanic
- hypertension
- high cholesterol

- A1C $\geq 5.7\%$, IGT, or IFG on previous testing

For all others:

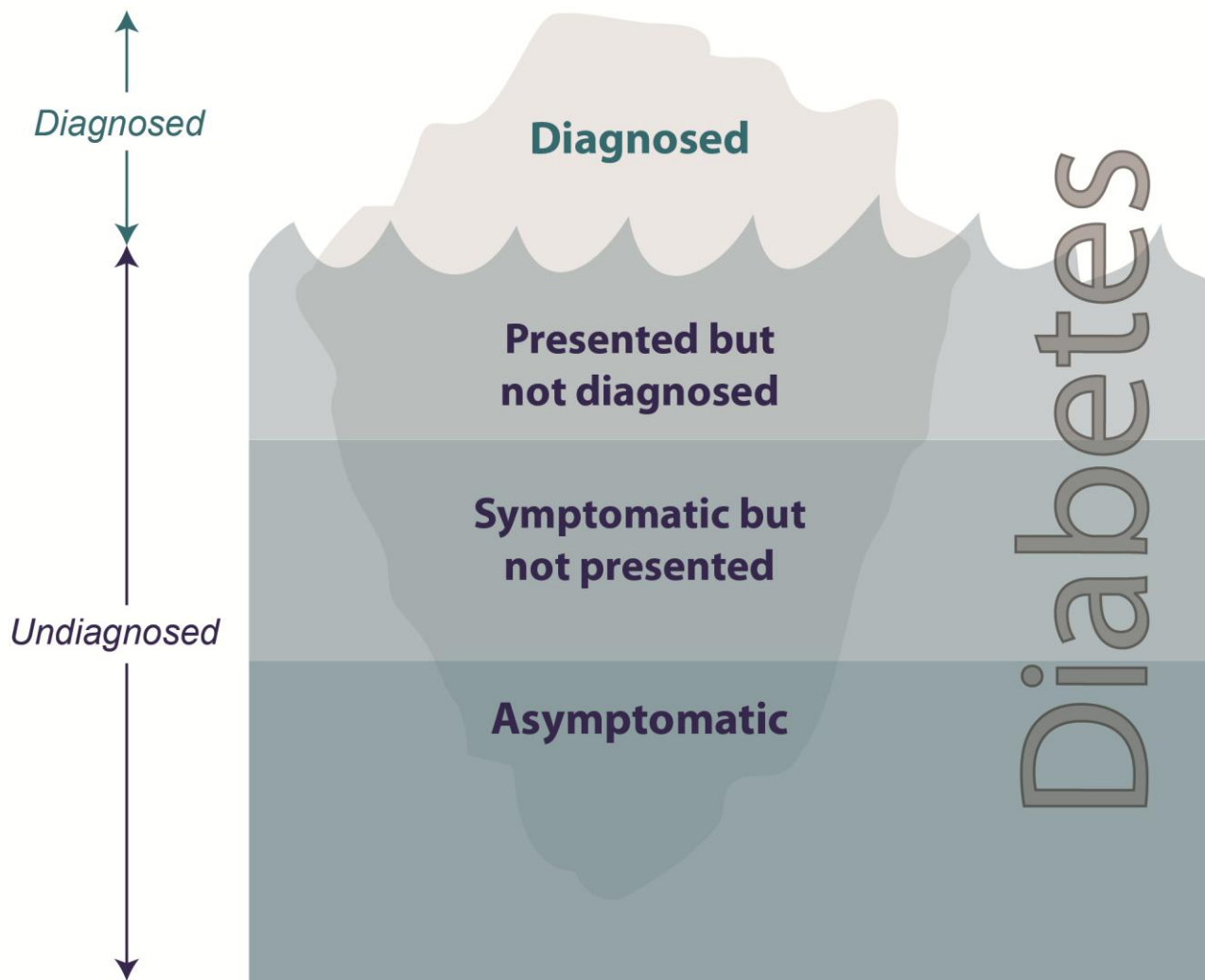
- screening should not begin until age 45

2. In the absence of the above criteria, testing for diabetes should begin at age 45 years

3. If results are normal, testing should be repeated at least at 3-year intervals, with consideration of more-frequent testing depending on initial results (e.g., those with prediabetes should be tested yearly) and risk status.

