

Cardiovascular diseases and intersectionality: beyond traditional risk factors

Doenças cardiovasculares e interseccionalidade: além dos fatores de risco tradicionais

Vanessa Prado dos Santos¹ 

How to cite: Santos VP. Cardiovascular diseases and intersectionality: beyond traditional risk factors. J Vasc Bras. 2025;24:e20250052. <https://doi.org/10.1590/1677-5449.202500522>

Non-transmissible chronic diseases (NTCDs) were responsible for more than 70% of all deaths worldwide in 2017 and cardiovascular diseases (CVDs) constitute the number one cause of mortality.¹ In turn, ischemic heart disease (IHD) was the main cause of death from CVD and, in conjunction with stroke, accounted for 84.9% of deaths from CVD worldwide.¹ Ischemic heart disease, stroke, and peripheral arterial disease (PAD) are the three major diagnoses related to CVDs and atherosclerosis is the most common etiology.² Advanced age, diabetes mellitus (DM), hypertension (high blood pressure), and smoking are some of the genetic and environmental risk factors associated with CVDs.^{2,3} With regard to the behavior of these risk factors, from 2010 to 2019, there was a reduction in exposure to smoking and a greater than 1% per annum increase in exposure to hyperglycemia.⁴ Globally, the risk of exposure to hyperglycemia increased significantly, by 1.32% per year, whereas smoking reduced by 1.2%.⁴ Exposure to hypertension also increased, although to a lesser extent, with an annual increase of 0.51%.⁴ In Brazil, the prevalence of hypertension in the adult population is 32.3%, reaching 71.7% among people over the age of 70 years.⁵ Diabetes mellitus constitutes a serious public health problem all over the world, with prevalence that is growing year-on-year in many different countries.⁶⁻⁸ In 2018, it was estimated that more than 34 million people in the United States had DM, equating to 13% of the adult population and accounting for 26.6% of those aged 65 years or over.⁷ In Brazil, the estimated prevalence is 9.2%, at 8.1% of men and 10.2% of women.⁸

While genetic and environmental factors are relevant, studies indicate that they alone do not affect the risk of sickness. In the social sciences, the term

“intersectionality” was proposed by Crenshaw (1989) to describe the understanding of the complexity of the interactions between different economic and social characteristics, emphasizing the importance of analysis of ethno-racial and social factors.^{9,10} Varied methodologies have been developed to study intersectionality in the social and health sciences, revealing the complexity of interactions between different life conditions among social strata, genders, and ethnic groups.⁹⁻¹³ In Brazil, one multicenter study found an increased risk of CVD-related death among people with black or brown skin color/race.¹¹ An intersectional analysis combining skin color and sex detected a 52% increase in risk of mortality among white men, a 96% increase among brown-skinned men, and a 118% increase among black men.¹¹ This finding reinforces the need to conduct analyses that consider interactions among several factors, such as ethno-racial, gender, economic, and social variables.

Studying the interactions between gender, ethno-racial, and socioeconomic characteristics through the lens of intersectionality can yield more in-depth analyses of the risk of CVDs, including PAD, and facilitate understanding of many aspects of prevention and treatment. A study conducted in Sweden showed that there was a greater risk of ischemic cardiac disease (ICD) among men. However, when income was included in the analysis, it was observed that risk was higher among people with low income, with 1.69 times higher risk among men and 2.19 times higher risk among women.¹⁴ Moreover, men and women with low income who lived alone and had lived in Sweden for 10 years or less had an even higher risk of ICD.¹⁴ In Spain, a study of cardiovascular mortality analyzed sex, age, and educational level, finding an

¹ Universidade Federal da Bahia – UFBA, Salvador, BA, Brasil.

Financial support: None.

Conflicts of interest: No conflicts of interest declared concerning the publication of this article.

Submitted: March 08, 2025. Accepted: March 09, 2025.

The study was carried out at Universidade Federal da Bahia (UFBA), Salvador, BA, Brazil.

Ethics committee approval: A Research Ethics Committee evaluation is not required for editorial article that do not involve new patient data.



inverse association between cardiovascular mortality and educational level, especially among women, 8.9% of whom had not completed primary education, compared with 6.2% of men.¹⁵ The difference in cardiovascular mortality between those with the lowest and highest educational levels was 88% for women and 44% for men.¹⁵

The literature also reveals associations between certain social and ethnic groups and greater vulnerability to vascular diseases and amputations.^{16,17} In 2023, a retrospective study of critical lower limb ischemia found an elevated risk of major amputations among Black/African-American and Latino/Hispanic patients, irrespective of the severity of clinical status at admission, as assessed using the Wifi Classification.¹⁸ In Australia, patients living in more economically vulnerable circumstances exhibited a higher incidence of advanced stage PAD, with complications such as ulcers and gangrene, in addition to higher rates of amputation.¹⁹ With regard to the impact of gender, while studies have not confirmed worse revascularization outcomes among women,^{20,21} some studies have identified higher rates of complications related to vascular access.²⁰ Others have identified a higher risk of graft failure in Black women who undergone vascularization.²² The literature has suggested new interactions between a range of different risk factors, mortality, and CVDs in different parts of the body. A population study with elderly Japanese people (≥ 65 years) revealed that those whose routines involved greater social isolation exhibited higher all-causes mortality (odds ratio 1.20; 95% confidence interval [95%CI] 1.09-1.32) and mortality due to malignant neoplasms (odds ratio 1.14; 95%CI 1.01-1.28). However, higher CVD mortality was not confirmed (odds ratio 1.22; 95%CI 0.98-1.52) in this Japanese study.²³

