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Social drivers in atrial fibrillation occurrence, screening, treatment, and outcomes: systematic-narrative hybrid review

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The importance of social drivers of health (SDOH) in the occurrence, detection, treatment, and outcome of atrial fibrillation (AF) has attracted increasing attention. Addressing SDOH factors may suggest opportunities to prevent AF and its complications. We aimed to conduct a structured narrative review and summarize current knowledge on the association between race and ethnicity, SDOH, including rural vs. urban habitation, education, income, and neighbourhood, and the risk of AF, its management, and complications. We identified 537 references in PubMed and 473 references in Embase. After removal of duplicates, we screened the abstracts of 975 references, resulting in 113 references that were examined for eligibility. Subsequently, 34 references were excluded leaving 79 references for the review. Evidence of a social gradient in AF incidence and prevelance were conflicting. However, we found substantial evidence indicating social inequities in the detection of AF, access to treatment, and outcomes such as healthcare utilization, bleeding, heart failure, stroke, dementia, work disability, and death. Inequities are reported across various health care systems and constitute a global problem affecting several continents, although data from Africa and South America are lacking. Given the documented social inequities in AF detection, management, and outcomes, there is an urgent need for healthcare systems, policymakers, and society to identify and implement effective interventions that can reduce inequities and improve outcomes in individuals with AF.

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Introduction

Atrial fibrillation (AF) poses a global epidemic that affected about 53 million individuals in 2021.[1] The global disease burden is likely escalating at least partially due to the aging of many populations. Recent data also suggest that the burden is rapidly growing with the birth of new generations.[2] Patients with AF have high risks of complications, including heart failure, stroke, dementia, and death.[3–6]

Social drivers of health (SDOH) are according to the World Health Organization (WHO) 'the conditions in which people are born, grow, live, work, and age', and the contributing money, power, resources, and policy choices. Social drivers of health significantly influence health and outcomes, and a key recommendation by the WHO is to measure health inequity, expand the knowledge base, and raise public awareness about SDOH.[7] Over the past few decades, the importance of SDOH for the occurrence, detection, treatment, and outcomes of AF has attracted increasing attention. However, comprehensive reviews summarizing evidence on SDOH and AF care and outcomes remain scarce.

Gaining deeper insights into the interplay between SDOH and AF is crucial to improve our understanding of cardiovascular health inequities, guide resource allocation, and inform policy-making that addresses health challenges by social groups. Additionally, such detailed information may help in the design and implementation of future interventions for more effective AF prevention and treatment, thereby reducing its complications. Accordingly, we aimed to conduct a structured narrative review and summarize the current knowledge of SDOH and AF risk, management, and complications.

Methods

Search strategy and information source

To conduct the systematic literature search, we included all original studies published in English, excluding reviews that examined associations between AF and SDOH. We searched PubMed and Embase with no date restriction up to and including 2023. The last search was accomplished on 18 October 2023. We developed the search strategy (see Supplementary material online, *Table S1*) with the assistance of a healthcare librarian. All potential publications were assessed for eligibility. Two reviewers (L.F./N.V.) used the title and abstract to evaluate each record for inclusion. Eligible articles were retrieved as full text.

Data collection process

Two reviewers (L.F./N.V.) extracted all information independently and in duplicate. Inconsistencies were resolved by consensus. For extraction, relevant SDOH were prespecified and included race and ethnicity (used as proxies for structural racism), marital status, living independently, neighbourhood deprivation, family income, educational attainment, rural vs. urban habitation, and socioeconomic status (SES) (defined as a combination of education, income, and occupation). We evaluated incidence and prevalence, screening (systematic, opportunistic, and self-screening), management, and clinical outcomes. Management of AF included initiation and use of oral anticoagulation (OAC), persistence of OAC, switching to direct oral anticoagulants (DOACs) from warfarin, evaluation by a cardiologist, heart rhythm control, and implantation of a left atrial appendage occlusion (LAAO). Clinical outcomes after AF included all-cause hospitalization, bleeding, heart failure, stroke, dementia, work disability, and mortality. We noted the origin of the study to account for different healthcare systems.

Results

Literature search

We included 79 studies in the review. We initially identified 537 references in PubMed and 473 references in Embase. After the removal of duplicates, we screened the abstracts of 975 references, resulting in 113 references that were examined further for eligibility. Subsequently, 34 references were deemed ineligible (*Figure 1*).

Social drivers of healths and the incidence and prevalence of atrial fibrillation

The information about incidence and prevalence in relation to SES and racial and ethnic identity is conflicting. *Table 1* shows the retrieved evidence base at a global and regional scale.

Systematic screening for AF

The STROKESTOP I (7 160 participants) and II studies (6 868 participants) were Swedish randomized systematic screening trials, with level of participation around 50%. The level of participation was higher in invitees with higher education,[31,32] non-immigrant status, and marital ties.[32] Decentralized screening increased participation in disadvantaged areas.[33] We found no studies that examined SDOH and opportunistic screening or self-screening for AF.

Atrial fibrillation care

Initiation of oral anticoagulation

A multitude of studies from various countries have reported that higher SES, race, and ethnicity are associated with the successful use of OAC in patients with AF. In the USA, among 41 447 Medicare beneficiaries diagnosed with AF in 2007 and 2008, the use of warfarin was lower among Black individuals and those with lower incomes.[34] Similarly, a cohort study of 12 417 individuals with AF, reported that patients who were Black and Hispanic were less likely to receive OAC than White patients.[35] Furthermore, among 69 553 patients hospitalized with AF, Black patients were less likely to be discharged on treatment with vitamin K antagonist and DOACs.[36] Similarly, a study of 16 656 individuals with AF showed that residing in higher mean area deprivation index (most disadvantaged) census tracts was associated with a higher proportion of prescriptions for warfarin vs. DOACs than observed for individuals in the least disadvantaged tracts.[37] Among 161 089 Veterans with incident AF, neighbourhood deprivation was associated with less use of DOACs.[38]

Results were similar in Europe. In the UK, among 192 265 individuals with incident AF, patients from Black and other minoritized races, and those living in the most disadvantaged areas were less frequently prescribed OAC.[39] In Sweden, a study in 12 283 individuals with