*At-risk BMI may be lower in some ethnic groups. PCOS, polycystic ovary syndrome.

25-40% of T2DM is undiagnosed



- ❖ The **only** way to measure the prevalence of both diagnosed **and undiagnosed** diabetes is to conduct a community-based survey

- ❖ What is the prevalence of undiagnosed diabetes in the Boston Area Community Health (BACH) III Survey?
- ❖ What are the risk factors for remaining undiagnosed?

The Boston Area Community Health (BACH) III Survey

- ❖ Population-based **random**-sample survey of community dwelling adults
- ❖ BACH is the third wave of the BACH Survey
 - BACH T1 (2002-2005), n=5,502
 - BACH T2 (2006-2010), n=4,145
 - BACH T3 (2010-2012), n=3,151

| | Black | Hispanic | White | Total |
|-------|-------|----------|-------|-------|
| Men | 370 | 354 | 460 | 1,184 |
| Women | 657 | 679 | 631 | 1,967 |
| Total | 1,027 | 1,033 | 1,091 | 3,151 |

The Boston Area Community Health (BACH) III Survey

- ❖ Diagnosed diabetes (self report)
 - Medication/insulin usage
- ❖ Undiagnosed diabetes
 - Fasting glucose ≥ 126 or
 - HbA1c ≥ 6.5

Criteria for Clinical Diagnosis of Prediabetes and Diabetes

| | HbA1c | FPG | OGTT |
|---------------------|---------------------------|-----------------------------------|-----------------------------------|
| Diabetes | $\geq 6.5\%$ | ≥ 126 mg/dl | ≥ 200 mg/dl |
| Pre-Diabetes | $< 6.5\%$ $\geq 5.7\%$ | < 126 mg/dl ≥ 100 mg/dl | < 200 mg/dl ≥ 140 mg/dl |
| Normal | $< 5.7\%$ | < 100 mg/dl | < 140 mg/dl |

Statistical methods for prevalence data

- ❖ Determinants:
 - Race/ethnicity
 - Gender
 - Age
 - Social class (Green)
- ❖ Outcome: Prevalence of undiagnosed diabetes (age-adjusted where appropriate)
- ❖ Selected data from the National Health and Nutrition Examination Survey (NHANES) were included for comparison

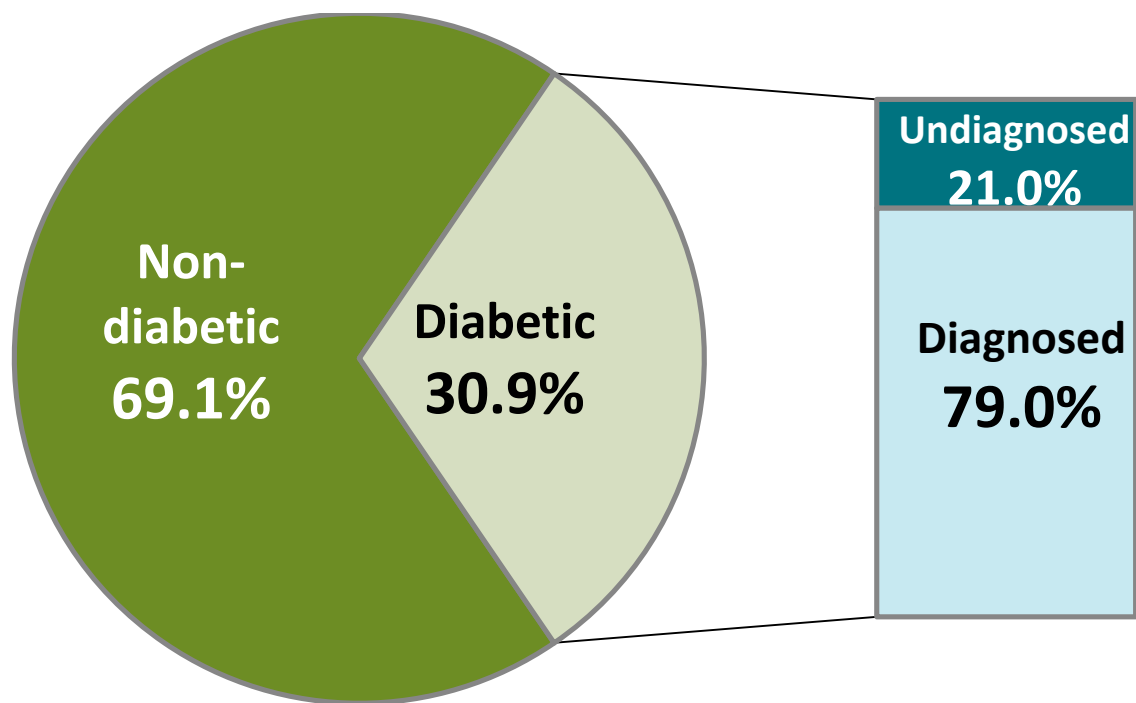
Statistical methods for risk factor data

