v. 5, n. 29, 2025

International Journal of Health Science

Acceptance date: 30/09/2025

ANNUAL OPHTHALMOLOGICAL EXAMINATION IN PEOPLE WITH DIABETES MELLITUS: DEMOGRAPHIC ANALYSIS BASED ON THE 2019 PNS

Letícia Esmério Olmedo
Federal University of Santa Maria – UFSM
Santa Maria – Rio Grande do Sul
https://orcid.org/0000-0001-7090-7298

Vinícius Goldschmidt
Faculty of Medicine University of Passo Fundo – UPF
Passo Fundo – Rio Grande do Sul
https://orcid.org/0000-0001-7865-191X

Valéria Tessaro Grandi
Faculty of Medicine, University of Passo Fundo – UPF
Passo Fundo – Rio Grande do Sul

Pietra Campigotto Aquino
Faculty of Medicine, University of Passo Fundo – UPF
Passo Fundo – Rio Grande do Sul
https://orcid.org/0009-0008-3001-9817

Pedro Henrique Grigolo Neckel
Faculty of Medicine, University of Passo Fundo – UPF
Passo Fundo – Rio Grande do Sul
https://orcid.org/0009-0005-2274-3256

Tomás Rodrigues Bigolin
Faculty of Medicine, University of Passo Fundo – UPF
Passo Fundo – Rio Grande do Sul
https://orcid.org/0009-0005-9867-0516

Valentina Antônio Simonetti
Faculty of Medicine, University of Passo Fundo – UPF
Passo Fundo – Rio Grande do Sul
https://orcid.org/0000-0002-6898-3723

Vinícius Grasselli Omizzolo
Faculty of Medicine, University of Passo Fundo – UPF
Passo Fundo – Rio Grande do Sul
https://orcid.org/0000-0002-1956-889X

Vitória Morgana Sales do Amaral
Faculty of Medicine, University of Passo Fundo – UPF
Passo Fundo – Rio Grande do Sul
https://orcid.org/0009-0008-5734-8178

Ana Laura Guedes D'Agostini
Faculty of Medicine, University of Passo Fundo – UPF
Passo Fundo – Rio Grande do Sul
https://orcid.org/0000-0002-6044-5760

Abstract: Introduction: Diabetes mellitus (DM) presents high morbidity and mortality rates in patients who do not achieve adequate glycemic control. Among the complications of DM is diabetic retinopathy, for which annual screening with ophthalmological evaluation is indicated. The frequency of this evaluation is essential, since diabetic retinopathy is one of the leading causes of acquired blindness in developing countries. **Objective:** To describe the percentages of annual ophthalmological examinations in people with DM in Brazil according to demographic characteristics. **Methodology:** This is a cross-sectional study based on data from the 2019 National Health Survey (PNS), a population-based survey in Brazil. The percentage of people who reported a diagnosis of diabetes and had an eye exam in the 12 months prior to the interview was selected. The following demographic variables were evaluated: region, gender, age, color/race, education, income, and housing situation. The results were analyzed using descriptive statistics. **Results:** Among the people interviewed in the 2019 PNS who reported a diagnosis of DM, only 36.7% had undergone an eye exam in the 12 months prior to the survey. The region with the highest percentage of eye exam records was the Southeast (40.8%). Regarding gender, 36.8% of men and 36.6% of women with DM had undergone an eye exam in the country. The 60-64 and 65-74 age groups had the highest percentages of eye exams (40.8% and 39.1%, respectively). In terms of skin color, white people accounted for the highest rates (40.3%). It was observed that the population with the highest level of education had the highest percentages (50.6% in people with complete higher education, contrasting with 32.2% in those without education). In relation to income, there is an increase in the percentage of examinations as declared income increases, reaching the highest rate in the population earning 3 or more minimum wages.

