

EDITORIAL COMMENT

A Message From the Next Generations



I Believe in You—Take Control of Your Health*

Jaideep Patel, MD,^a Anandita Agarwala, MD,^b Deepak L. Bhatt, MD, MPH^c

South Asian individuals (ancestry from Bhutan, Bangladesh, India, the Maldives, Nepal, Pakistan, and Sri Lanka) carry a disproportionately higher burden of atherosclerotic cardiovascular disease (ASCVD) and higher proportional mortality from ischemic heart disease when compared with other racial and ethnic groups.¹⁻⁴ Notably, much of this risk can be attributed to a combination of highly prevalent traditional risk factors (eg, prediabetes and diabetes, hypertension, overweight status and central obesity, and specific dyslipidemia patterns), lifestyle choices (eg, low rates of physical activity and poor dietary habits), and heritable genetic influence.

'Asians' are often collectively classified as a single-origin group, such that South Asian adults are typically represented as 'Asian Indian' (excluding other East Asian and South Asian subgroups). Alas, considering varied cardiometabolic risk profiles, certain groups may be at disproportionately high, unrecognized, ASCVD risk. Indeed, Asian Indian men and women have the highest age-standardized mortality rates from ischemic heart disease compared with East Asian American subgroups (Chinese, Filipino, Japanese, Korean, and Vietnamese).^{1,5} On further characterization, Pakistani and Bangladeshi

adults are at 3 to 4× higher ASCVD-risk compared with Asian Indians according to more contemporary literature.⁴

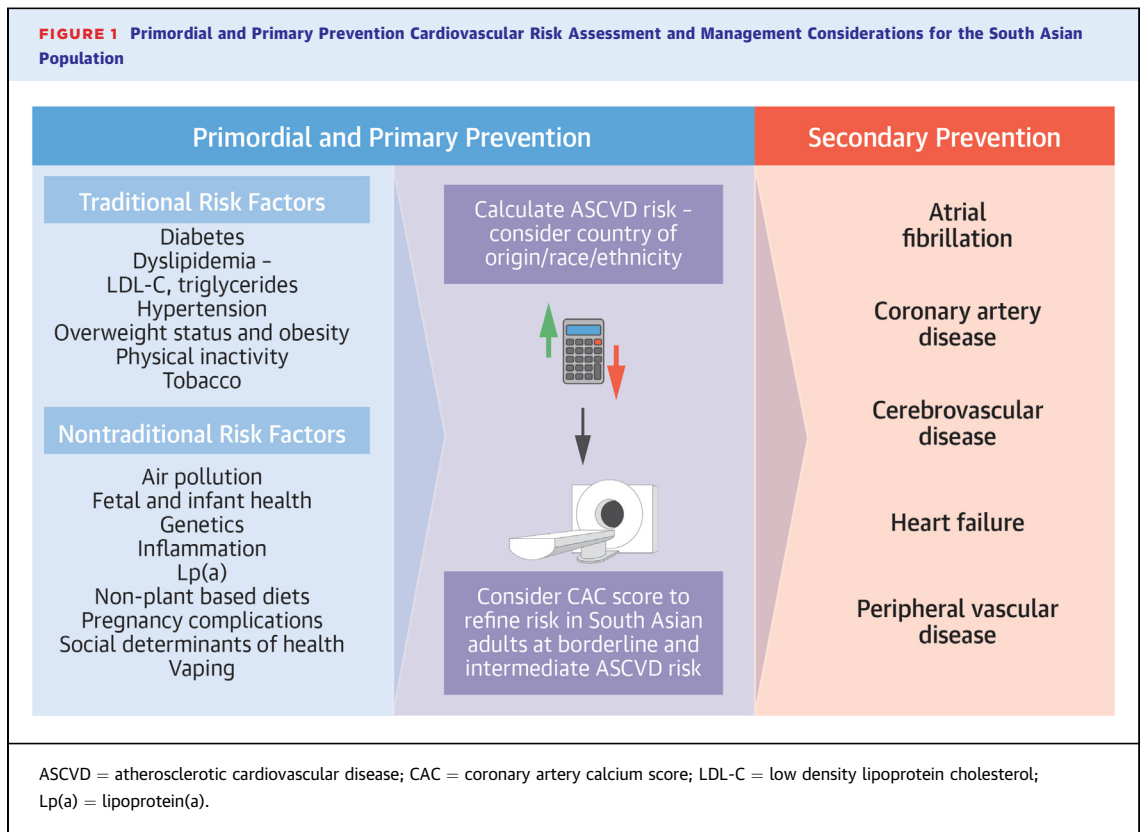
Racial and ethnic health data disaggregation is of critical importance to support effective interventions and policies to achieve health equity.⁶ In this issue of *JACC: Advances*, Rooprai et al⁷ sought to further refine our understanding by evaluating the association of disaggregated Asian racial data with evidence of obstructive coronary disease using angiographic imaging. This study included adults >18 years old from the CorHealth registry (Ontario, Canada) who underwent first time left heart catheterization (LHC) for stable coronary artery disease between 2012 and 2019. Obstructive CAD was defined as a stenosis of ≥50% in the left main coronary artery or stenosis of ≥70% in a major epicardial coronary artery. Although specific South Asian subgroup disaggregation was not possible due to limitations inherent to data collection, subpopulations at highest risk of ASCVD, including Bangladeshi, Pakistani, and Sri Lankan adults were included in this study.⁴ The authors should be commended on producing one of the largest data sets of stable South Asian adults undergoing LHC (14% of total study population) living in the diaspora, under the influence of modern health care and preventive management practices.