- ❖ Determinants were grouped into 4 domains:
 - Social/economic
 - Access to care/utilization
 - Lifestyle/behaviours
 - Physiologic influences
- ❖ Outcome: % of diabetes that is undiagnosed
- ❖ Logistic regression analyses
- ❖ Participants with **diagnosed diabetes at T2** were excluded



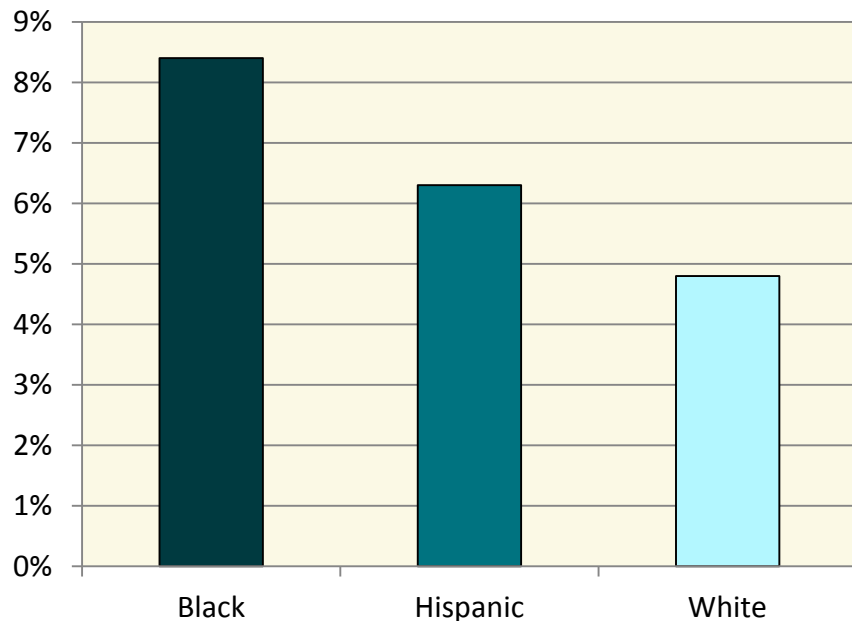
What is the prevalence of undiagnosed diabetes?

- ❖ The prevalence of diabetes in BACH III was 30.9% (n=862)
- ❖ 21.0% of diabetes cases were undiagnosed (n=181)
- ❖ Almost **40%** according to national estimates (NHANES)