Conclusions: It was observed that, among people with DM, the percentage of annual eye exams is low, regardless of gender, region of the country, or age group, not reaching 40% of the total affected population in 2019. Even so, a higher relative rate of examinations was observed in some demographic groups, such as the white population, those with higher income, those with higher education, and residents of urban areas.
Keywords: Diabetes Mellitus; Ophthalmology; Diabetic Retinopathy.

INTRODUCTION

Diabetes Mellitus (DM) is a chronic noncommunicable disease of extreme relevance in the national scenario, as it affects approximately 12 million Brazilians (BRAZIL, 2024). Patients with poorly controlled DM have high morbidity and mortality rates due to prolonged exposure to high blood glucose levels. In addition to this fact, many patients with DM may remain asymptomatic for years, discovering the diagnosis only after organic lesions have already been established. (AMERICAN DIABETES ASSOCIATION, 2025).

DM can lead to microvascular circulation problems, causing complications such as neuropathy, nephropathy, and diabetic retinopathy. The latter is the main long-term complication of DM and a frequent cause of blindness in adults, but other eye diseases (such as cataracts, glaucoma, and diabetic keratopathy) can be triggered or aggravated by inadequate blood glucose levels in these patients (BRAZIL, 2021). The pathophysiological mechanisms of DM-related ophthalmopathies are diverse, such as the release of local inflammatory mediators, endothelial aggression, the emergence of neovascularization, and neuropathies (SOLOMON *et al.,* 2017; ANTONETTI, SILVA, STITT, 2025).

Adequate control of blood glucose levels is the main therapeutic way to prevent eye damage in diabetes, and ophthalmological evaluation and periodic fundoscopy are part of the diagnostic process in this context. The Brazilian Diabetes Society recommends that screening for diabetic retinopathy begin at the time of diagnosis in patients with type 2 DM and five years after diagnosis of type 1 DM. In both cases, ophthalmological examinations should be performed annually, regardless of glycemic values (MALERBI *et al.*, 2023). However, it is known th ccess to health services varies according to sociodemographic characteristics, which can interfere with the adequate follow-up of these patients (RODRIGUES et al., 2020).

OBJECTIVE

To describe the percentage data on the performance of annual eye exams in people with DM in Brazil according to demographic characteristics.

METHOD

This is a cross-sectional study that used the 2019 PNS as a data source. The PNS is a household, sample, and probabilistic survey conducted throughout the national territory by the Brazilian Institute of Geography and Statistics (IBGE) in conjunction with the Ministry of Health. The objective of the PNS is to collect information on the health of the Brazilian population, including access to health services, vaccination coverage, lifestyle, and individual health conditions (STOPA *et al.,* 2020).

Data collection was performed through the IBGE Automatic Retrieval System website (IBGE, 2025), selecting the "PNS 2019" section. On the website, we searched for the topic "Perception of health status, lifestyles, chronic diseases, and oral hygiene and health," selecting information related to "chronic diseases."

The eye exam was referred to as "eye exam" in the PNS 2019 interviews. Thus, the topic "people aged 18 years or older who report a medical diagnosis of diabetes and have had an eye exam in the last 12 months" was selected.

The data were collected in percentage values, and the variables analyzed were: region, gender, age, color/race, education, income, and housing situation. Subsequently, the results were tabulated in *Excel* spreadsheets and analyzed using descriptive statistics. Data collection took place on July 6, 2025.

Since the database used is public and openly available, this study does not require submission to a research ethics committee. The authors declare that they have no conflicts of interest with the topic.

RESULTS

In total, among Brazilians over 18 years of age who reported a diagnosis of DM, 36.7% had an eye exam in the 12 months prior to the 2019 PNS. By region of the country, the highest rate of eye exams was in the Southeast (40.8%), followed by the Midwest (36.3%), North (34.1%), Northeast (32.2%), and South (32.1%). In terms of gender, 36.8% of men had undergone the exam, while the percentage for women was 36.6%. The region with the largest percentage difference between genders was the South, with 35.5% of women undergoing the exam compared to 28% of men. The distribution by region and gender can be seen in Figure 1.

