Diversifying Clinical Trials: A Path Forward

Roxana Mehran, MD, FACC, FAHA, MSCAI, FESC

Mount Sinai Endowed Professor Of Cardiovascular Clinical Research and Outcomes Professor of Medicine (Cardiology), and Population Health Science and Policy Director, Interventional Cardiovascular Research and Clinical Trials, Director, Women's Heart and Vascular Center at Mount Sinai Heart Icahn School of Medicine at Mount Sinai, New York, NY, USA



Roxana.Mehran@mountsinai.org



Disclosures

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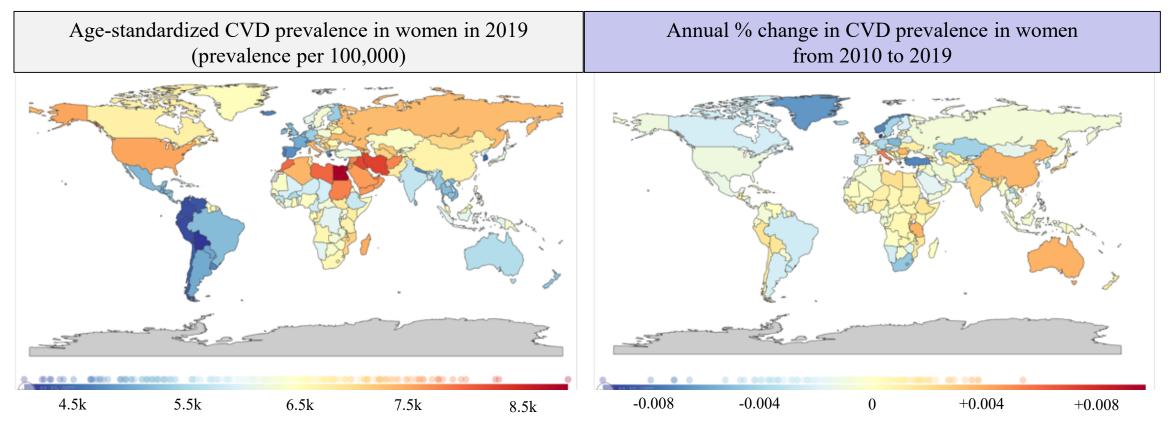
Gender disparities in CV health

Women's Cardiovascular Health:

Extent of the Problem?

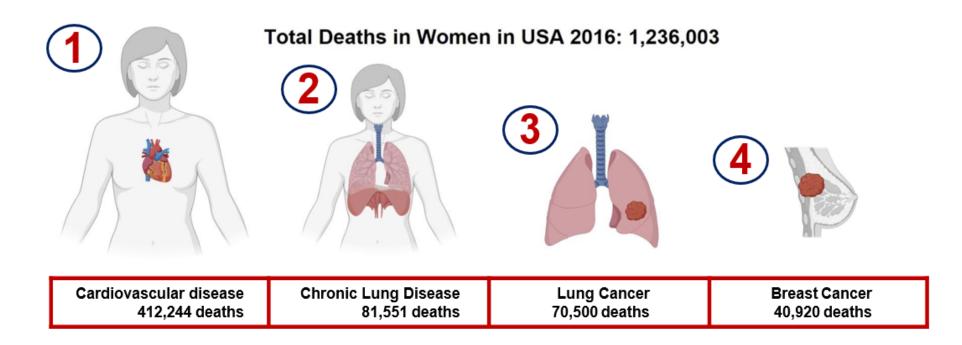


Prevalence of Cardiovascular Diseases in Women



Globally CVD prevalence decreased between 1990 and 2010, but it slightly increased since 2010