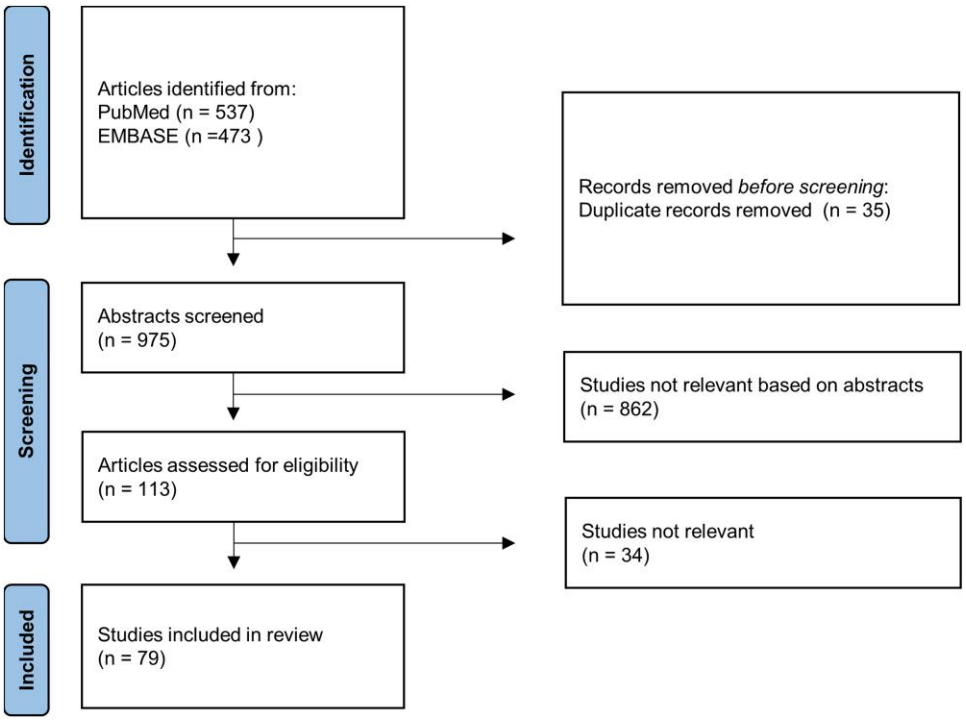

Figure 1 Flowchart of literature search.

incident AF showed a higher user rate of OAC among individuals living in neighbourhoods with high SES.[40] A Swedish nationwide study of 68 056 patients with AF, reported that patients with high SES and urban residence were more frequently initiated on DOAC therapy rather than warfarin.[41] Riksstroke, the national Swedish stroke registry, reported that among 12 088 OAC naive stroke survivors with AF, those with low levels of education or income, or immigrants from outside Europe, were less likely to be initiated on OAC.[42] Among 3 429 stroke survivors with AF in Glasgow, the use of warfarin was lower in patients from neighbourhoods characterized by low SES.[43] A Danish study of 154 448 patients with AF reported that low income, low education, and living independently were associated with lower levels of OAC initiation. For education and cohabiting status, the inequity in initiation of OAC declined around 2011, corresponding to an update of clinical guidelines in Denmark.[44] In Finland, a study based on 239 222 individuals with AF reported that higher income was associated with higher rates of OAC prescriptions, but SES-related inequalities decreased over the study period.[45] In Spain, a study of 60 978 anticoagulated patients with AF reported that patients living in rural and deprived urban districts were less frequently treated with DOACs.[46] A survey among 1 147 patients with AF in Europe showed that those with the highest educational attainment were more frequently prescribed DOACs.[47]

In Korea, a study of 276 842 individuals with AF showed that use of OAC was higher with higher incomes, and DOACs were more often prescribed in the higher income groups.[27] In China, lower levels of education, lower income, and rural residence were associated with less frequent treatment with OAC at discharge from hospital among 49 531 patients with AF and ischaemic stroke.[48]

A global survey of 15 400 patients with AF reported that patients were more often managed according to AF guidelines in high-income countries.[49]

Adherence to oral anticoagulation

In the USA, a study of 12 417 individuals with AF reported that the quality of OAC treatment in AF was lower in Black and Hispanic populations.[35] Furthermore, among 17 558 patients with AF initiating DOACs, higher co-payments were associated with lower initiation rates and higher discontinuation rates.[50] In contrast, a nationwide Finnish study of 74 222 patients with AF reported that higher income and higher educational levels were associated with higher initiation of DOAC therapy in patients with AF; however, these factors did not influence adherence to OAC.[51]

Switching from warfarin to direct oral anticoagulant

A Canadian study highlighted SES inequity in access to switching to dabigatran among 34 797 patients who were already receiving warfarin for AF. This inequity was eliminated after dabigatran was included in the list of drugs eligible for cost reimbursement.[52]

Evaluation by a cardiologist and ambulatory care

In the USA, a study of 223 891 individuals with AF showed that non-White Hispanic and Asian individuals were less frequently evaluated by a cardiologist; however, the likelihood of such consultation increased with higher educational attainment.[53] A separate USA study based

Table 1 Social determinants of health and incidence and prevalence of atrial fibrillation

Scale	Data source	Major findings
Global	Global Health Study	The prevalence of AF was highest in high-income countries.[8] Prevalence of AF correlated with longevity and the ratio of medical doctors to inhabitants.[8]
Race	Atherosclerosis Risk in Communities (ARIC)	Black participants had lower AF risk compared to White participants.[9,10]
	Multi-Ethnic Study of Atherosclerosis (MESA)	• The incidence of AF was lower in Hispanic, Black, and Chinese than in White participants.[11] • Postoperative AF after heart surgery was observed more frequently in White than Black patients.[12]
USA	The Northwestern Medicine Enterprise Data Warehouse and American Community Survey	Individuals living in neighbourhoods with intermediate compared to low poverty levels had higher incidence of AF.[13]
	Atherosclerosis Risk in Communities (ARIC)	Lower family income was associated with higher risk of AF.[9]
	Medicaid data	A combination of disability and low SES was associated with higher risk of AF.[14]
	The Framingham Heart Study	Neither education nor household income was associated with a lifetime risk of AF.[15]
Europe	The Global Health Study	No general temporal trend in AF incidence in 20 European countries stratified into tertiles of income.[16]
	Swedish nationwide registries	Neighbourhood deprivation and SES inequities were not associated with a hospital diagnosis of AF.[17]
	Moli-sani Study (Italy)	A life-course unfavourable SDOH score was associated with higher risk of AF.[18]
	Danish nationwide registries	• Inequity in AF incidence by educational attainment was small.[19] • The inequity in AF incidence between highest and lowest income groups increased between 1987 and 2015; AF incidence was highest in the lowest income group.[20] • Higher educational attainment and income were associated with lower risk of AF in young individuals, but the disparities diminished with advancing age and were almost non-existing for the oldest individuals.[21]
	The Clinical Practice Research Datalink (UK)	• A higher AF risk with a worse deprivation level.[22] • Individuals with low SES had more multimorbidity and a higher risk of AF.[23]
	UK Biobank	Modification of genetic predisposition to cardiovascular risk factors or cardiovascular disease including AF by educational achievement is not likely to explain inequities in cardiovascular risk.[24]
	Genome-wide association studies (Europe)	• Multivariable Mendelian randomization and mediation analysis showed that the lower risk of AF by higher educational achievement was partially mediated by reduced level of risk factors.[25] • Another Mendelian randomization study reported that higher household earnings did not lower the risk of genetic predisposition to AF.[26]
Asia and Oceania	Nationwide Korean health care database	• A nationwide study among patients with prevalent AF in the Republic of Korea showed a J-shaped association between income level and prevalence of AF.[27] • Low SES was associated with higher risk of AF among patients with diabetes[28]
	China National Stroke Screening and Prevention Project	The prevalence of AF was highest in high-income regions.[29]
	Tasmania	Low SES and rural residency were associated with higher risk of AF.[30]

on 156 732 patients with AF reported that patients residing in rural areas had fewer outpatient visits.[54]

Heart rhythm control

In the USA, a study in 3 508 122 patients with AF showed that Black and Hispanic patients underwent fewer AF ablations than White patients, and patients with Medicare or Medicaid coverage and non-insured patients underwent fewer ablations than those with private insurance.[55] Another study in 109 221 patients with AF reported that patients from minoritized racial and ethnic groups and those with lower income less frequently had rhythm control including catheter ablation.[56] A study in 5 445 patients with AF showed that despite similar appointment rates to general cardiology

and cardiac electrophysiology between non-Hispanic White and non-Hispanic Black patients, the latter were less likely to undergo ablation for AF.[57] A study in 8 648 patients who underwent catheter ablation for AF, showed that higher household income was associated with an increased number of re-do ablations.[58]