The 2024 European Society for Vascular Surgery (ESVS) guidelines discuss socioeconomic, ethnic, and gender aspects in relation to PAD.²⁴ According to this publication, studies of gender and PAD indicate later onset of symptoms among women, but report conflicting results, and there is a need to include more women in future studies.²¹ With regard to socioeconomic and ethnic aspects, the literature reports greater PAD prevalence in lower income countries and also among groups with lower income and educational level and also suggests that outcomes are worse among people of African-American ethnicity.²⁴ Brazil has an area of 8,510,417.771 km², encompassing many different geographic and environmental conditions, which are compounded by marked economic, social, ethnic, and cultural differences.²⁵ Ethno-racial characteristics, educational level, and income, in combination with genetic and environmental risk factors, act in a complex

manner on the risk of sickness due to many different etiologies, including CVDs. Daily, while practicing our specialty, we perceive the complex interaction between the different risk factors of the peripheral vascular diseases and we have the opportunity to reflect on the influence of living conditions on the health of Brazilian population.

REFERENCES

1. Roth GA, Abate D, Abate KH, et al. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2018;392(10159):1736–88. [http://doi.org/10.1016/S0140-6736\(18\)32203-7](http://doi.org/10.1016/S0140-6736(18)32203-7). PMID:30496103.
2. Pouncey AL, Woodward M. Sex-specific differences in cardiovascular risk, risk factors and risk management in the peripheral arterial disease population. *Diagnostics*. 2022;12(4):808. <http://doi.org/10.3390/diagnostics12040808>. PMID:35453859.
3. Lin J, Chen Y, Jiang N, Li Z, Xu S. Burden of peripheral artery disease and its attributable risk factors in 204 countries and territories from 1990 to 2019. *Front Cardiovasc Med*. 2022;9:868370. <http://doi.org/10.3389/fcvm.2022.868370>. PMID:35498034.
4. Leigh J, Rafiee A, Oancea B, et al. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*. 2020;396(10258):1223–49. [http://doi.org/10.1016/S0140-6736\(20\)30752-2](http://doi.org/10.1016/S0140-6736(20)30752-2). PMID:33069327.
5. Malta DC, Gonçalves RPF, Machado ÍE, Freitas MIF, Azeredo C, Szwarcwald CL. Prevalência da hipertensão arterial segundo diferentes critérios diagnósticos, Pesquisa Nacional de Saúde. *Rev Bras Epidemiol*. 2018;21(Suppl 1):e180021. <http://doi.org/10.1590/1980-549720180021.supl.1>.
6. Lin X, Xu Y, Pan X, et al. Global, regional, and national burden and trend of diabetes in 195 countries and territories: an analysis from 1990 to 2025. *Sci Rep*. 2020;10(1):14790. <http://doi.org/10.1038/s41598-020-71908-9>. PMID:32901098.
7. National Diabetes Statistics. Report 2020: estimates of diabetes and its burden in the United States. Hollywood; 2020. 32 p.
8. Muzy J, Campos MR, Emmerick I, Silva RSD, Schramm JMA. Prevalência de diabetes mellitus e suas complicações e caracterização das lacunas na atenção à saúde a partir da triangulação de pesquisas. *Cad Saude Publica*. 2021;37(5):e00076120. <http://doi.org/10.1590/0102-311x00076120>. PMID:34076095.
9. Pereira BCJ. Sobre usos e possibilidades da interseccionalidade. *Civitas Rev Cien Soc*. 2021;21(3):445–54. <http://doi.org/10.15448/1984-7289.2021.3.40551>.
10. Crenshaw K. Demarginalizing the intersection of race and sex: a black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. 1989;1989(1):139–67.
11. Oliveira FEG. Desigualdades raciais e de gênero na mortalidade geral no ELISA-Brasil: uma abordagem interseccional [dissertação]. Belo Horizonte: Faculdade de Medicina, Universidade Federal de Minas Gerais; 2018.
12. Barbosa VNM, Moura Jr JF. Intersecções entre gênero, raça e pobreza na vida de mulheres no nordeste do Brasil. *Estud Pesqui Psicol*. 2021;21(4):1478–99. <http://doi.org/10.12957/epp.2021.64031>.
13. Oliveira E, Couto MT, Separavich MAA, Luiz OC. Contribuição da interseccionalidade na compreensão da saúde-doença-cuidado de homens jovens em contextos de pobreza urbana. *Interface*. 2020;24:e180736. <http://doi.org/10.1590/interface.180736>.