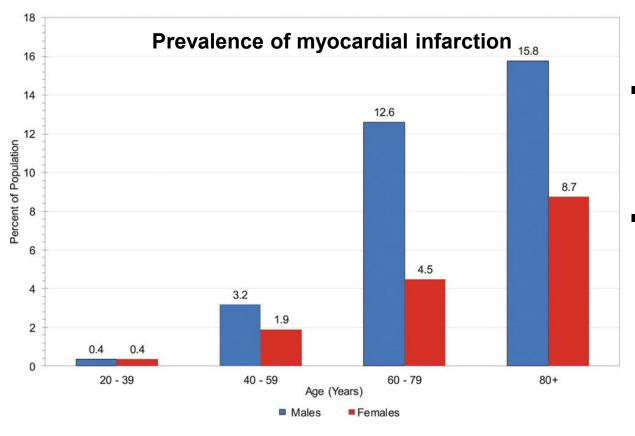
CVD is the Leading Cause of Mortality in Women



With regard to cardiovascular disease subtypes, **ischemic heart disease is the most common cause of cardiovascular death in women** globally

Prevalence of Acute Myocardial Infarction

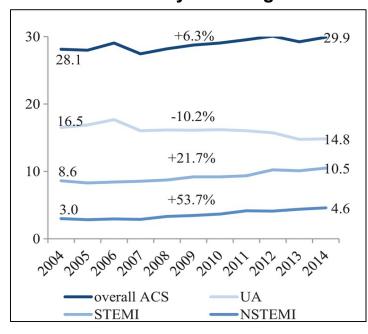
Heart Disease and Stroke Statistics—2021 Update (Report from AHA)



- The median survival time after a first MI is as follows: at ≥45 years of age, 8.2 for males and 5.5 years for females.
- Of those who have a first MI, the percentage with a recurrent MI or fatal CHD within 5 years is as follows: at ≥45 years of age, 17% of males and 21% of females.

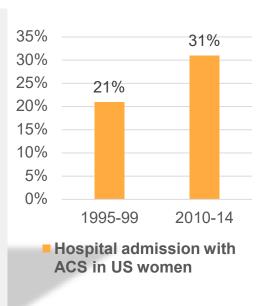
There is an Increase in Myocardial Infarction in Young Women

French women <65 years of age



Hospital admissions with acute coronary syndrome in women younger than 55 years **INCREASE** D 21% in 1995-99 31% in 2010–14

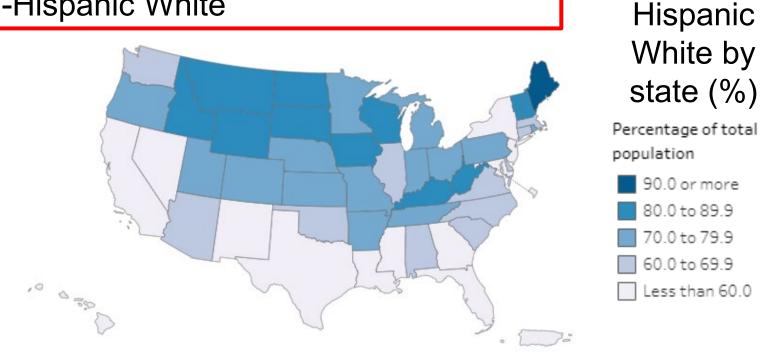
Data from US



Not only gender disparities, but also ethnic/racial disparities exist!

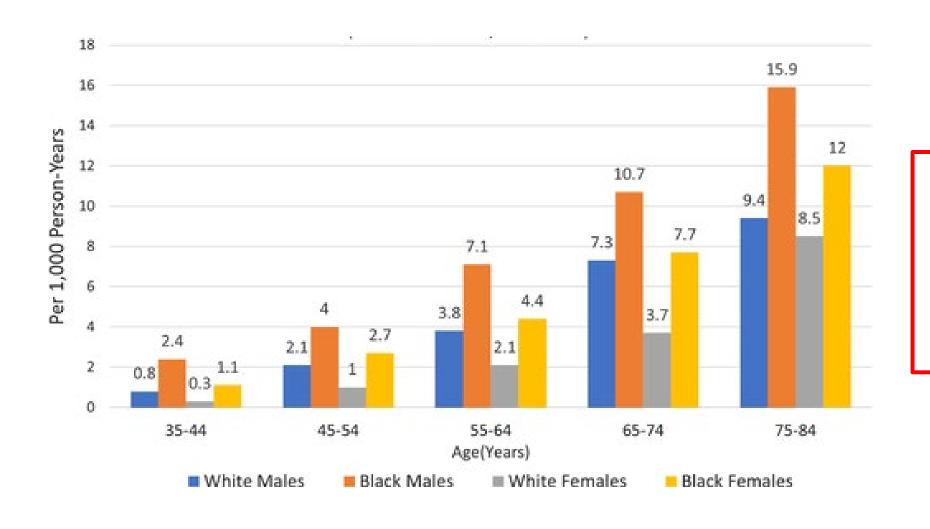
US 2020 Census: 38.4% are other than Non-Hispanic White