In Europe, a Danish nationwide study of 150 544 patients with AF reported that individuals with lower household income underwent fewer cardioversions and ablations.[59] Similarly, a Norwegian study of 88 534 patients with AF showed that patients with higher educational attainment and income more frequently underwent an ablation.[60] A nationwide study in 188 175 patients with AF from Finland reported lower use of rhythm control procedures including cardioversions, use of antiarrhythmic drugs, and ablations in those with the lowest incomes.[61] A study in 2 236 580 patients with AF from the UK reported that individuals from minoritized racial and low SES groups underwent fewer catheter ablations for AF.[62]

Left atrial appendage occlusion

In the USA, it was found in a case-control study in 98 cases and 109 controls that patients with higher vs. lower incomes were more likely to undergo LAAO, and African-American patients received fewer LAAO procedures compared to White patients.[63] Another US study in 6 478 patients having LAAO reported that individuals who were Black, Hispanic, or 'other' race or ethnicity, underwent LAAO less frequently.[64] A study of 1 270 hospitals in the US, showed that lower rates of LAAO implantations were observed in metropolitan areas marked by lower SES or with greater proportions of Black or Hispanic patients.[65] It is noteworthy that no studies examining SDOH and LAAO were found outside the US.

Adverse outcomes in patients with AF

We identified studies that examined associations between SDOH and hospitalizations and outpatient contacts, bleeding after exposure to OAC, heart failure, stroke, dementia, work disability, and mortality.

Hospitalizations and outpatient contacts

The associations between the risk of hospitalization and SDOH are inconsistent across studies. In the USA, a study in 4 641 036 patients with AF showed that AF hospitalization rates have increased from 2004 to 2018 across all races and ethnicities, with a greater increase in the proportion of Black patients being hospitalized compared to non-Black patients. Both Black and non-Black individuals with low household income had an increase in AF hospitalizations over time. AF hospitalizations increased modestly among Black individuals with high household income but decreased among their non-Black counterparts.[66] A study of 1 320 123 emergency room visits for AF found that hospitalizations were more frequent among patients seen at hospitals that primarily served uninsured and underinsured patients.[67] Another study in the USA in 339 patients with AF reported that lower income was associated with higher risk of unplanned all-cause hospitalization.[68]

In Europe, a nationwide Danish study reported that among 150 544 survivors of first-time hospitalization for or with AF, lower household income was associated with fewer outpatient contacts and readmissions.[59] A UK study followed 3 377 342 individuals free of AF at study entry and found was no time trend in the difference in hospitalizations for AF by SES.[23]

Bleeding

A study from USA in 7 274 patients with AF receiving warfarin reported that a worse area deprivation index predicted increased risk for bleeding events.[69] Another study in 16 307 patients with AF indicated that the risk of bleeding was higher among Black patients than White patients.[36] A Canadian study found that among 166 742 patients with AF exposed to warfarin, those with lower SES had a higher risk of bleeding and bleeding-related mortality.[70]

A UK case-control study reported that low SES and residency in rural areas were associated with a higher risk of over-anticoagulation during warfarin therapy.[71] A nationwide study from Finland in 205 019 patients with AF reported that patients with low income were at higher risk of any bleeding including gastrointestinal and intracranial bleeding.[72]

A study conducted in New Zealand, which followed 15 212 primary care patients with AF receiving OAC, reported that Māori, Chinese, and Pacific individuals were at a higher risk of all bleeding types compared to Europeans. Furthermore, Māori, Pacific, Chinese, and other Asian individuals had a higher risk of intracranial bleeds. Additionally, SES deprivation was associated with a higher risk of all bleeds and also intracranial bleed.[73]

Heart failure after AF

Research conducted in the USA in 336 736 patients with AF and in 68 909 patients with AF in Canada reported a higher risk of heart failure among patients with lower income.[74,75] Interestingly, living in rural or remote areas, as opposed to urban residential areas, was associated with lower risks of diagnosed incident heart failure.[75] A Danish nationwide study in 150 544 patients with AF reported a lower risk of hospitalization for heart failure with higher income.[59]

Stroke

A study from the USA reported that among 7 274 individuals with AF worse area deprivation index was associated with an increased risk of ischaemic events (stroke, transient ischaemic attack, or systemic embolism).[69] Another study within the USA based on 16 307 patients with AF found that individuals with AF from minoritized racial groups were at a higher risk of stroke compared to White patients.[36] Nationwide registry-based studies from Denmark based on 150 544 patients with AF and from Finland based on 203 154 patients with AF reported that lower income was associated with a higher risk of stroke.[59,76] In Asia, a study in 3 026 patients with AF from Thailand found that lower educational attainment was associated with a higher risk of ischaemic stroke.[77]

Dementia

A nationwide study in 537 513 patients with AF in Sweden reported that lower educational attainment was

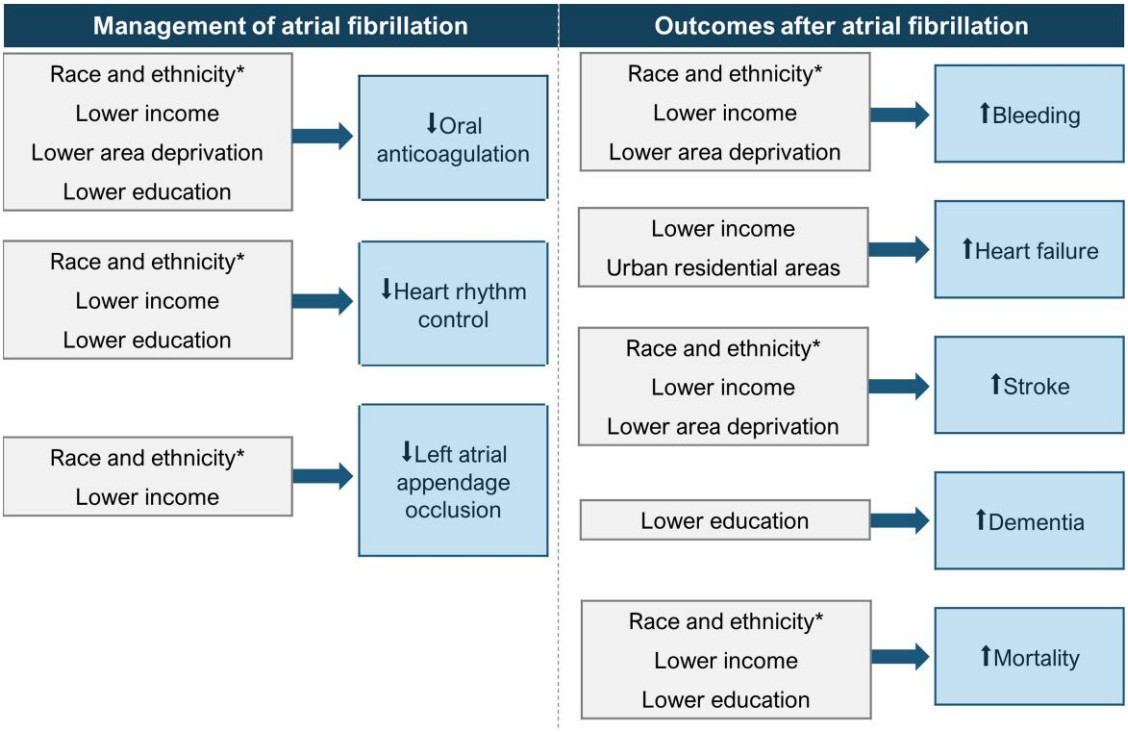

Figure 2 Major findings in relation to socioeconomic drivers of health and management, and outcomes of atrial fibrillation. *Race and ethnicity as proxies for structural racism and disadvantage.