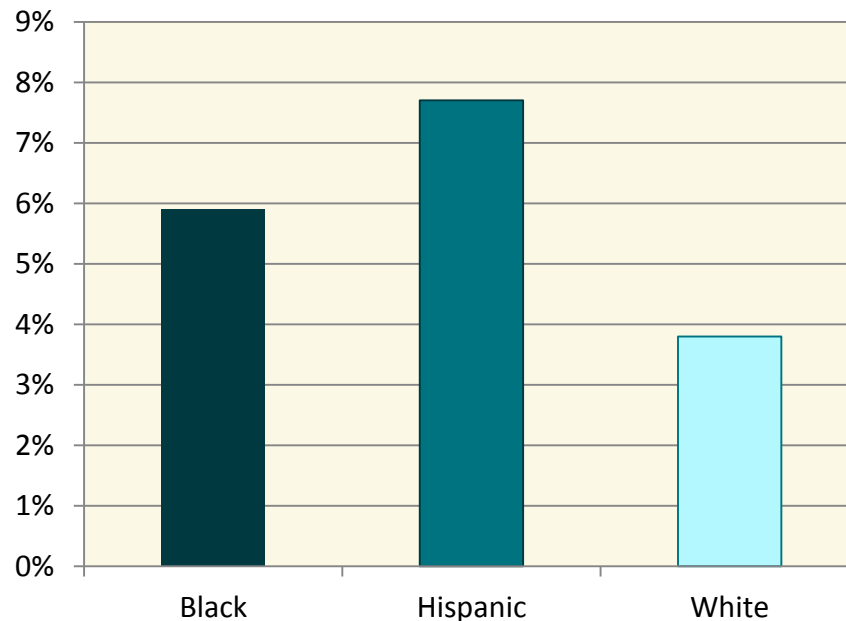


By Race/Ethnicity

Undiagnosed Diabetes in BACH III by Race/Ethnicity (p=0.006)



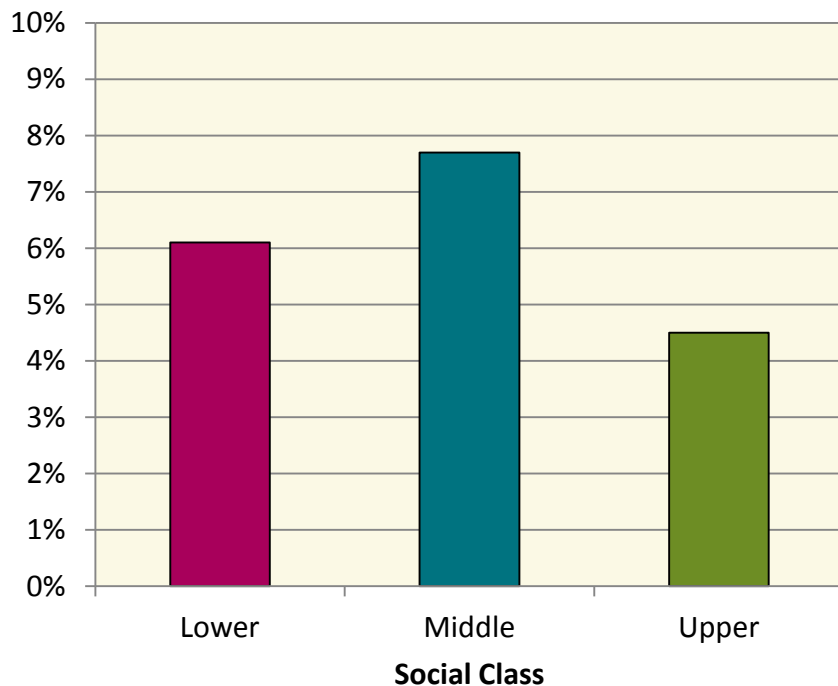
Undiagnosed Diabetes in NHANES by Race/Ethnicity (p=0.008)



