

# Diabetes and Hearing Loss Among Underserved Populations



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## KEYWORDS

- Diabetes • Hearing loss • Microvascular circulation • Microvascular complications
- Minorities • Underserved populations • Consequences of hearing loss

## KEY POINTS

- Diabetes affects the vasculature of the middle ear, resulting in hearing loss.
- Early detection and treatment can help prevent the complications associated with hearing loss.
- There are strategies and devices that can help alleviate the complications of hearing loss.

## INTRODUCTION

Type 2 diabetes (T2DM) and its resulting complications exact a devastating personal, social, and economic burden on the United States population. Since 1980, the prevalence of diabetes in the United States has more than tripled. Approximately 29.1 million people, or 9.3% of the United States population, are living with diabetes, and 8.1 million of these people remain undiagnosed.<sup>1</sup> Alarming, 86 million people are estimated to have prediabetes, a condition whereby blood glucose levels are higher than normal but not at a diagnostic level for diabetes.<sup>1</sup> The presence of prediabetes increases one's risk of developing diabetes.

Minority populations disproportionately bear the burden of T2DM. Compared with white Americans whose rate of T2DM is 7.6%, Native Americans (15.9%), African Americans (13.2%), and Hispanics (12.8%) are approximately twice as likely to develop the disease.<sup>1</sup>

These populations are also more apt to develop the devastating microvascular complications of T2DM, namely blindness, lower limb amputation, and kidney failure.<sup>2</sup> Low socioeconomic status (SES) and substandard environmental conditions are often associated with poor health outcomes, resulting in higher risks of microvascular and

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microvascular complications. The disparities have often been attributed to the fact that persons with T2DM who are of low SES do not receive optimal health care, and often the environment does not support their ability to adequately manage the disease.<sup>3-6</sup> Minorities are also disproportionately represented in the lower SES category.

## DIABETES AND HEARING LOSS

Data from the National Health and Nutrition Examination Survey (NHANES) suggest that among persons with diabetes between the ages of 50 and 69 years, more than 70% have high-frequency hearing loss and one-third also have low-frequency or mid-frequency hearing loss. Hearing loss is approximately twice as common in adults with diabetes as in those who do not have the disease. The link between diabetes and hearing loss is evident across all frequencies.<sup>7-9</sup>

The prevalence of hearing loss among older adults with or without T2DM is significant. Hearing loss is listed as the third most prevalent chronic illness among the elderly population; 36 million people report having hearing loss. It is estimated that 25% to 40% of the United States population aged 65 years or older has some degree of hearing loss. This prevalence rises with age.<sup>10,11</sup> Hearing impairment may be due to a problem with conduction, the sensorineural pathway, or both. Presbycusis is a progressive sensorineural problem that makes one less able to hear high-pitched tones and filter background noise, and is the most common reason for hearing loss. Presbycusis is age related and starts around 50 years of age.<sup>12</sup> Persons with T2DM are twice as likely as those without T2DM to have a greater prevalence of hearing loss.<sup>7,9,13</sup> Research has shown that White males and females with T2DM have a greater prevalence of hearing loss than minorities.<sup>7,9,14</sup> However, there is a dearth of information concerning the ethnic-related differences in rates among individuals with diabetes and hearing loss. As already stated, minorities and persons of low SES in general do not receive optimal health care, including screening for hearing loss. Therefore, the true prevalence of the disease among the underserved population is not known. As the underserved population is disproportionately affected by the well-known microvascular complications caused by T2DM, there exists the potential for hearing loss also to disproportionately affect this population. The NHANES data also indicated that those who are of lower SES and have lower levels of education have a higher prevalence of T2DM hearing loss (**Table 1**).<sup>9</sup>

Other well-known causes of hearing loss should be ruled out to ensure that one receives optimal care<sup>12</sup>:

- Ear wax: conductive hearing loss
- Otosclerosis of the malleus, incus, and stapes bones
- Infections such as meningitis, mumps, and measles
- Neurologic disorders such as multiple sclerosis
- Acoustic neuroma
- Ménière disease
- Damage to the cochlea or the eighth nerve producing sensorineural loss from head trauma
- Effects of ototoxic medications (eg, aminoglycoside antibiotics, diuretics, salicylates, and antineoplastic agents)
- Noise-induced hearing loss

## WHAT IS HEARING LOSS?

The softest sounds a person with normal hearing can hear is 25 dB or lower. When one is unable to hear at this level, signs and symptoms of hearing loss become apparent.

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