



The impact of access to health services on prediabetes awareness: A population-based study



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ABSTRACT

Research demonstrates that prediabetes awareness has important implications for participation in diabetes risk-reducing behaviors. We examined the impact of levels of access to health services on prediabetes awareness. In 2016, we conducted an analysis among U.S. adults with prediabetes using cross-sectional data from three cycles (2007–2008, 2009–2010, and 2011–2012) of the National Health and Nutrition Examination Survey. Participants aware and unaware of their prediabetes were classified as having full, partial, or no access to health services based on current health insurance coverage and having a routine place to go for health care. Multivariable logistic regression was used to estimate the association between access to health services and prediabetes awareness. Among a total sample of 2999 U.S. adults with prediabetes, an estimated 92.0% were unaware of their prediabetes status. Participants that were unaware of their prediabetes tended to be younger, male, and were less likely to be obese or have a family history of diabetes. Having no access to health services significantly increased the odds of being prediabetes unaware (AOR: 2.65; 95% CI: 1.10–6.38). However, participants with insurance but no place of regular care had the greatest odds of being prediabetes unaware (AOR: 3.21; 95% CI: 1.21–8.55). These findings suggest that access to health services is a key factor for prediabetes awareness. Health policies and interventions should strive to ensure equitable access to health services in order to detect prediabetes, and promote awareness and engagement in risk-reducing behaviors to decrease the incidence of diabetes.

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1. Introduction

Type 2 diabetes has increasingly become an international concern due to the high prevalence worldwide, and the substantial risk for long-term complications and mortality (Alberti and Zimmet, 1998; Roglic et al., 2005; World Health Organization, 2011; Morrish et al., 2001; World Health Organization, 2012). Without intervention, 15–30% of people that have prediabetes, an asymptomatic preclinical phase, will go on to develop type 2 diabetes (Centers for Disease Control and Prevention, 2013; Centers for Disease Control and Prevention, 2014). Between 2010 and 2012, the number of U.S. adults aged 20 or older with prediabetes increased from an estimated 79 million to 86 million. Furthermore, an alarming 9 in 10 people with prediabetes do not know they have prediabetes (Centers for Disease Control and Prevention, 2013; Centers for Disease Control and Prevention, 2014). Among adults with prediabetes, research has highlighted that

even modest lifestyle changes can normalize blood glucose levels, and that a lack of prediabetes awareness is a barrier for engaging in risk-reducing behaviors such as weight management and physical activity (Centers for Disease Control and Prevention, 2013; Gopalan et al., 2015).

Evidence supporting the impact of access to health services on treatment, prevention, and better health outcomes is well established (DeVoe et al., 2011; Finkelstein et al., 2012; Zhang et al., 2012; Hadley, 2003; Bindman et al., 1995; Nelson et al., 2005; Moy et al., 1995). In particular, studies have demonstrated the importance of both insurance coverage and a place of regular care, as either type of access alone is often insufficient to ensure that health care needs are met. For instance, DeVoe et al. (2011) demonstrated that U.S. adults lacking both insurance and a regular source of care had a higher percentage of unmet medical needs, and more problems and delays in obtaining care, relative to their counterparts with both insurance and a regular place of care. Furthermore, having only insurance or only a usual source of care was associated with higher rates of care-related problems and delays, relative to those with both insurance and a usual source of care. Similarly, lack of health insurance coverage has been shown to be associated with early mortality, lack of medical care, and poor health status (Hadley, 2007; Institute of Medicine, 2004; Starfield and Shi, 2004). Lack of a usual source of care is also linked to health disparities and

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increased health care costs (Starfield and Shi, 2004; De Maeseneer et al., 2003; National Center for Health Statistics, 2012). Despite this evidence, as well as health insurance expansion under the Affordable Care Act in the U.S., and universal access to health care services in a number of countries around the world, inequities related to access to care persist (Zhang et al., 2012; van Doorslaer et al., 2006; Socías et al., 2016; Meadows et al., 2015). Specifically, in the U.S. population, access to health services is regarded as ‘unreliable’, with a large segment of the population receiving less than optimal and timely care (U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, 2016).

The association between health insurance and the probability of diabetes diagnosis has been demonstrated (Hogan et al., 2015); however, the influence that health care access has on prediabetes awareness is currently understudied. Prediabetes is a key preclinical state, amenable to risk management, medicinal treatment, or preventive lifestyle changes, which can decrease the risk of progression to diabetes (Knowler et al., 2002; Tuomilehto et al., 2001; American Diabetes Association and National Institute of Diabetes, Digestive and Kidney Diseases, 2002). Thus, an understanding of the magnitude to which access to system-level health services impacts the detection of prediabetes is imperative. Given the importance of both a place of regular care and health insurance coverage for ensuring access to health services, we sought to understand the combined impact of both factors on prediabetes awareness. The objective of this study was to examine the association between access to health services and prediabetes awareness, and specifically to understand the impact that the joint effect of insurance coverage and a routine place to go for health care has on the odds of prediabetes awareness.