Despite potential limitations of extrapolation to all Asian subpopulations, this study offers some important insights and expands our knowledge of South Asian centric cardiometabolic research. Disappointingly (and expectedly), the results of this study parallel national and global studies comparing South Asian adults with other racial groups, describing a preponderance of traditional cardiac risk factors, namely diabetes and elevated fasting blood glucose, hypertension, overweight status, and dyslipidemia (low high-density lipoprotein cholesterol, elevated triglycerides) (all $P < 0.001$).⁷ Previous

*Editorials published in *JACC: Advances* reflect the views of the authors and do not necessarily represent the views of *JACC: Advances* or the American College of Cardiology.

From the ^aSouth Asian Cardiovascular Health Initiative (SACHI) for the Johns Hopkins Ciccarone Center for the Prevention of Cardiovascular Disease, Johns Hopkins Hospital, Baltimore, Maryland, USA; ^bCenter for Cardiovascular Disease Prevention, Baylor Scott and White Health Heart Hospital Baylor Plano, Plano, Texas, USA; and the ^cMount Sinai Heart, Icahn School of Medicine at Mount Sinai Health System, New York, NY, USA.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).



evidence suggests South Asian adults have a higher prevalence and earlier onset of CAD compared with non-Hispanic white populations.^{8,9} Indeed, in the current study, South Asian men and women (mean age 60.9 years) were significantly younger compared with non-Hispanic white patients (mean age 65.1 years).

The pattern and degree of coronary atherosclerotic burden in South Asian adults suggest that the left anterior descending artery (LAD) is predominantly diseased by LHC, coronary artery calcium imaging, and cardiac computed tomography angiography (CCTA), with the proximal segment more frequently involved.^{10,11} Results of this study extend disease patterns to include the mid-distal LAD. Additive to other cohorts, South Asians harbor more diffuse (multivessel disease) and obstructive CAD, even after multivariable adjustment.^{10,12,13} The current results cannot distinguish whether the degree of obstruction is indicative of anatomic vessel size difference across racial groups versus neointimal thickening (representing an early stage in the development of atheromatous plaque).^{10,14} Despite the hypothesis that smaller coronary artery diameter may be a risk factor for a higher incidence of CAD in South Asians, available data do not support this belief.¹⁵

Lastly, South Asian adults had the highest use of cardiometabolic therapies (particularly statin and diabetes pharmacotherapy), suggesting access to medical care and health-seeking behaviors were unlikely barriers with respect to ASCVD disparities. This may, however, signal broader, suboptimal risk factor control, explaining the strong association between South Asian race and risk factor burden with obstructive CAD described in the current study (nearly double that of non-Hispanic white patients).