Regarding age groups, the 60-64 age group had the highest percentage, with 40.8% undergoing the exam, while the 18-29 age group had the lowest percentage (30.5%). The distribution by age group can be seen in Figure 2.

In terms of race, the white population had the highest rate of eye exams in the country. All regions showed lower rates of eye exams among the black or brown population, except in the Northeast, as can be seen in Figure 3.

In terms of the population's level of education, people with a college degree and those with a high school diploma and incomplete college education were the most likely to have had an annual eye exam, according to the 2019 PNS assessment. Figure 4 shows the percentages of people who had an eye exam, by education level and region of the country.

In the assessment by income, it was observed that the population with higher salaries had higher rates of annual eye exams, with the highest rate in the population that reported earning 3 to 5 minimum wages. The distribution by income is shown in Figure 5.

Regarding the housing situation, 38.2% of the urban population in the country underwent an eye exam. In contrast, only 25.2% of the population living in rural areas underwent this exam.

CONCLUSION

It was observed that less than 40% of the population who reported a diagnosis of diabetes underwent an annual eye exam in the 2019 PNS. Nationally, the rate of completion was higher among people aged 60 to 64, self-declared whites, those with higher education, and those with higher income in the country. The urban population had a higher rate compared to the rural population. The Southeast region had the highest percentage of eye exams. No significant percentage difference was observed between genders.

Thus, there is a large gap in ophthalmological examinations among people with DM in the country, in addition to significant social and regional disparities in exam coverage. It is therefore essential that health programs be developed to ensure their effective and periodic implementation throughout the country, in addition to policies aimed at minimizing the observed inequality in access to the exam.

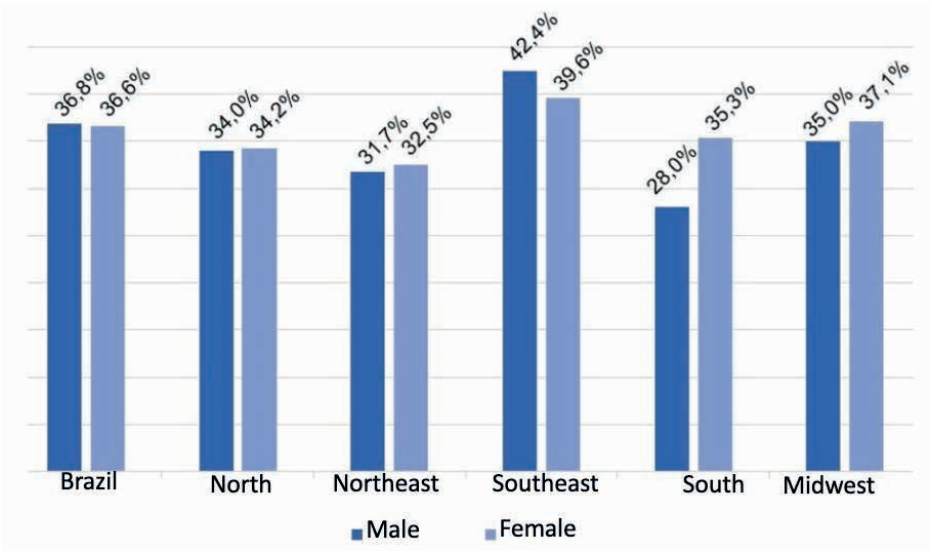

Figure 1: Percentage of people with DM who underwent an annual eye exam by region and gender, in the 2019 PNS.
Source: prepared by the author, using data from the 2019 PNS