In 2045, >50% of the population is expected to be other than non-Hispanic White



Non-

Incidence of myocardial infarction by age, sex and race



ARIC surveillance 2005-2014

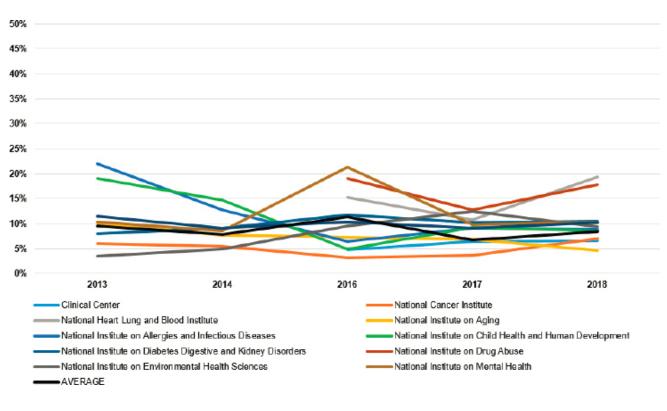
- Remarkably higher risk in black females and males
 - Consistent across all ages

Diversity in RCTs

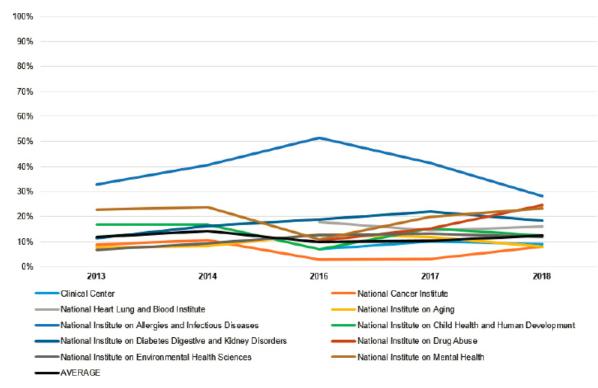
Enrollment of ethnic minorities in NIH clinical trials

Share of Hispanic participants in clinical trials by NIH

institutes

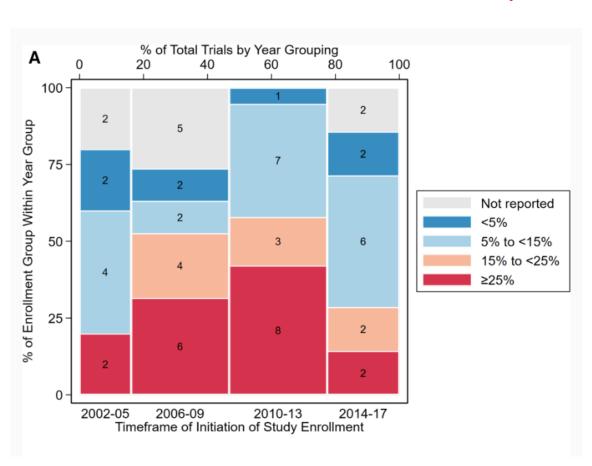


Share of African American/Black participants in clinical trials by NIH institutes



Rate of African American/Black participants in cardiovascular trials by time frame

Recruitment characteristics of NIH funded CVD trials (n=62 analysed from 2000-2019)