Ultimately, this analysis continues to underscore the significance of primordial and primary prevention efforts in the South Asian community. Roughly 25% of the American healthcare work force is Asian; as such healthy behavior influence *must* come from within. Additionally, *we* need to deliver culturally and linguistically appropriate health services, derive high-quality evidence to support system-level interventions, and encourage innovative research to reduce health disparities for this group.^{16,17} Hope lies in the children of immigrant South Asians, powered with an increased awareness of healthy behaviors, who have improved access to and utilization of healthcare (including novel pharmaceuticals, digital/wearable technology, novel imaging of subclinical atherosclerosis, and genetic risk assessment).^{18,19}

Indeed, available evidence suggests higher levels of physical activity in second, compared with first-is on the generation immigrants.²⁰ Smaller studies of second-generation South Asians suggest history may be repeating itself, however, considering a heightened prevalence of traditional risk factor and sub-clinical atherosclerosis burden.²¹ Herein, a unique opportunity exists not only to influence the health and well-being of a generation after, but the one before them.

The Asian population is not homogenous, suggesting inaccuracies in the classism concept of the 'model minority' and 'healthy immigrant effect' to which this group is ascribed. This important study by Roprai et al⁷ draws attention to multilevel social determinants of health and should influence clinical and population research in this area (such as deriving race/ethnic-specific risk assessment calculators) and emphasizes the importance of implementing culturally appropriate ASCVD risk factor screening and preventive management strategies (Figure 1).

FUNDING SUPPORT AND AUTHOR DISCLOSURES

Dr Bhatt is on the advisory board for AngioWave, Bayer, Boehringer Ingelheim, Cardax, CellProthera, Cereno Scientific, Elsevier Practice Update Cardiology, High Enroll, Janssen, Level Ex, McKinsey, Medscape Cardiology, Merck, MyoKardia, NirvaMed, Novo Nordisk, PhaseBio, PLx Pharma, Regado Biosciences, and Stasys; is on the Board of Directors for AngioWave (stock options), Boston VA Research Institute, Bristol Myers Squibb (stock), DRS.LINQ (stock options), High Enroll (stock), Society of Cardiovascular Patient Care, and TobeSoft; is the Inaugural Chair for the American Heart Association Quality Oversight Committee; is a consultant: for Broadview Ventures; is on the Data Monitoring Committees for Acesion Pharma, Assistance Publique-Hôpitaux de Paris, Baim Institute for Clinical Research (formerly Harvard Clinical Research Institute, for the PORTICO trial, funded by St. Jude Medical, now Abbott), Boston Scientific (Chair, PEITHO trial), Cleveland Clinic (including for the ExCEED trial, funded by Edwards), Contego Medical (Chair, PERFORMANCE 2), Duke Clinical Research Institute, Mayo Clinic, Mount Sinai School of Medicine (for the ENVISAGE trial, funded by Daiichi Sankyo; for the ABILITY-DM trial, funded by Concept Medical), Novartis, Population Health Research Institute; Rutgers University (for the NIH-funded MINT Trial); has received honoraria from American College of Cardiology (Senior Associate Editor, Clinical Trials and News, ACC.org; is Chair of the ACC Accreditation Oversight Committee), Arnold and