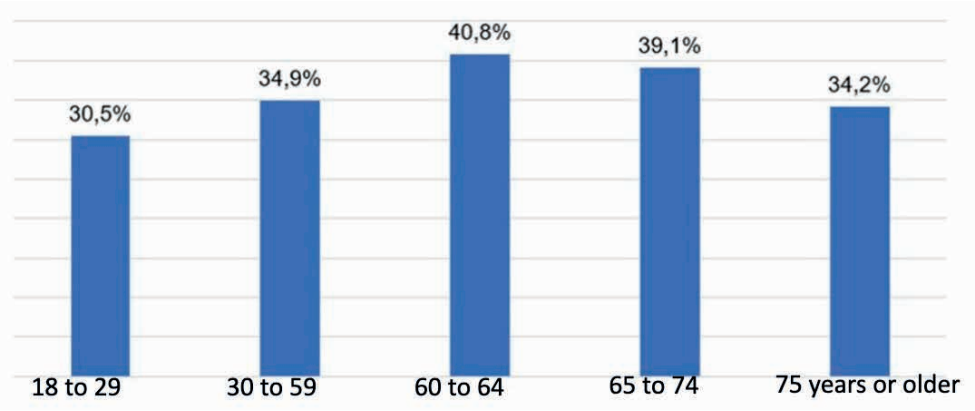

Figure 2: Percentage of people with DM who underwent annual eye exams by age group, in the 2019 PNS.
Source: prepared by the author, using data from the 2019 PNS

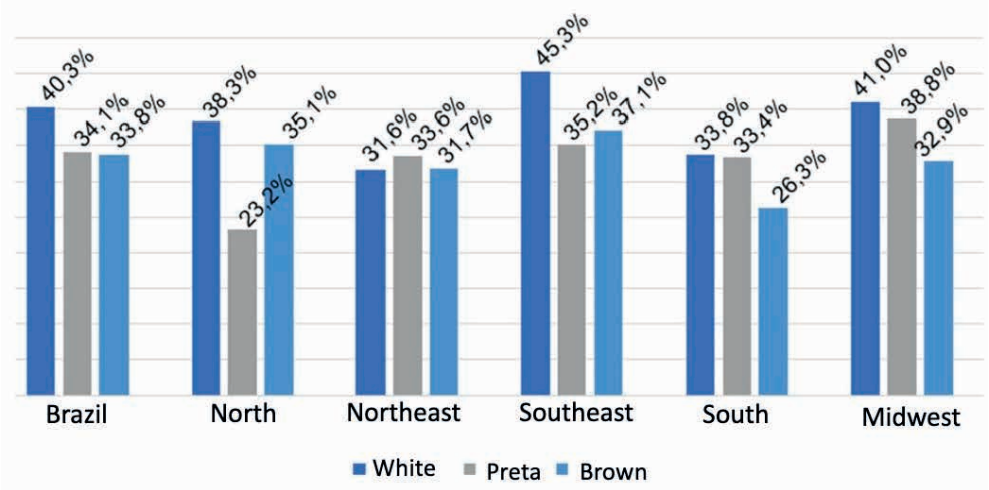

Figure 3: Percentage of people with DM who underwent annual eye exams by region and race/color, in the 2019 PNS.
Source: prepared by the author, using data from the 2019 PNS