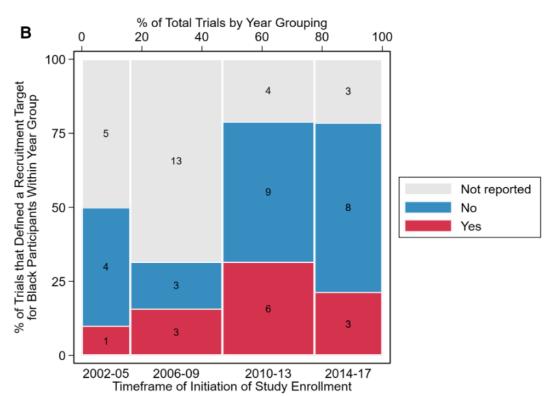
Number of clinical trials population composed of Black participants, by timeframe

- → 46% of trials reported enrolling <25% Black participants
 </p>
- No significant change in the recruitment of Black adults between 2002 and 2017

Setting and achieving recruitment goals for enrollment of Black participants

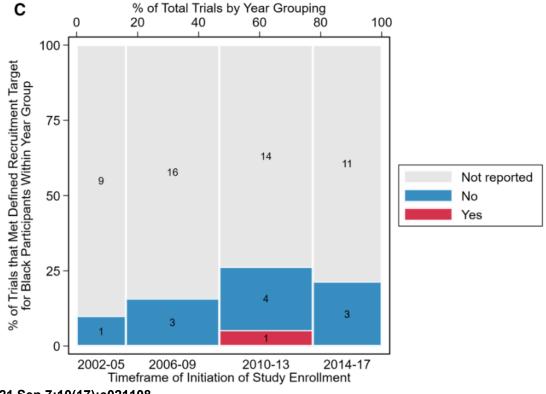
Rate of studies that defined recruitment target for Black participants, by timeframe

Majority of trials do not define or report on recruitment targets for black participants



Rate of studies that achieved recruitment target for Black participants, by timeframe

only 1 trial explicitly documented achieving recruitment goals for Black participants during this period



Prasanna A et al. J Am Heart Assoc. 2021 Sep 7;10(17):e021108.

Diversity in trials supporting FDA approval of cardiometabolic drugs



JAHA 2020



Findings:

35 novel drugs

Study Participants (n=296,163)

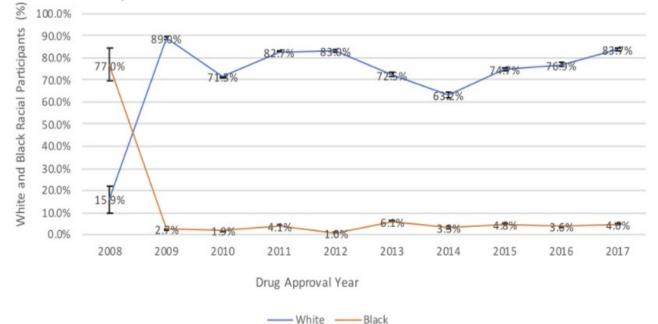
81% White 36% Women 4% Black 12% Asian 11% Hispanic/Latino

Women: underrepresented (particip. to prev. ratio of 0.5 for HF, CAD)