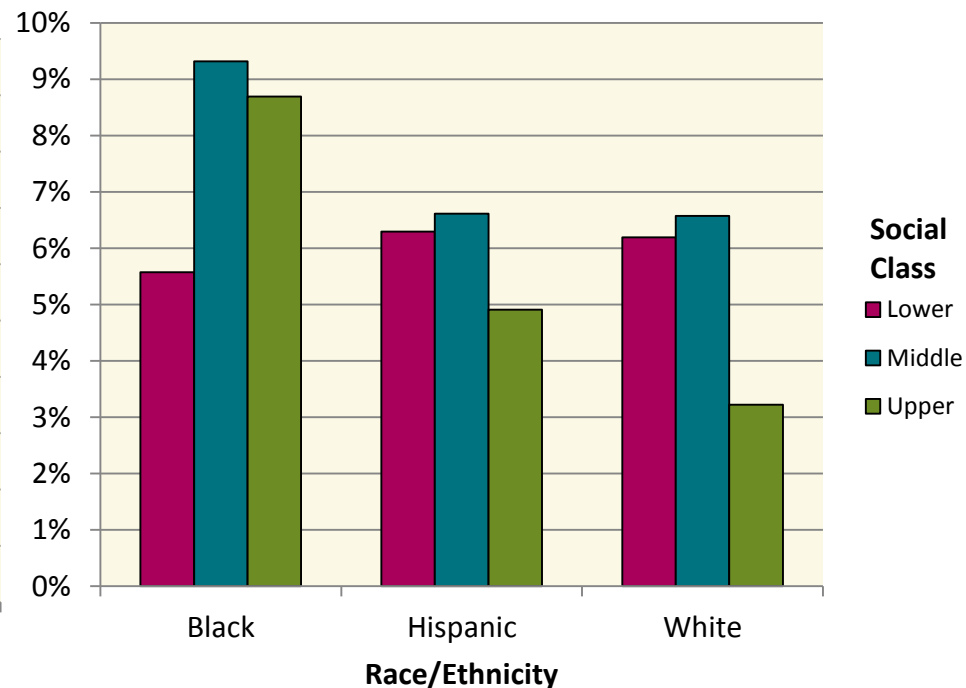
Age-adjusted

By Social Class

Undiagnosed Diabetes in BACH III by Social Class ($p=0.02$)



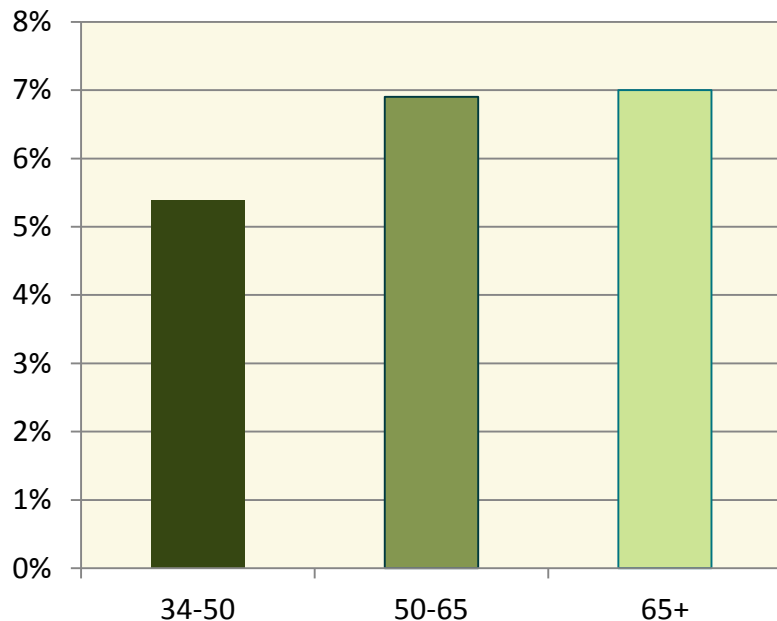
Undiagnosed Diabetes in BACH III by Social Class and Race/Ethnicity ($p=0.49$)