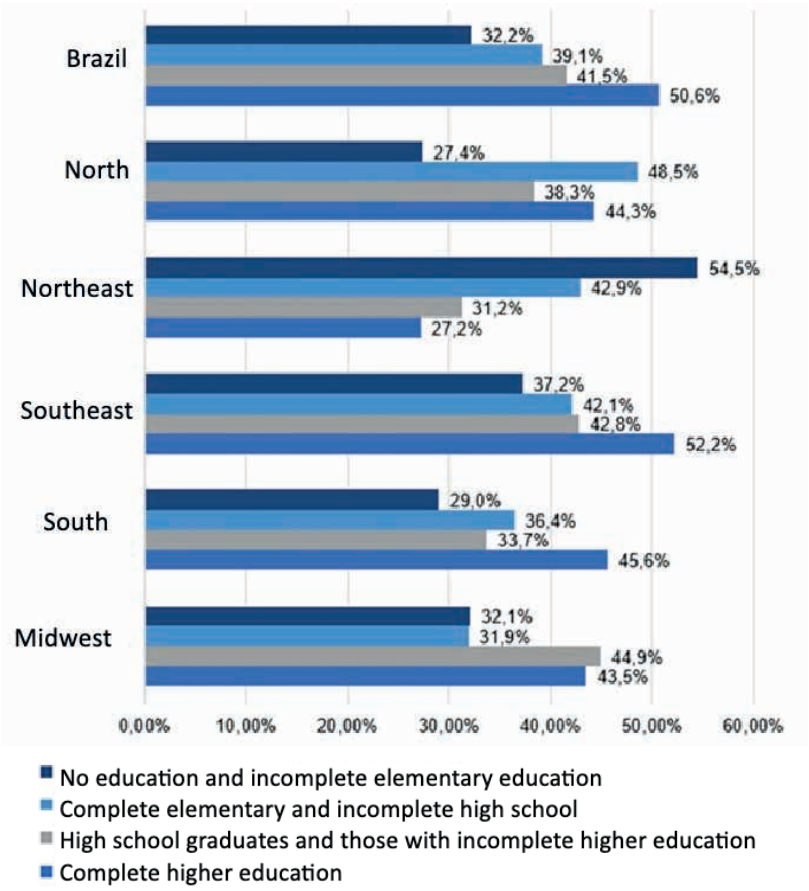

Figure 4: Percentage of people with DM who underwent annual eye exams according to region and education level, in the 2019 PNS.

Source: prepared by the author, using data from the 2019 PNS

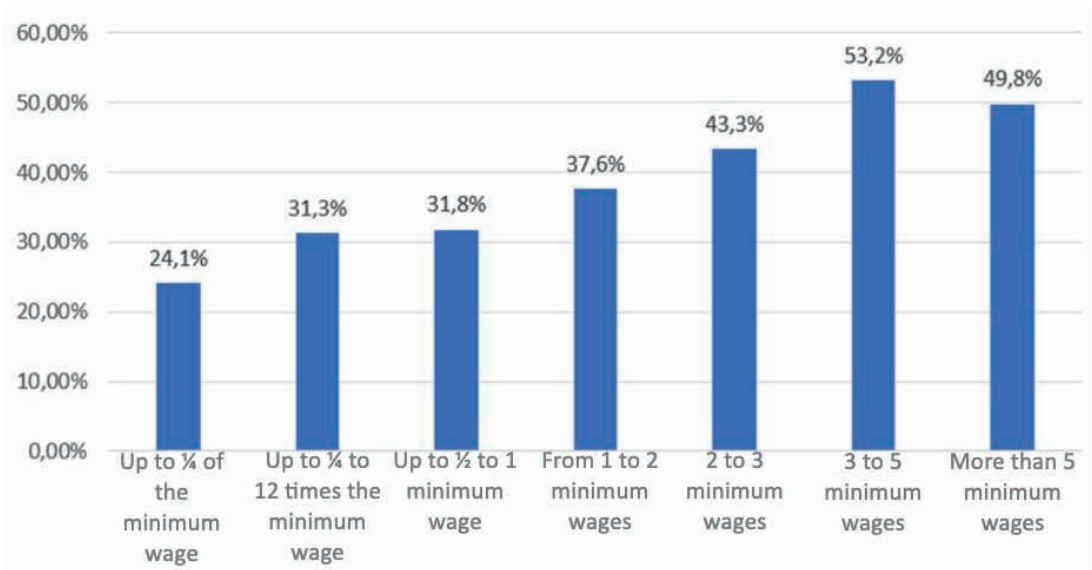

Figure 5: Percentage of people with DM who underwent annual eye exams according to income, in the 2019 PNS.