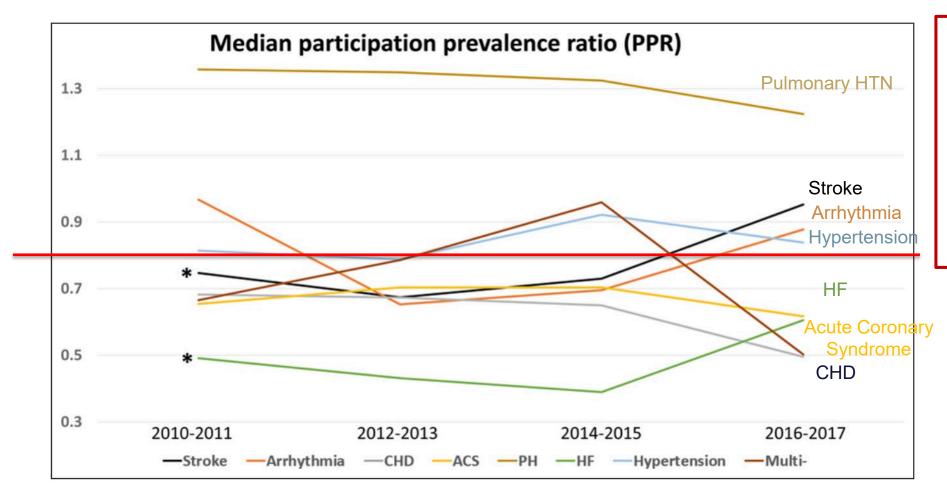
No change in enrollment over 10 years

Ten-Year Trends in Enrollment of Women and Minorities in Pivotal Trials Supporting Recent US Food and Drug Administration Approval of Novel Cardiometabolic Drugs

Muhammad Shahzeb Khan, MD; Izza Shahid, MBBS; Tariq Jamal Siddiqi, MBBS; Safi U. Khan, MD; Haider J. Warraich, MD; Stephen J. Greene, MD; Javed Butler, MD, MPH, MBA; Erin D. Michos, MD, MHS



Participation-prevalence ratio of women in 740 CVD trials between 2010 and 2017



Women have been under-represented in heart failure, acute coronary syndrome, coronary heart disease, stroke, and arrhythmia trials.

PPR of <0.8 indicates underrepresentation in relation to disease prevalence

Diversity in RCTs - Why does it matter?

Generalizability of results

Ethical considerations: provide equal opportunities

Address health disparities

Practice precision medicine

Detect potential differences in safety and efficacy

Tailor practical guidelines

Improve public health outcomes

Strategies to increase the proportion of women in clinical trials



Be inclusive

 Avoid upper and lower age limits in exclusion criteria for enrolment in trials



Meet women where they are

- Target outreach in community settings frequented by women
- Involve primary care physicians and family members
- Provide education and information about the risk but also the benefits of participation



Exchange knowledge

- Educate recruiting personnel on importance of enrolling women
- Share experience of enrolling women after each study
- Conduct routine surveys on motivations for participation and non-participation in trials



Remove barriers

- Arrange childcare and free transportation
- Offer flexible hours and at-home follow-up

Strategies to increase diversity in CVD trials



1: Ensure your eligibility criteria and recruitment pathway do not limit participation in ways you do not intend

Ensure that eligibility criteria do not disproportionally affect the ability of ethnic minority groups to take part in the trial.



2: Ensure your trial materials are developed with inclusion in mind

Consider language and not just in written form but also verbal and expressed in other ways.



3: Ensure trial staff are culturally competent

Provide support and training to all staff on cultural competency to avoid stereotypes and increase their confidence to engage with different ethnic groups.

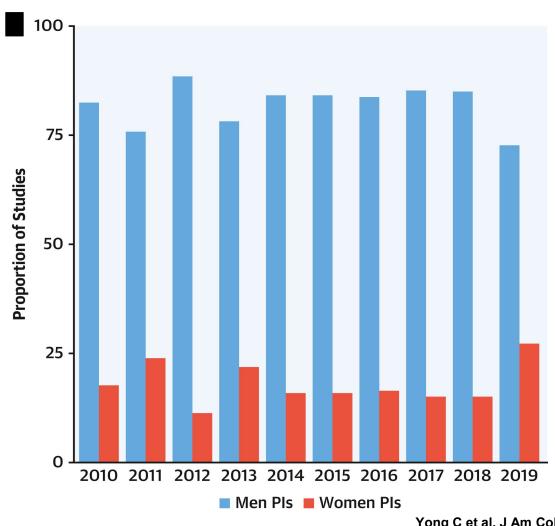


4: Build trusting partnerships with community organisations that work with ethnic minority groups

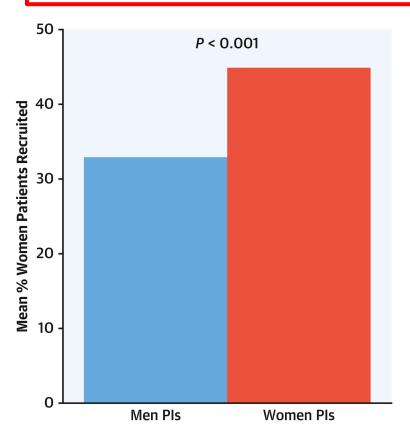
Spend time to build relationships with local community organisations and ensure you allocate time and resources to this when designing the trial.