associated with a higher risk of diagnosed dementia after AF.[78]

Work disability

A Danish nationwide study including 28 059 patients with AF and 312 667 referents reported that the risk of work disability after AF was most pronounced in individuals with lower SES.[79]

Composite of adverse events

A study based on data from the Medicaid programme reported that in individuals with AF, a combination of lower SES and increased disability was associated with a higher risk of stroke, heart failure, major bleeding, and cognitive imparment.[14]

Mortality

In the USA, a study in 4 616 patients with AF reported that those with lower neighbourhood household income had higher all-cause and cardiovascular mortality; driven by a higher level of multimorbidity among individuals with a lower household income.[80] A study based on data from 16 307 individuals retrieved from a USA AF registry reported that Black patients had higher 1-year mortality compared to White patients.[36] However, when discharged while taking OAC, the Black–White mortality difference was not present.[36]A single-centre hospital-based study of 4 503 patients with AF reported that the lowest quartile (vs. the highest quartile) SES was associated with increased mortality.[81]

In Europe, a study from Greece in 1 082 patients with AF reported that higher educational attainment was associated with lower mortality.[82] A UK Clinical Practice Research Datalink study in 199 433 patients with AF reported higher mortality in patients living in the most deprived neighbourhoods.[22] Another UK study in 72 412 patients with AF reported that patients with lower SES had higher all-cause mortality, higher cerebrovascular mortality, higher cardiovascular mortality, and non-cardiovascular or non-cerebrovascular mortality.[83]

Studies of 12 283 individuals with AF from general practice in Sweden reported a higher risk of mortality by lower educational level in men and women, in unmarried and divorced men, and in men living in low SES neighbourhoods.[84,85] A nationwide study from Finland based on 203 154 patients with AF reported that lower annual income was associated with higher rate of mortality.[76] A nationwide Danish study in 150 544 patients with AF reported that lower household income was associated with increased all-cause and cardiovascular mortality.[59] A study from Norway based on 42 138 patients with AF showed that patients with lower education had higher mortality.[86]

In Asia, a study from Thailand in 3 402 patients with AF reported that a lower educational level was associated with higher mortality AF.[77] A nationwide study in the Republic of Korea based on 99 306 patients with AF having an emergency department visit reported that patients with lower SES had a higher death rate after the visit.[87]

A report from the Global Health Study documented that there was no general trend in AF-associated mortality across 20 European countries stratified by gross national income in high, medium, and low-income countries. However, higher mortality rates were found in the

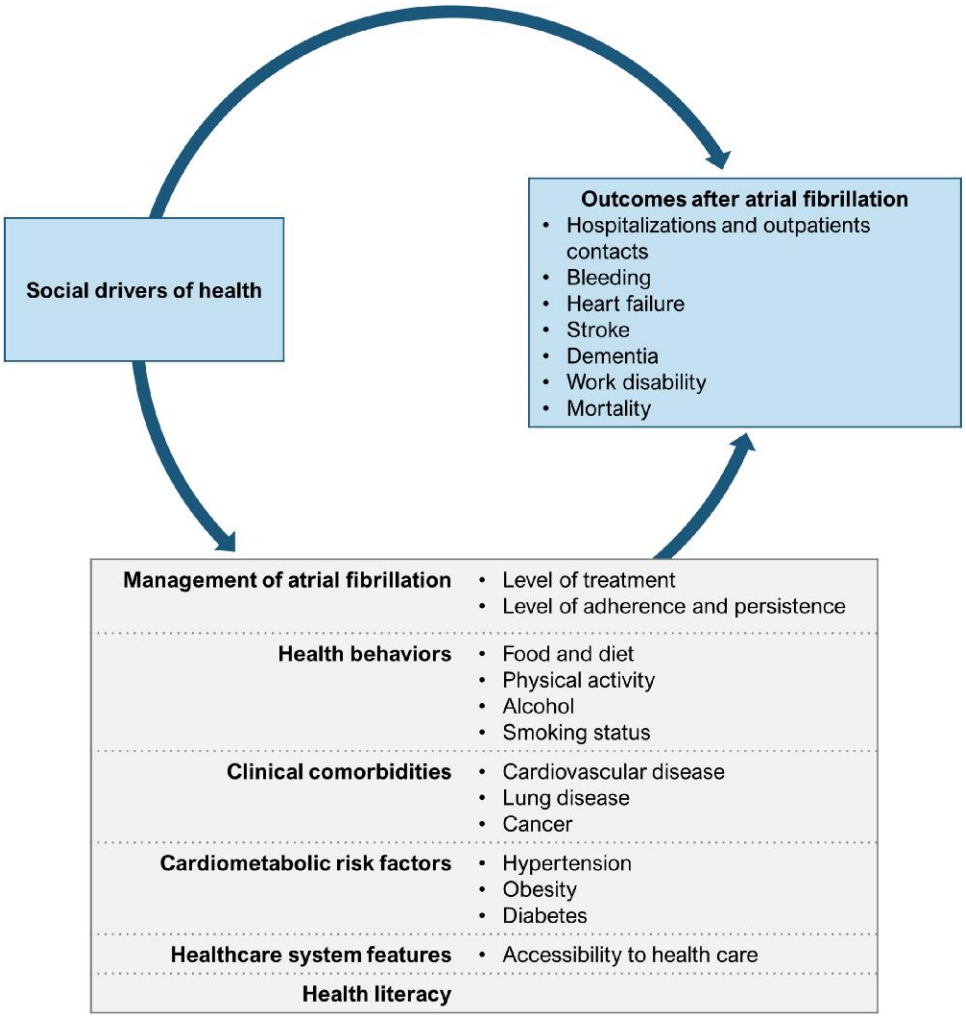

Figure 3 Potential mediators of the association between social drivers of health and atrial fibrillation and its outcomes.

wealthiest countries, possibly secondary to a survivor effect, i.e. individuals become old enough to develop AF and its complications.[16]

Discussion

Evidence for a social gradient in AF incidence is somewhat conflicting, but there is substantial documentation for social inequity in relation to the detection of AF, access to treatment, and outcomes including healthcare utilization, bleeding, heart, failure, stroke, dementia, work disability, and death *(Figure 2)*. These findings have been reported across various healthcare systems and seem to be a global issue, although data from Africa and South America are sparse. Current evidence suggests a multitude of possible explanations for inequities in AF, including detection and survival biases, inequities in health literacy, inequities in a healthy lifestyle, inequities in predisposing conditions for AF and its complications, and inequity in healthcare access.