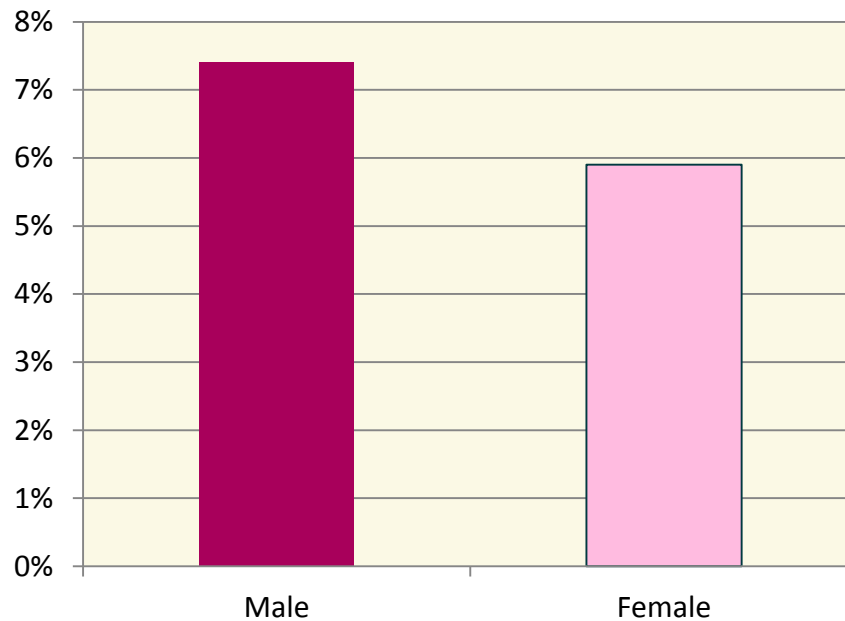
Age-adjusted

Prevalence of Undiagnosed Diabetes in BACH III

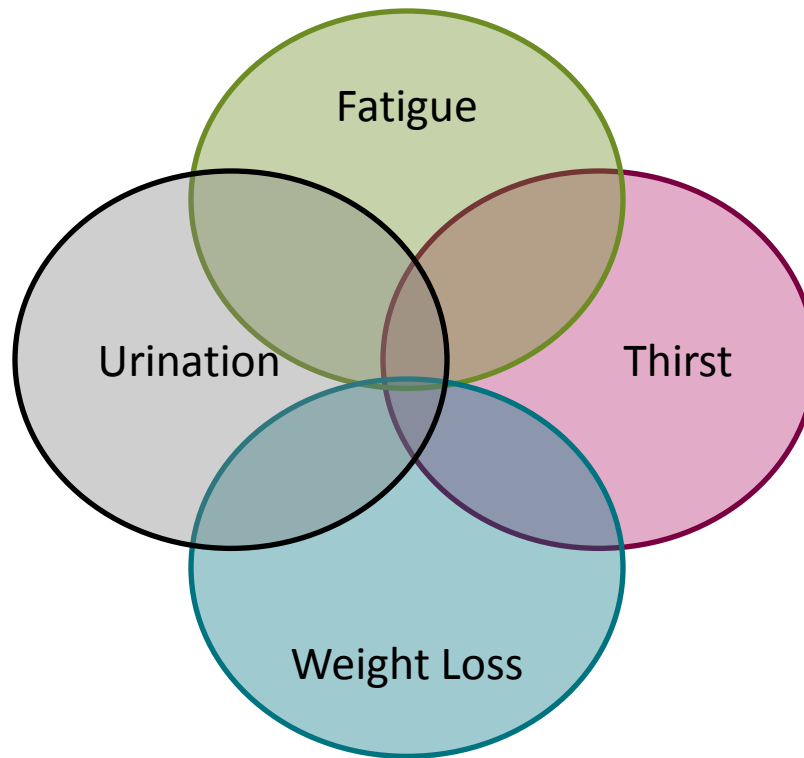
Age ($p=0.31$)



Gender ($p=0.13$)



- Most undiagnosed participants reported having no symptoms (65.1%)