Porter law firm (work related to Sanofi/Bristol-Myers Squibb clopidogrel litigation), Baim Institute for Clinical Research (formerly Harvard Clinical Research Institute; is on the RE-DUAL PCI clinical trial steering committee funded by Boehringer Ingelheim; AEGIS-II executive committee funded by CSL Behring), Belvoir Publications (Editor in Chief, Harvard Heart Letter), Canadian Medical and Surgical Knowledge Translation Research Group (clinical trial steering committees), Cowen and Company, Duke Clinical Research Institute (clinical trial steering committees, including for the PRONOUNCE trial, funded by Ferring Pharmaceuticals), HMP Global (Editor in Chief, Journal of Invasive Cardiology), Journal of the American College of Cardiology (Guest Editor; Associate Editor), K2P (Co-Chair, interdisciplinary curriculum), Level Ex, Medtelligence/ReachMD (CME steering committees), MJH Life Sciences, Oakstone CME (Course Director, Comprehensive Review of Interventional Cardiology), Piper Sandler, Population Health Research Institute (for the COMPASS operations committee, publications committee, steering committee, and USA national co-leader, funded by Bayer), Slack Publications (Chief Medical Editor, Cardiology Today's Intervention), Society of Cardiovascular Patient Care (Secretary/Treasurer), WebMD (CME steering committees), Wiley (steering committee); is part of Clinical Cardiology (Deputy Editor), NCDR-ACTION Registry Steering Committee (Chair), VA CART Research and Publications Committee (Chair); has a patent for Sotagliflozin (named on a patent for sotagliflozin assigned to Brigham and Women's Hospital who assigned to Lexicon; neither I nor Brigham and Women's Hospital receive any income from this patent); has received research funding from Abbott, Acesion Pharma, Afimmune, Aker Biomarine, Amarin, Amgen, AstraZeneca, Bayer, Beren, Boehringer Ingelheim, Boston Scientific, Bristol-Myers Squibb, Cardax, CellProthera, Cereno Scientific, Chiesi, CinCor, CSL Behring, Eisai, Ethicon, Faraday Pharmaceuticals, Ferring Pharmaceuticals, Forest Laboratories, Fractyl, Garmin, HLS Therapeutics, Idorsia, Ironwood, Ischemix, Janssen, Javelin, Lexicon, Lilly, Medtronic, Merck, Moderna, MyoKardia, NirvaMed, Novartis, Novo Nordisk, Owkin, Pfizer, PhaseBio, PLx Pharma, Recardio, Regeneron, Reid Hoffman Foundation, Roche, Sanofi, Stasys, Sympact, The Medicines Company, Youngene, and 89Bio; has received royalties from Elsevier (Editor, Braunwald's Heart Disease); is a Site Co-Investigator for Abbott, Biotronik, Boston Scientific, CSI, Endotronix, St. Jude Medical (now Abbott), Philips, SpectraWAVE, Svelte, and Vascular Solutions; is a trustee for American College of Cardiology; and has unfunded research from FlowCo, Takeda. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

ADDRESS FOR CORRESPONDENCE: Dr Jaideep Patel, 6569 North Charles Street, Physician's Pavilion West, Suite #600, Towson, Maryland 21204, USA. E-mail: jpgatel27@jhmi.edu. Twitter: [@jaideepatelm](https://twitter.com/jaideepatelm), [@AAgarwalaMD](https://twitter.com/AAgarwalaMD), [@DLBhattMD](https://twitter.com/DLBhattMD).

REFERENCES

1. Jose PO, Frank AT, Kappahn KI, et al. Cardiovascular disease mortality in Asian Americans. *J Am Coll Cardiol*. 2014;64(23):2486-2494.
2. Rana A, de Souza RJ, Kandasamy S, Lear SA, Anand SS. Cardiovascular risk among South Asians living in Canada: a systematic review and meta-analysis. *CMAJ Open*. 2014;2:E183-E191.
3. Satish P, Vela E, Bilal U, et al. Burden of cardiovascular risk factors and disease in five Asian groups in Catalonia: a disaggregated, population-based analysis of 121 000 first-generation Asian immigrants. *Eur J Prev Cardiol*. 2022;29:916-924.
4. Patel AP, Wang M, Kartoun U, Ng K, Khera AV. Quantifying and understanding the higher risk of atherosclerotic cardiovascular disease among South Asian individuals: results from the UK biobank prospective cohort study. *Circulation*. 2021;144(6):410-422.
5. Shah NS, Xi K, Kappahn KI, et al. Cardiovascular and cerebrovascular disease mortality in Asian American subgroups. *Circ Cardiovasc Qual Outcomes*. 2022;15(5):e008651.
6. Kanaya AM, Hsing AW, Panapasa SV, et al. Knowledge gaps, challenges, and opportunities in health and prevention research for Asian Americans, native Hawaiians, and Pacific Islanders: a report from the 2021 National Institutes of Health Workshop. *Ann Intern Med*. 2022;175(4):574-589. <https://doi.org/10.7326/M21-3729>