Figure 3 illustrates the authors' current understanding of the mediators of the association between SDOH and AF incidence and outcomes. The conflicting evidence concerning risk of AF by exposure to SDOH may be attributed to two mechanisms. First, individuals with adverse SDOH may have accumulated more risk factors for AF, leading to an earlier onset of AF. Conversely, individuals with a favourable SDOH profile may develop AF later in life due to a lower risk factor burden and increased longevity. Thus, variation in the duration of follow-up for AF across studies may at least partly explain the conflicting findings. There may also be an imbalance in risk factors for AF concerning SDOH. For instance, obesity is more prevalent in patients with lower SES, at least in high-income countries, while height, a risk factor for AF, is more prevalent in those with higher SES. Conversely, social risk factors are associated with markedly increased rates of death so that individuals with adverse SDOH might die before AF develops or is detected.

We included race and ethnicity as proxies for structural racism as an SDOH. We acknowledge that race is a social construct. Our search did not turn up articles examining AF, disentangling genetic ancestry from SDOH.[88] We suspect variation by race and ethnicity in management, complications, and outcomes largely reflect systemic and interpersonal racism, socioeconomic disadvantages,

and the exposome, as opposed to inherent biological factors.[89,90]

To substantiate the efficacy of systematic screening for a specific disease within an intention-to-screen framework, certain prerequisites must be satisfied. These include a high rate of participation, the use of a screening tool with a high sensitivity and specificity, and the implementation of an intervention that is both effective, safe, and accompanied by a substantial acceptance level. In relation to opportunistic screening for AF, the source population is most often not well characterized. This limits the possibility for evaluation of a potential selection bias by SES to opportunistic screening. Self-screening for AF requires a device, for example, wristbands or watches, with the capability of detecting possible AF. Devices for self-screening for AF can be costly, and may therefore not be accessible to individuals with low income.

Limitations

Different SDOH exposures have been used in different studies. However, components of SDOH exposures are highly intercorrelated.[91] Many studies have possibly over-adjusted for components in the causal pathway between SDOH and outcomes (*Figure 3*). It is well known that for example smoking, obesity, severe comorbidity, and multimorbidity are more prevalent among individuals and neighbourhoods with lower educational attainment and income. Obesity is a risk factor for hypertension as well as for AF. Given that obesity, hypertension, and multimorbidity may represent intermediates in the causal pathway between lower educational attainment and newly diagnosed AF, adjusting for such factors in statistical analyses may lead to underestimating the risks associated with lower educational attainment. We cannot exclude the possibility of publication biases, given that null findings are less likely to be disseminated than positive associations. Findings cannot be extrapolated between different healthcare systems. We reported no risk estimates because this will require a systematic meta-analysis; the study heterogeneity and quality made such analyses challenging.

We abstained from reviewing gender or sex inequities because the literature search was not designed to retrieve such specific information. However, a recent publication has reviewed gender inequities in relation to the risk of AF and outcomes of AF.[92]

Perspectives

Addressing social inequity necessitates proactive strategies from policymakers and society, beginning from an individual's conception or no later than birth. In the health sector, primary prevention of AF urgently needs to be designed to address social inequity by employing methods that have demonstrated effectiveness in large, randomized trials. Specifically, we advocate for effective interventions aimed at enhancing access to physical activity and high-quality diets, with the goal of reducing obesity and hypertension.

Healthcare systems associated with social differentiation in care and treatment should undergo reforms to diminish inequity. In addition, a differentiated rehabilitation approach for patients with AF, focusing resources on the most deprived patients with AF, has the potential to improve treatment quality and outcome. However, there is a paucity of information on how to implement differentiated rehabilitation to improve compliance and outcomes.

Research initiatives concentrating on reducing inequities in patient management and outcomes are needed and should involve multidisciplinary and multi-sectorial approaches, patient engagement, expertise in nursing, psychology, anthropology, sociology, medicine, and clinical trials.[91] Multidisciplinary pragmatic research should culminate in the development of novel patient pathways, feasibility studies, and large, randomized studies addressing social inequity using a composite of major cardiovascular outcomes.

In conclusion, we found substantial global evidence indicating social inequities in the detection of AF, access to treatment, and outcomes. Effective interventions that can reduce inequities and improve outcomes in individuals with AF are urgently needed.

Supplementary material

Supplementary material is available at *European Heart Journal Supplements* online.

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Data availability

All papers and data used in this review are available.

References

1. Martin SS, Aday AW, Almarzooq ZI, Anderson CAM, Arora P, Avery CL *et al*. 2024 heart disease and stroke statistics: a report of US and global data from the American Heart Association. *Circulation* 2024; **149**:e347–e913.
2. Vinter N, Cordsen P, Johnsen SP, Benjamin EJ, Frost L, Trinquart L. Birth cohort effects on diagnosed atrial fibrillation incidence: nationwide cohort study from 1980 to 2018. *Heart* 2024;**110**:694–701.
3. Odutayo A, Wong CX, Hsiao AJ, Hopewell S, Altman DG, Emdin CA. Atrial fibrillation and risks of cardiovascular disease, renal disease, and death: systematic review and meta-analysis. *BMJ* 2016;**354**:i4482.