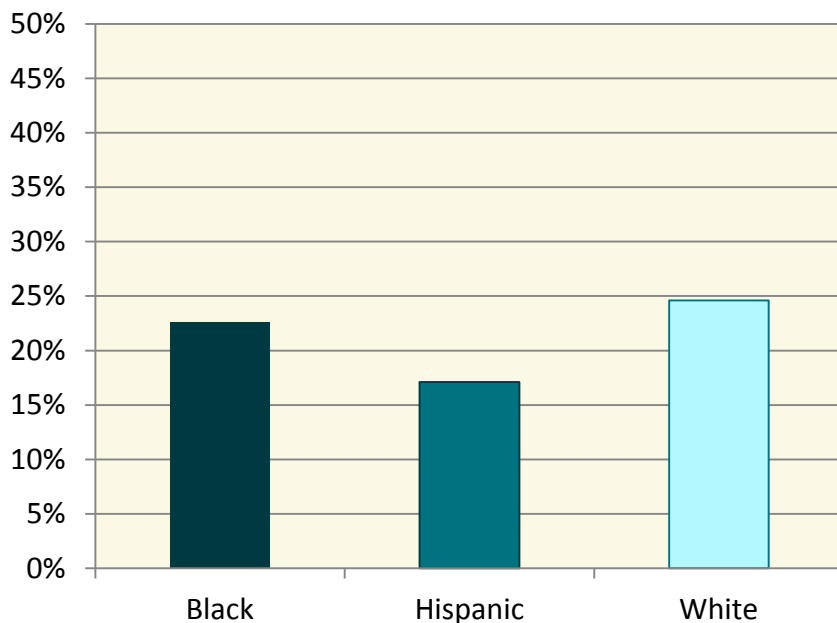


- 20% reported having 2 or more symptoms

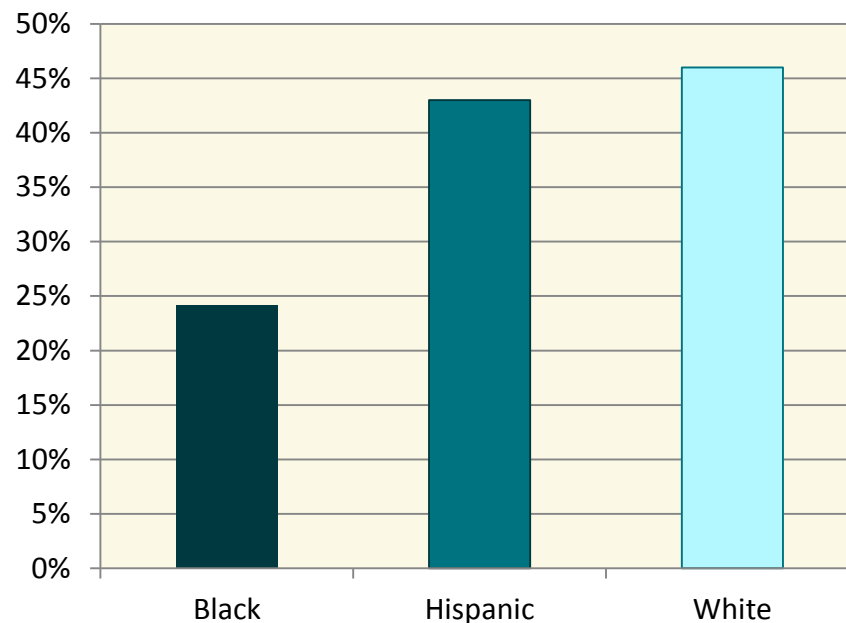
What are the risk factors for remaining undiagnosed?

% of total diabetes that is undiagnosed

% of Undiagnosed Diabetes by Race/Ethnicity BACH III (p=0.08)