7. Roorprai J, Qiu F, Poter J, et al. Association of race and ethnicity with obstructive coronary artery disease. *JACC Adv.* 2023;2(1):100161.
8. Joshi P, Islam S, Pais P, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. *J Am Med Assoc.* 2007;297:286–294.
9. Yusuf PS, Hawken S, Ounpuu S, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet.* 2004;364:937–952.
10. Hasan RK, Ginwala NT, Shah RY, Kumbhani DJ, Wilensky RL, Mehta NN. Quantitative angiography in South Asians reveals differences in vessel size and coronary artery disease severity compared to caucasians. *Am J Cardiovasc Dis.* 2011;1(1):31–37.
11. Koulaouzidis G, Nicoll R, Charisopoulou D, McArthur T, Jenkins PJ, Henein MY. Aggressive and diffuse coronary calcification in South Asian angina patients compared to caucasians with similar risk factors. *Int J Cardiol.* 2013;167(6):2472–2476.
12. Bhatia HS, Lin F, Thomas IC, et al. Coronary artery calcium incidence and changes using direct plaque measurements: the MASALA study. *Atherosclerosis.* 2022;353:41–46.
13. Al Rifai M, Kanaya AM, Kandula NR, et al. Distribution of calcium volume, density, number, and type of coronary vessel with calcified plaque in South Asians in the US and other race/ethnic groups: the MASALA and MESA studies. *Atherosclerosis.* 2021;317:16–21.
14. Dhawan J, Bray CL. Are Asian coronary arteries smaller than caucasian? A study on angiographic coronary artery size estimation during life. *Int J Cardiol.* 1995;49:267–269.
15. Hosseini F, Malhi N, Sellers SL, et al. The morphology of coronary artery disease in South Asians vs White Caucasians and its implications. *Can J Cardiol.* 2022;38(10):1570–1579.
16. Anandita A. Dispelling disparity – achieving health equity for those of South Asian. 2022. Accessed November 7, 2022. <https://www.acc.org/-/media/Non-Clinical/Files-PDFs-Excel-MS-Word-etc/Meetings/2022/Webinar-Files/ACC-Health-Equity-Webinar-Companion-Guide-JUNE-21.pdf>
17. Patel J. South Asian cardiovascular disease: dispelling stereotypes and disparity. *Am J Prev Cardiol.* 2021;7:100189.
18. Ourhealthstudy.org. Accessed November 6, 2022. <https://ourhealthstudy.org/>
19. Haque W, Grandhi GR, Kanaya AM, et al. Implications of the 2019 American College of Cardiology/American Heart Association primary prevention guidelines and potential value of the coronary artery calcium score among South Asians in the US: the mediators of atherosclerosis in South Asians living in America (MASALA) study. *Atherosclerosis.* 2021;334:48–56. <https://doi.org/10.1016/j.atherosclerosis.2021.08.030>
20. Bhatnagar P, Shaw A, Foster C. Generational differences in the physical activity of UK South Asians: a systematic review. *Int J Behav Nutr Phys Act.* 2015;12:96.
21. Shah NS, Siddique J, Huffman MD, Kanaya AM, Kandula NR. Cardiovascular health and subclinical atherosclerosis in second generation South Asian Americans: the MASALA study. *Indian Heart J.* 2021;73(5):629–632.

KEY WORDS diabetes, ethnic, prevention, risk, South Asians