4. Piccini JP, Hammill BG, Sinner MF, Hernandez AF, Walkey AJ, Benjamin EJ *et al*. Clinical course of atrial fibrillation in older adults: the importance of cardiovascular events beyond stroke. *Eur Heart J* 2014;**35**:250–256.
5. Vinter N, Huang Q, Fenger-Grøn M, Frost L, Benjamin EJ, Trinquart L. Trends in excess mortality associated with atrial fibrillation over 45 years (Framingham Heart Study): community based cohort study. *BMJ* 2020;**370**:m2724.
6. Vinter N, Cordsen P, Johnsen SP, Staerk L, Benjamin EJ, Frost L *et al*. Temporal trends in lifetime risks of atrial fibrillation and its complications between 2000–2022. A Danish nationwide study. *BMJ* 2024;**385**:e077209.
7. Commission on Social Determinants of HealthWorld Health Organization. *Closing the Gap in a Generation: Health Equity Through Action on the Social Determinants of Health: Commission on social determinants of Health Final Report*. Geneva, Switzerland: World Health Organization; 2008.
8. Ohlrogge AH, Brederecke J, Schnabel RB. Global burden of atrial fibrillation and flutter by national income: results from the global burden of disease 2019 database. *J Am Heart Assoc* 2023;**12**:e030438.
9. Misialek JR, Rose KM, Everson-Rose SA, Soliman EZ, Clark CJ, Lopez FL *et al*. Socioeconomic status and the incidence of atrial fibrillation in whites and blacks: the Atherosclerosis Risk in Communities (ARIC) study. *J Am Heart Assoc* 2014;**3**:e001159.
10. Mou L, Norby FL, Chen LY, O'Neal WT, Lewis TT, Loehr LR *et al*. Lifetime risk of atrial fibrillation by race and socioeconomic Status: ARIC study (Atherosclerosis Risk in Communities). *Circ Arrhythm Electrophysiol* 2018;**11**:e006350.
11. Rodriguez CJ, Soliman EZ, Alonso A, Swett K, Okin PM, Goff DC Jr *et al*. Atrial fibrillation incidence and risk factors in relation to race-ethnicity and the population attributable fraction of atrial fibrillation risk factors: the multi-ethnic study of atherosclerosis. *Ann Epidemiol* 2015;**25**:71–76.e1.
12. Rader F, Van Wagoner DR, Ellinor PT, Gillinov AM, Chung MK, Costantini O *et al*. Influence of race on atrial fibrillation after cardiac surgery. *Circ Arrhythm Electrophysiol* 2011;**4**:644–652.
13. Essien UR, McCabe ME, Kershaw KN, Youmans QR, Fine MJ, Yancy CW *et al*. Association between neighborhood-level poverty and incident atrial fibrillation: a retrospective cohort study. *J Gen Intern Med* 2022;**37**:1436–1443.
14. Lip GYH, Genaidy A, Tran G, Marroquin P, Estes C. Incidence and complications of atrial fibrillation in a low socioeconomic and high disability United States (US) population: a combined statistical and machine learning approach. *Int J Clin Pract* 2022;**2022**:8649050.
15. Ataklte F, Huang Q, Kornej J, Mondesir F, Benjamin EJ, Trinquart L. The association of education and household income with the lifetime risk of incident atrial fibrillation: the Framingham Heart Study. *Am J Prev Cardiol* 2022;**9**:100314.
16. Al-Khayatt BM, Salciccioli JD, Marshall DC, Krahn AD, Shalhoub J, Sikkel MB. Paradoxical impact of socioeconomic factors on outcome of atrial fibrillation in Europe: trends in incidence and mortality from atrial fibrillation. *Eur Heart J* 2021;**42**:847–857.
17. Zöller B, Li X, Sundquist J, Sundquist K. Neighbourhood deprivation and hospitalization for atrial fibrillation in Sweden. *Europace* 2013; **15**:1119–1127.
18. Bonaccio M, Di Castelnuovo A, Costanzo S, De Curtis A, Persichillo M, Cerletti C *et al*. Life course socioeconomic status and risk of hospitalization for heart failure or atrial fibrillation in the Moli-Sani study cohort. *Am J Epidemiol* 2021;**190**:1561–1571.
19. Christensen AV, Koch MB, Davidsen M, Jensen GB, Andersen LV, Juel K. Educational inequality in cardiovascular disease depends on diagnosis: a nationwide register based study from Denmark. *Eur J Prev Cardiol* 2016;**23**:826–833.
20. Wodschow K, Bihrmann K, Larsen ML, Gislason G, Ersbøll AK. Geographical variation and clustering are found in atrial fibrillation beyond socioeconomic differences: a Danish cohort study, 1987–2015. *Int J Health Geogr* 2021;**20**:11.
21. Lunde ED, Joensen AM, Lundbye-Christensen S, Fonager K, Paaske Johnsen S, Larsen ML *et al*. Socioeconomic position and risk of atrial fibrillation: a nationwide Danish cohort study. *J Epidemiol Community Health* 2020;**74**:7–13.
22. Chung SC, Sofat R, Acosta-Mena D, Taylor JA, Lambiase PD, Casas JP *et al*. Atrial fibrillation epidemiology, disparity and healthcare contacts: a population-wide study of 5.6 million individuals. *Lancet Reg Health Eur* 2021;**7**:100157.
23. Wu J, Nadarajah R, Nakao YM, Nakao K, Wilkinson C, Mamas MA *et al*. Temporal trends and patterns in atrial fibrillation incidence: a population-based study of 3·4 million individuals. *Lancet Reg Health Eur* 2022;**17**:100386.
24. Carter AR, Harrison S, Gill D, Davey Smith G, Taylor AE, Howe LD *et al*. Educational attainment as a modifier for the effect of polygenic scores for cardiovascular risk factors: cross-sectional and prospective analysis of UK Biobank. *Int J Epidemiol* 2022;**51**:885–897.
25. Liu Y, Liu C, Liu Q. Education and atrial fibrillation: Mendelian randomization study. *Glob Heart* 2022;**17**:22.
26. Zheng X, Yang Y, Chen J, Lu B. Dissecting the causal relationship between household income status and genetic susceptibility to cardiovascular-related diseases: insights from bidirectional Mendelian randomization study. *BMC Public Health* 2023;**23**:749.
27. Lee SR, Choi EK, Han K, Cha MJ, Oh S. Prevalence of non-valvular atrial fibrillation based on geographical distribution and socioeconomic Status in the entire Korean population. *Korean Circ J* 2018;**48**:622–634.
28. Han M, Lee SR, Choi EK, Park SH, Lee H, Chung J *et al*. The impact of socioeconomic deprivation on the risk of atrial fibrillation in patients with diabetes mellitus: a nationwide population-based study. *Front Cardiovasc Med* 2022;**9**:1008340.
29. Wang X, Fu Q, Song F, Li W, Yin X, Yue W *et al*. Prevalence of atrial fibrillation in different socioeconomic regions of China and its association with stroke: results from a national stroke screening survey. *Int J Cardiol* 2018;**271**:92–97.
30. Ramkumar S, Ochi A, Yang H, Nerlekar N, D'Elia N, Potter EL *et al*. Association between socioeconomic status and incident atrial fibrillation. *Intern Med J* 2019;**49**:1244–1251.
31. Engdahl J, Holmén A, Svennberg E, Friberg L, Frykman-Kull V, Al-Khalili F *et al*. Geographic and socio-demographic differences in uptake of population-based screening for atrial fibrillation: the STROKESTOP I study. *Int J Cardiol* 2016;**222**:430–435.
32. Gudmundsdottir KK, Bonander C, Hygrell T, Svennberg E, Frykman V, Strömberg U *et al*. Factors predicting participation and potential yield of screening-detected disease among non-participants in a Swedish population-based atrial fibrillation screening study. *Prev Med* 2022;**164**:107284.
33. Gudmundsdottir KK, Holmen A, Fredriksson T, Svennberg E, Al-Khalili F, Engdahl J *et al*. Decentralising atrial fibrillation screening to overcome socio-demographic inequalities in uptake in STROKESTOP II. *J Med Screen* 2021;**28**:3–9.
34. Raji MA, Lowery M, Lin YL, Kuo YF, Baillargeon J, Goodwin JS. National utilization patterns of warfarin use in older patients with atrial fibrillation: a population-based study of Medicare Part D beneficiaries. *Ann Pharmacother* 2013;**47**:35–42.
35. Essien UR, Holmes DN, Jackson LR 2nd, Fonarow GC, Mahaffey KW, Reiffel JA *et al*. Association of race/ethnicity with oral anticoagulant use in patients with atrial fibrillation: findings from the outcomes registry for better informed treatment of atrial fibrillation II. *JAMA Cardiol* 2018;**3**:1174–1182.
36. Essien UR, Chiswell K, Kaltenbach LA, Wang TY, Fonarow GC, Thomas KL *et al*. Association of race and ethnicity with oral anticoagulation and associated outcomes in patients with atrial fibrillation: findings from the get with the guidelines-atrial fibrillation registry. *JAMA Cardiol* 2022;**7**:1207–1217.
37. Khatib R, Glowacki N, Colavecchia C, Mills JR, Glosner S, Cato M *et al*. Associations between clinical and social factors and anticoagulant prescription among patients with atrial fibrillation: a retrospective cohort study from a large healthcare system. *PLoS One* 2023;**18**: e0289708.
38. McDermott A, Kim N, Hausmann LRM, Magnani JW, Good CB, Litam TMA *et al*. Association of neighborhood disadvantage and anticoagulation for patients with atrial fibrillation in the veterans health administration: the REACH-AF study. *J Gen Intern Med* 2023;**38**: 848–856.
39. Ajabnoor AM, Zghebi SS, Parisi R, Ashcroft DM, Rutter MK, Doran T *et al*. Incidence of nonvalvular atrial fibrillation and oral anticoagulant prescribing in England, 2009 to 2019: a cohort study. *PLoS Med* 2022;**19**:e1004003.
40. Carlsson AC, Wändell P, Gasevic D, Sundquist J, Sundquist K. Neighborhood deprivation and warfarin, aspirin and statin