Source: prepared by the author, using data from the 2019 PNS

REFERENCES

1. AMERICAN DIABETES ASSOCIATION. Professional Practice Committee. 12. **Retinopathy, neuropathy, and foot care: standards of care in diabetes—2025.** Diabetes Care, Washington, v. 48, supl. 1, p. S252–S265, 1 jan. 2025. DOI: https://doi.org/10.2337/dc25-S012. Acesso em: 10 ago. 2025.

2. ANTONETTI, D. A.; SILVA, P. S.; STITT, A. W. **Current understanding of the molecular and cellular pathology of diabetic retinopathy.** *Nature Reviews Endocrinology*, [s. l.], v. 17, n. 4, p. 195-206, 2021. DOI: https://doi.org/10.1038/s41574-020-00451-4. Disponível em: https://pmc.ncbi.nlm.nih.gov/articles/PMC9053333/. Acesso em: 10 ago. 2025.

3. BRASIL. Ministério da Saúde. **Portaria conjunta nº 17, de 1º de outubro de 2021**. Aprova o Protocolo Clínico e Diretrizes Terapêuticas da Retinopatia Diabética. Disponível em: https://www.gov.br/conitec/pt-br/midias/protocolos/20211220_portal_retinopatia_diabetica.pdf. Acesso em: 10 ago. 2025.

4. BRASIL. Ministério da Saúde. **Protocolo Clínico e Diretrizes Terapêuticas de Diabete Melito Tipo 2**. Portaria SECTICS/MS nº 7, de 28 de fevereiro de 2024. Diário Oficial da União, Brasília, DF, 2024. Disponível em: https://www.gov.br/conitec/pt-br/composicao/saps/ecv/publicacoes/protocolo-clinico-de-diretrizes-terapeuticas-pcdt-para-diabetes-mellitus-tipo-ii/view. Acesso em: 10 ago. 2025.

5. IBGE. **Pesquisa Nacional de Saúde 2019**. Sistema IBGE de Recuperação Automática – SIDRA. Rio de Janeiro. Disponível em: https://sidra.ibge.gov.br/pesquisa/pns/pns-2019. Acesso em: 06 jul. 2025.

6. MALERBI, F.; ANDRADE, R.; MORALES, P.; TRAVASSOS, S.; RODACKI, M.; BERTOLUCI, M. **Manejo da retinopatia diabética.** Diretriz Oficial da Sociedade Brasileira de Diabetes, 2022. DOI: https://doi.org/10.29327/557753.2022-17. ISBN 978-65-5941-622-6. Disponível em: https://diretriz.diabetes.org.br/manejo-da-retinopatia-diabetica/. Acesso em: 11 ago. 2025.

7. RODRIGUES, A. M. A. M. *et al.* **Uso dos serviços de saúde segundo determinantes sociais, comportamentos em saúde e qualidade de vida entre diabéticos**. *Ciência & Saúde Coletiva*, [s. l.], v. 25, n. 3, p. 845-858, mar. 2020. Disponível em: https://doi.org/10.1590/1413-81232020253.12652018. Acesso em: 11 ago. 2025.

8. SOLOMON, S. D.; CHEW, E.; DUH, E. J. *et al.* **Diabetic retinopathy: a position statement by the American Diabetes Association.** *Diabetes Care*, [s. l.], v. 40, n. 3, p. 412-418, 2017. DOI: https://doi.org/10.2337/dc16-2641. Disponível em: https://diabetesjournals.org/care/article/40/3/412/36975/Diabetic-Retinopathy-A-Position-Statement-by-the. Acesso em: 10 ago. 2025.

9. STOPA, S. R. *et al.* **Pesquisa Nacional de Saúde 2019: histórico, métodos e perspectivas.** Epidemiologia e Serviços de Saúde, v. 29, p. e2020315, 2020. Disponível em: https://www.scielo.br/j/ress/a/RdbtmCHjJGt8xDW6bV3Y6JB/?lang=pt. Acesso em: 6 jul. 2025.