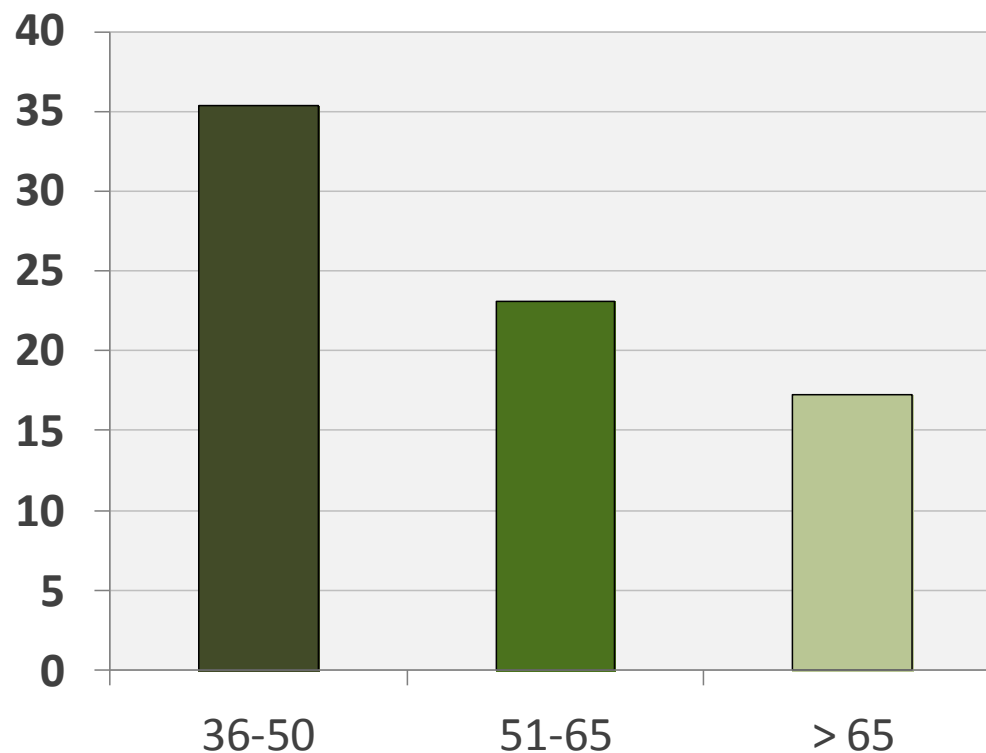


% of Undiagnosed Diabetes by Race/Ethnicity NHANES (p=0.02)



% of total diabetes that is undiagnosed

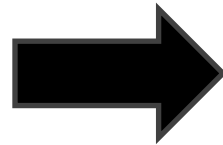
% of Undiagnosed Diabetes by Age



What are the risk factors for remaining undiagnosed?

Social/economic

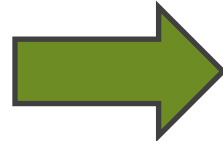
Age
Gender
Race/Ethnicity
Primary language
Social class



↑ English-speakers were slightly more likely to be diagnosed (OR = 2.9, p = 0.07)

Access/Utilization

Insurance (private, public, none)
Visits to a health care provider
Having a usual provider
Trouble paying for care



↑ Participants who visited a health care provider 5 or more times in the past year were more likely to be diagnosed (OR = 2.4, p = 0.004)

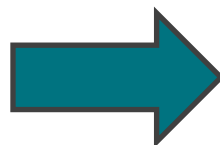
What are the risk factors for remaining undiagnosed?

Lifestyles/behaviours

Physical activity

Diet

BMI



↓ Participants with greater physical activity were less likely to be diagnosed (OR = 1.4, 2.6; middle v. low, high v. low; $p = 0.004$)

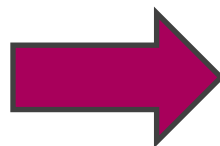
Physiologic influences

High blood pressure

Cardiovascular disease

High cholesterol

Family history of diabetes



↑ Participants with a history of high cholesterol were more than twice as likely to be diagnosed (OR = 3.1, $p < 0.001$)

↑ Participants with a documented family history of diabetes were more likely to be diagnosed (OR = 3.0, $p < 0.001$)

- ❖ Undiagnosed diabetes is less prevalent in the BACH III sample than in national survey samples
- ❖ Factors like **access to care, health care utilization**, and the presence of **co-morbid conditions** had the greatest impact on diabetes diagnosis.
- ❖ Individuals without traditional risk factors for diabetes (i.e. **family history**) have a greater risk of remaining undiagnosed.

Improving access to care may greatly increase the likelihood of diagnosing previously undiagnosed cases, with important implications for health costs and outcomes.

Thank you.

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