prescription—a cohort study of men and women treated for atrial fibrillation in Swedish primary care. *Int J Cardiol* 2015;**187**:547–552.
41. Gurusamy VK, Brobert G, Vora P, Friberg L. Sociodemographic factors and choice of oral anticoagulant in patients with non-valvular atrial fibrillation in Sweden: a population-based cross-sectional study using data from national registers. *BMC Cardiovasc Disord* 2019;**19**:43.
42. Sjölander M, Eriksson M, Asplund K, Norrving B, Glader EL. Socioeconomic inequalities in the prescription of oral anticoagulants in stroke patients with atrial fibrillation. *Stroke* 2015;**46**:2220–2225.
43. Abdul-Rahim AH, Wong J, McAlpine C, Young C, Quinn TJ. Associations with anticoagulation: a cross-sectional registry-based analysis of stroke survivors with atrial fibrillation. *Heart* 2014;**100**:557–562.
44. Lunde ED, Joensen AM, Fonager K, Lundbye-Christensen S, Johnsen SP, Larsen ML *et al*. Socioeconomic inequality in oral anticoagulation therapy initiation in patients with atrial fibrillation with high risk of stroke: a register-based observational study. *BMJ Open* 2021;**11**: e048839.
45. Teppo K, Jaakkola J, Biancari F, Halminen O, Linna M, Haukka J *et al*. Association of income and educational levels on initiation of oral anticoagulant therapy in patients with incident atrial fibrillation: a Finnish nationwide cohort study. *Br J Clin Pharmacol* 2023;**89**: 351–360.
46. Dalmau Llorca MR, Aguilar Martín C, Carrasco-Querol N, Hernández Rojas Z, Forcadell Drago E, Rodríguez Cumplido D *et al*. Gender and socioeconomic inequality in the prescription of direct oral anticoagulants in patients with non-valvular atrial fibrillation in primary care in catalonia (Fantas-TIC study). *Int J Environ Res Public Health* 2021;**18**:1099.
47. Hernández Madrid A, Potpara TS, Dagres N, Chen J, Larsen TB, Estner H *et al*. Differences in attitude, education, and knowledge about oral anticoagulation therapy among patients with atrial fibrillation in Europe: result of a self-assessment patient survey conducted by the European Heart Rhythm Association. *Europace* 2016;**18**:463–467.
48. Gu HQ, Yang X, Wang CJ, Zhao XQ, Wang YL, Liu LP *et al*. Assessment of trends in guideline-based oral anticoagulant prescription for patients with ischemic stroke and atrial fibrillation in China. *JAMA Netw Open* 2021;**4**:e2118816.
49. Oldgren J, Healey JS, Ezekowitz M, Commerford P, Avezum A, Pais P *et al*. Variations in cause and management of atrial fibrillation in a prospective registry of 15,400 emergency department patients in 46 countries: the RE-LY atrial fibrillation registry. *Circulation* 2014;**129**: 1568–1576.
50. Rome BN, Gagne JJ, Avorn J, Kesselheim AS. Non-warfarin oral anticoagulant copayments and adherence in atrial fibrillation: a population-based cohort study. *Am Heart J* 2021;**233**:109–121.
51. Teppo K, Jaakkola J, Biancari F, Halminen O, Linna M, Haukka J *et al*. Association of income and educational levels with adherence to direct oral anticoagulant therapy in patients with incident atrial fibrillation: a Finnish nationwide cohort study. *Pharmacol Res Perspect* 2022;**10**: e00961.
52. Sholzberg M, Gomes T, Juurlink DN, Yao Z, Mamdani MM, Laupacis A. The influence of socioeconomic status on selection of anticoagulation for atrial fibrillation. *PLoS One* 2016;**11**:e0149142.
53. O'Neal WT, Sandesara PB, Claxton JS, MacLehose RF, Chen LY, Bengtson LGS *et al*. Influence of sociodemographic factors and provider specialty on anticoagulation prescription fill patterns and outcomes in atrial fibrillation. *Am J Cardiol* 2018;**122**:388–394.
54. Jiang S, Seslar SP, Sloan LA, Hansen RN. Health care resource utilization and costs associated with atrial fibrillation and rural-urban disparities. *J Managed Care Special Pharm* 2022;**28**: 1321–1330.
55. Patel N, Deshmukh A, Thakkar B, Coffey JO, Agnihotri K, Patel A *et al*. Gender, race, and health insurance status in patients undergoing catheter ablation for atrial fibrillation. *Am J Cardiol* 2016;**117**: 1117–1126.
56. Eberly LA, Garg L, Yang L, Markman TM, Nathan AS, Eneanya ND *et al*. Racial/ethnic and socioeconomic disparities in management of incident paroxysmal atrial fibrillation. *JAMA Netw Open* 2021;**4**: e210247.
57. Duke JM, Muhammad LN, Song J, Tanaka Y, Witting C, Khan SS *et al*. Racial disparity in referral for catheter ablation for atrial fibrillation at a single integrated health system. *J Am Heart Assoc* 2022;**11**: e025831.
58. Al-Hijji MA, Deshmukh AJ, Yao X, Mwangi R, Sangaralingham LR, Friedman PA *et al*. Trends and predictors of repeat catheter ablation for atrial fibrillation. *Am Heart J* 2016;**171**:48–55.
59. Hagengaard L, Andersen MP, Polcwiartek C, Larsen JM, Larsen ML, Skals RK *et al*. Socioeconomic differences in outcomes after hospital admission for atrial fibrillation or flutter. *Eur Heart J Qual Care Clin Outcomes* 2021;**7**:295–303.
60. Olsen F, Uleberg B, Jacobsen BK, Heuch I, Tande PM, Bugge E *et al*. Socioeconomic and geographic differences in ablation of atrial fibrillation in Norway—a national cohort study. *BMC Public Health* 2022;**22**:303.
61. Teppo K, Jaakkola J, Biancari F, Halminen O, Linna M, Haukka J *et al*. Socioeconomic disparities in use of rhythm control therapies in patients with incident atrial fibrillation: a Finnish nationwide cohort study. *IJC Heart Vasculature* 2022;**41**:101070.
62. Hamade H, Jabri A, Mishra P, Butt MU, Sallam S, Karim S. Gender, ethnic, and socioeconomic differences in access to catheter ablation therapy in patients with atrial fibrillation. *Front Cardiovasc Med* 2022;**9**:966383.
63. Kupsky DF, Wang DD, Eng M, Gheewala N, Nakhle A, Georgie F *et al*. Socioeconomic disparities in access for watchman device insertion in patients with atrial fibrillation and at elevated risk of bleeding. *Structural Heart* 2019;**3**:144–149.
64. Sparrow R, Sanjoy S, Choi YH, Elgendy IY, Jneid H, Villablanca PA *et al*. Racial, ethnic and socioeconomic disparities in patients undergoing left atrial appendage closure. *Heart* 2021;**107**:1946–1955.
65. Reddy KP, Eberly LA, Halaby R, Julien H, Khatana SAM, Dayoub EJ *et al*. Racial, ethnic, and socioeconomic inequities in access to left atrial appendage occlusion. *J Am Heart Assoc* 2023;**12**:e028032.
66. Patil S, Rojulpote C, Gonuguntla K, Bhattaru A, Atri A, Madubata C *et al*. Socioeconomic status and burden of atrial fibrillation hospitalizations among black US adults: a fifteen year analysis. *Curr Probl Cardiol* 2023;**48**:101737.
67. Barrett TW, Self WH, Jenkins CA, Storrow AB, Heavrin BS, McNaughton CD *et al*. Predictors of regional variations in hospitalizations following emergency department visits for atrial fibrillation. *Am J Cardiol* 2013; **112**:1410–1416.
68. Tertulien T, Chen Y, Althouse AD, Essien UR, Johnson A, Magnani JW. Association of income and educational attainment in hospitalization events in atrial fibrillation. *Am J Prev Cardiol* 2021;**7**:100201.
69. Ravvaz K, Weissert JA, Jahangir A, Ruff CT. Evaluating the effects of socioeconomic status on stroke and bleeding risk scores and clinical events in patients on oral anticoagulant for new onset atrial fibrillation. *PLoS One* 2021;**16**:e0248134.
70. Cressman AM, Macdonald EM, Yao Z, Austin PC, Gomes T, Paterson JM *et al*. Socioeconomic status and risk of hemorrhage during warfarin therapy for atrial fibrillation: a population-based study. *Am Heart J* 2015;**170**:133–140.e3.
71. Martín-Pérez M, Gaist D, de Abajo FJ, García Rodríguez LA. Predictors of over-anticoagulation in warfarin users in the UK general population: a nested case-control study in a primary health care database. *Thromb Haemost* 2019;**119**:66–76.
72. Teppo K, Jaakkola J, Biancari F, Halminen O, Linna M, Putaala J *et al*. Socioeconomic factors and bleeding events in patients with incident atrial fibrillation: a Finnish nationwide cohort study. *Int J Cardiol Heart Vasc* 2022;**43**:101131.
73. Tse WC, Grey C, Harwood M, Jackson R, Kerr A, Mehta S *et al*. Risk of major bleeding by ethnicity and socioeconomic deprivation among 488,107 people in primary care: a cohort study. *BMC Cardiovasc Disord* 2021;**21**:206.
74. LaRosa AR, Claxton J, O'Neal WT, Lutsey PL, Chen LY, Bengtson L *et al*. Association of household income and adverse outcomes in patients with atrial fibrillation. *Heart* 2020;**106**:1679–1685.
75. Yogasundaram H, Islam S, Dover DC, Hawkins NM, Ezekowitz J, Kaul P *et al*. Nationwide study of sex differences in incident heart failure in newly diagnosed nonvalvular atrial fibrillation. *CJC Open* 2022;**4**: 701–708.
76. Biancari F, Teppo K, Jaakkola J, Halminen O, Linna M, Haukka J *et al*. Income and outcomes of patients with incident atrial fibrillation. *J Epidemiol Community Health* 2022;**76**:736–742.
77. Apiyasawat S, Thongsri T, Jongpiputvanich K, Krittayaphong R. Outcome disparities in patients with atrial fibrillation based on insurance plan and educational attainment: a nationwide, multicenter and prospective cohort trial. *BMJ Open* 2022;**12**:053166.