2. Methods

We conducted a pooled cross-sectional analysis using data from three consecutive cycles (2007–2008, 2009–2010, and 2011–2012) of the National Health and Nutrition Examination Survey (NHANES) to examine the association between access to health care and prediabetes awareness. NHANES is a nationally representative survey that uses a multistage probability sampling design to collect data from the U.S. civilian non-institutionalized population. Participants are interviewed at home, and medical examinations and laboratory measurements are taken in a mobile examination center.

2.1. Study population

Fig. 1 outlines the process undertaken to identify the analytic sample, which was comprised of U.S. adults with prediabetes. Between 2007 and 2012, 30,442 individuals participated in the interview stage of the NHANES survey. Pregnant women and individuals <20 years of age were excluded from our sample. We also excluded individuals with diagnosed diabetes (i.e., participants who answered yes to the following question: Other than during pregnancy, have you ever been told by a doctor or health professional that you have diabetes or sugar diabetes?). Individuals who answered no, but reported taking diabetes medication, were also excluded.

The remaining participants were classified according to hemoglobin A1c (HbA1c) and fasting plasma glucose (FPG) measurements, based on the American Diabetes Association guidelines (American Diabetes Association, 2015). We excluded individuals for whom HbA1c or FPG values were missing, as well as those who fasted <8 or ≥24 h. Participants were then classified as having undiagnosed diabetes (HbA1c ≥6.5% or FPG ≥126 mg/dL); prediabetes (HbA1c ≥5.7% but <6.5% or FPG ≥100 mg/dL but <126 mg/dL); or normoglycemic (HbA1c <5.7% and FPG <100 mg/dL). The analytic sample was restricted to only those persons meeting the criteria for prediabetes.

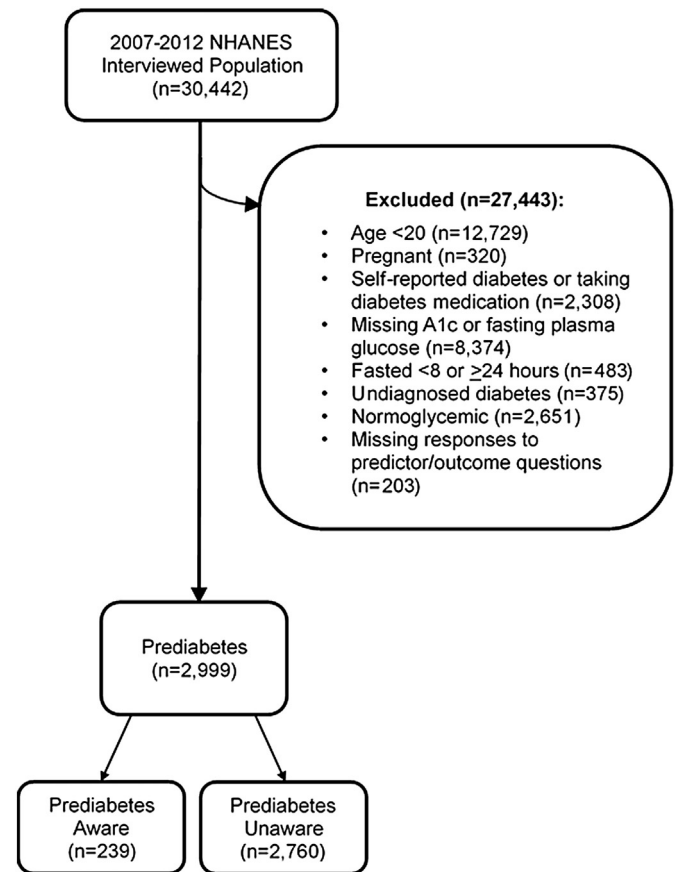


Fig. 1. The process of applying the exclusion criteria to identify the analytic sample.

2.2. Measures

We measured prediabetes awareness based on responses to two questions: 1) Other than during pregnancy, have you ever been told by a doctor or health professional that you have diabetes or sugar diabetes? 2) Have you ever been told by a doctor or other health professional that you have any of the following: prediabetes, impaired fasting glucose, impaired glucose tolerance, borderline diabetes, or that your blood sugar is higher than normal but not high enough to be called diabetes or sugar diabetes? Those who answered “borderline” to the first question, or “yes” to the second question, were classified as being prediabetes aware. The remaining participants were classified as being prediabetes unaware.

We measured access to health services using responses to two questions: 1) Is there a place that you usually go when you are sick or need advice about your health? 2) Are you covered by health insurance or some other kind of health care plan? Individuals who responded “yes” or “there is more than one place” to the first question, and “yes” to the second question, were defined as having complete access to health services. Individuals who answered “there is no place” to the first question, and “no” to the second question, were defined as having no access to health services. The remaining participants were classified into two partial access categories. The first category was comprised of individuals who responded “yes” or “there is more than one place” to the first question, and “no” to the second question. The second category consisted of participants who answered “there is no place” to the first question, and “yes” to the second question. Thus, access to health services was measured as a four-level categorical variable, as we aimed to assess the independence of the two risk factors in the relationship between prediabetes awareness.

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