14. Wemrell M, Mulinari S, Merlo J. Intersectionality and risk for ischemic heart disease in Sweden: Categorical and anti-categorical approaches. *Soc Sci Med*. 2017;177:213-22. <http://doi.org/10.1016/j.socscimed.2017.01.050>. PMID:28189024.
15. Haerberer M, León-Gómez I, Pérez-Gómez B, Tellez-Plaza M, Rodríguez-Artalejo F, Galán I. Social inequalities in cardiovascular mortality in Spain from an intersectional perspective. *Rev Esp Cardiol*. 2020;73(4):282-9. <http://doi.org/10.1016/j.rec.2019.07.022>. PMID:31784414.
16. Traven SA, Synovec JD, Walton ZJ, Leddy LR, Suleiman LI, Gross CE. Notable racial and ethnic disparities persist in lower extremity amputations for critical limb ischemia and infection. *J Am Acad Orthop Surg*. 2020;28(21):885-92. <http://doi.org/10.5435/JAAOS-D-19-00630>. PMID:31934928.
17. Brennan MB, Powell WR, Kaikow F, et al. Association of race, ethnicity, and rurality with major leg amputation or death among medicare beneficiaries hospitalized with diabetic foot ulcers. *JAMA Netw Open*. 2022;5(4):e228399. <http://doi.org/10.1001/jamanetworkopen.2022.8399>. PMID:35446395.
18. Jaramillo EA, Smith EJT, Matthay ZA, et al. Racial and ethnic disparities in major adverse limb events persist for chronic limb threatening ischemia despite presenting limb threat severity after peripheral vascular intervention. *J Vasc Surg*. 2023;77(3):848-857. <http://doi.org/10.1016/j.jvs.2022.10.043>. PMID:36334848.
19. de Jager E, Gunnarsson R, Ho Y-H. Disparities in advanced peripheral arterial disease presentation by socioeconomic status. *World J Surg*. 2022;46(6):1500-7. <http://doi.org/10.1007/s00268-022-06513-0>. PMID:35303132.
20. Ferranti KM, Osler TM, Duffy RP, Stanley AC, Bertges DJ. Association between gender and outcomes of lower extremity peripheral vascular interventions. *J Vasc Surg*. 2015;62(4):990-7. <http://doi.org/10.1016/j.jvs.2015.03.066>. PMID:26209578.
21. Parvar SL, Thiagarajah A, Nerlekar N, King P, Nicholls SJ. A systematic review and meta-analysis of gender differences in long-term mortality and cardiovascular events in peripheral artery disease. *J Vasc Surg*. 2021;73(4):1456-1465.e7. <http://doi.org/10.1016/j.jvs.2020.09.039>. PMID:33161072.
22. Nguyen LL, Hevelone N, Rogers SO, et al. Disparity in outcomes of surgical revascularization for limb salvage. *Circulation*. 2009;119(1):123-30. <http://doi.org/10.1161/CIRCULATIONAHA.108.810341>. PMID:19103988.
23. Nakagomi A, Saito M, Ojima T, Ueno T, Hanazato M, Kondo K. Sociodemographic heterogeneity in the associations of social isolation with mortality. *JAMA Netw Open*. 2024;7(5):e2413132. <http://doi.org/10.1001/jamanetworkopen.2024.13132>. PMID:38787557.
24. Nordanstig J, Behrendt C-A, Baumgartner I, et al. European Society for Vascular Surgery (ESVS) 2024 clinical practice guidelines on the management of asymptomatic lower limb peripheral arterial disease and intermittent claudication. *Eur J Vasc Endovasc Surg*. 2024;67(1):9-96. <http://doi.org/10.1016/j.ejvs.2023.08.067>. PMID:37949800.
25. Instituto Brasileiro de Geografia e Estatística – IBGE. Áreas territoriais [Internet]. Rio de Janeiro: IBGE; 2022 [citado 2022 out 17]. <https://www.ibge.gov.br/geociencias/organizacao-do-territorio/estrutura-territorial/15761-areas-dos-municipios.html?=&t=acesso-ao-produto>

Correspondence

Vanessa Prado dos Santos
 Universidade Federal da Bahia – UFBA, Faculdade de Medicina da Bahia
 Av. Reitor Miguel Calmon, s/n, Anexo I - Vale do Canela
 CEP 40110-905 - Salvador (BA), Brasil
 Tel.: +55 (71) 3283-8852
 E-mail: vansanbr@hotmail.com

Author information

VPS - Master's and PhD in Surgical Research, Faculdade de Ciências Médicas, Santa Casa de São Paulo; Supervisor, Vascular Surgery Residency Program, Hospital Universitário Professor Edgard Santos, Universidade Federal da Bahia (UFBA); Professor, Department of Anesthesiology and Surgery, Faculdade de Medicina da Bahia, Universidade Federal da Bahia (UFBA).