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Prevalence of undiagnosed diabetes among non-pregnant women of reproductive age in the United States, 1999–2010

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Undiagnosed diabetes affects an estimated 1.8-2.3% of the United States (US) adult population 20 years of age [1,2]. Undiagnosed diabetes can have particularly harmful consequences among women of reproductive age because pre-gestational diabetes mellitus (PGDM) is associated with a substantially increased risk of adverse birth outcomes in pregnant women [3-7]. Timely preconception care for women with PGDM can reduce the incidence of adverse birth outcomes, including preterm delivery, congenital malformations, and perinatal death [8,9]. We aimed to assess the prevalence of undiagnosed diabetes and those at high risk for developing diabetes among non-pregnant women of reproductive age in the US.

We applied the methods reported in Cowie, et al. [1] essentially to a subset of the population examined in that analysis (the notable deviation is that our analysis included more years of data than Cowie, et al.). Using data from the 1999-2010 National Health and Nutrition Examination Surveys (NHANES), we examined fasting plasma glucose (FPG) (assessed 1999-2010) and A1C (assessed 1999-2006) laboratory values among women age 15-44 with no self-reported diabetes diagnosis (based on whether, other than during pregnancy, a doctor or health care professional ever told them they had diabetes). NHANES is designed to be representative of the US population and includes an in-home questionnaire and an examination at a Mobile Examination Center [10].

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From 1999-2010, 10,700 women age 15-44 participated in the interview portion of NHANES, among whom 209 reported a diabetes diagnosis. Among 10,491 women who reported no diabetes diagnosis, 6,881 (65.6%, based on survey sample weights) and 4,352 (41.5%) had A1C and FPG laboratory values available for analysis, respectively. Among those, 30 had A1C values suggesting undiagnosed diabetes (A1C ≥ 6.5), compared to 28 based on FPG values (≥ 126 mg/dl) (Table). Although there was not sufficient sample size to produce reliable estimates of the percentage of non-pregnant US women of reproductive age with undiagnosed diabetes based on these data, the weighted survey estimates suggest it may be approximately 0.5%. The current population of US women age 15-44 is 61,606,000 [11]. Our results suggest approximately 300,000 women of reproductive age nationwide may have undiagnosed diabetes. An additional 284 (4.0%) and 438 (11.2%) women from our sample were at risk of diabetes based on A1C values (5.7- <6.5 %) and FPG values (100- <126 mg/dl), respectively, suggesting approximately 2.5 to 7 million more women of reproductive age may be at risk for diabetes (Table). Given that 49% of pregnancies in the U.S. are unplanned, our findings suggest many pregnancies might be affected by unrecognized diabetes [12].

Among pregnant women 15-44 years in NHANES 1999-2010 (n=1,173), none had undiagnosed diabetes based on our criteria. However, we show here a noteworthy number of women who may become pregnant have elevated glucose values; this has serious implications for women's health during pregnancy and the postpartum period, as well as the health of the developing fetus. Identifying and treating women with elevated glucose in the preconception period might ultimately help reduce adverse birth outcomes for thousands of women nationwide.

The prevalence of undiagnosed diabetes in the general US population varies significantly by age and race/ethnicity [1]. Even with the power of the NHANES data, the population we examined was small and therefore the estimates were somewhat unstable. This issue inhibited examination of differences by women's demographic characteristics—including race/ethnicity—as well as the scope of conclusions we can draw from our results. Because of these drawbacks, explanation of our analysis was best suited to a brief report format. However, these results point to the importance of additional future examination of undiagnosed and pre-diabetes among women of reproductive age.

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Abbreviations

NHANES	National Health and Nutrition Examination Survey
PGDM	pre-gestational diabetes mellitus

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Table

A1C and fasting plasma glucose levels among non-pregnant women age 15-44 without diagnosed diabetes, National Health and Nutrition Surveys (NHANES), 1999-2010

Hemoglobin A1C (1999-2006) (n=6881, n _{weighted} =37,720,319)			Fasting plasma glucose (FPG) (1999-2010) (n=4352, n _{weighted} =60,266,892)		
Normal/low <5.7%	At risk of diabetes 5.7-6.5%	Diabetes 6.5+	Normal/low <100 mg/dl	At risk of diabetes 100-<126 mg/dl	Diabetes 126+ mg/dl
6,567 (95.5% ^{<i>l</i>})	284 ^{**} (4.0% ^{<i>l</i>})	30 [*]	3,886 (88.1% ^{<i>l</i>})	438 [#] (11.2% ^{<i>l</i>})	28 [*]

Notes. Includes women who self-reported no diabetes diagnosis and had recorded A1C/FPG laboratory values.

^{*l*} Weighted percentages.

* Estimates suppressed because minimum degrees of freedom (12) for strata not met.

** Approximately 2.5 million women of childbearing age may be at risk for diabetes.

Approximately 7 million women of childbearing age may be at risk for diabetes