78. Wändell P, Carlsson AC, Li X, Gasevic D, Sundquist J, Sundquist K. The association between sociodemographic characteristics and dementia in patients with atrial fibrillation. *Aging Clin Exp Res* 2020;**32**: 2319–2327.
79. Lunde ED, Fonager K, Joensen AM, Johnsen SP, Lundbye-Christensen S, Larsen ML *et al*. Association between newly diagnosed atrial fibrillation and work disability (from a Nationwide Danish Cohort Study). *Am J Cardiol* 2022;**169**:64–70.
80. Dhore-Patil A, Crawford M, Nedunchezhian S, El Hajjar AH, Mekhael M, O'Keefe E *et al*. The association of disparities in neighborhood median household income and mortality in patients admitted to the hospital with atrial fibrillation. *Prog Cardiovasc Dis* 2023;**76**:84–90.
81. Kargoli F, Shulman E, Aagaard P, Briceno DF, Hoch E, Di Biase L *et al*. Socioeconomic status as a predictor of mortality in patients admitted with atrial fibrillation. *Am J Cardiol* 2017; **119**:1378–1381.
82. Patsiou V, Moysidis DV, Kartas A, Samaras A, Papazoglou AS, Bekiaridou A *et al*. Education level predicts mortality and morbidity in hospitalised patients with atrial fibrillation. *Hellenic J Cardiol* 2022; **65**:19–24.
83. Wu J, Nadarajah R, Nakao YM, Nakao K, Wilkinson C, Cowan JC *et al*. Temporal trends of cause-specific mortality after diagnosis of atrial fibrillation. *Eur Heart J* 2023;**44**:4422–4431.
84. Wändell P, Carlsson AC, Gasevic D, Holzmann MJ, Ärnlöv J, Sundquist J *et al*. Socioeconomic factors and mortality in patients with atrial fibrillation-a cohort study in Swedish primary care. *Eur J Public Health* 2018;**28**:1103–1109.
85. Wändell P, Carlsson AC, Gasevic D, Sundquist J, Sundquist K. Neighbourhood socio-economic status and all-cause mortality in adults with atrial fibrillation: a cohort study of patients treated in primary care in Sweden. *Int J Cardiol* 2016;**202**:776–781.
86. Akerkar R, Ebbing M, Sulo G, Ariansen I, Igland J, Tell GS *et al*. Educational inequalities in mortality of patients with atrial fibrillation in Norway. *Scand Cardiovasc J* 2017;**51**:82–87.
87. Lee SY, Lee SR, Choi EK, Han KD, Oh S, Lip GYH. Impact of socioeconomic Status on emergency department visits in patients with atrial fibrillation: a nationwide population-based cohort study. *J Am Heart Assoc* 2022;**11**:e027192.
88. Borrell LN, Elhawary JR, Fuentes-Afflick E, Witonsky J, Bhakta N, Wu AHB *et al*. Race and genetic ancestry in medicine—a time for reckoning with racism. *N Engl J Med* 2021;**384**:474–480.
89. Powell-Wiley TM. Disentangling ancestry from social determinants of health in hypertension disparities-an important step forward. *JAMA Cardiol* 2020;**6**:398.
90. Rao S, Segar MW, Bress AP, Arora P, Vongpatanasin W, Agusala V *et al*. Association of genetic West African ancestry, blood pressure response to therapy, and cardiovascular risk among self-reported black individuals in the systolic blood pressure reduction intervention trial (SPRINT). *JAMA Cardiol* 2020;**6**:388–398.
91. Benjamin EJ, Thomas KL, Go AS, Desvigne-Nickens P, Albert CM, Alonso A *et al*. Transforming atrial fibrillation research to integrate social determinants of health: a national heart, lung, and blood institute workshop report. *JAMA Cardiol* 2023;**8**:182–191.
92. Volgman AS, Benjamin EJ, Curtis AB, Fang MC, Lindley KJ, Naccarelli GV *et al*. Women and atrial fibrillation. *J Cardiovasc Electrophysiol* 2021;**32**:2793–2807.