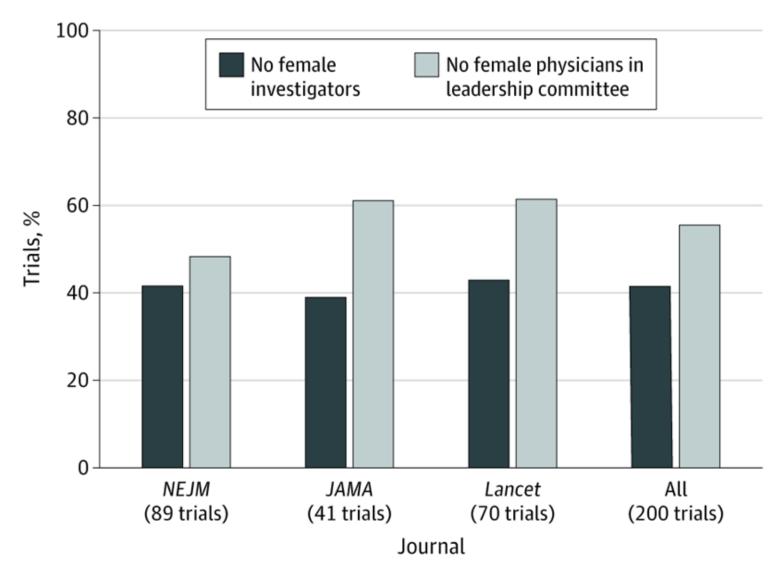
Temporal trends in principal investigator gender and association with patient diversity



Female PIs lead to a higher rate of female recruitment!



Representation of Women in CVD Clinical Trial Leadership



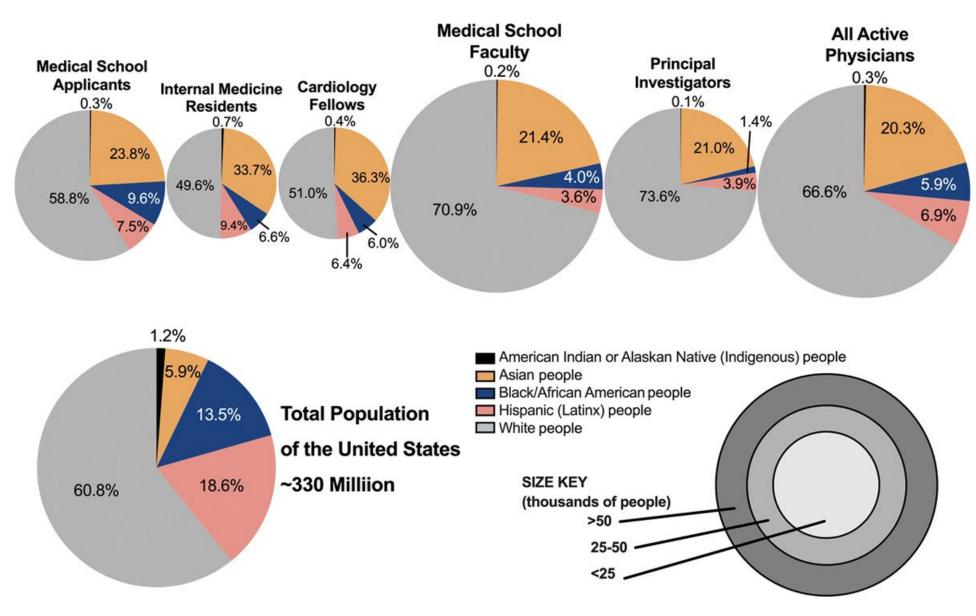
- 56% of leadership committees had no female representation.
- 42% of trials had <u>NO</u> women investigators.
- 9% of trial publications had women in first authorship position.

Gender Differences in Grant Funding

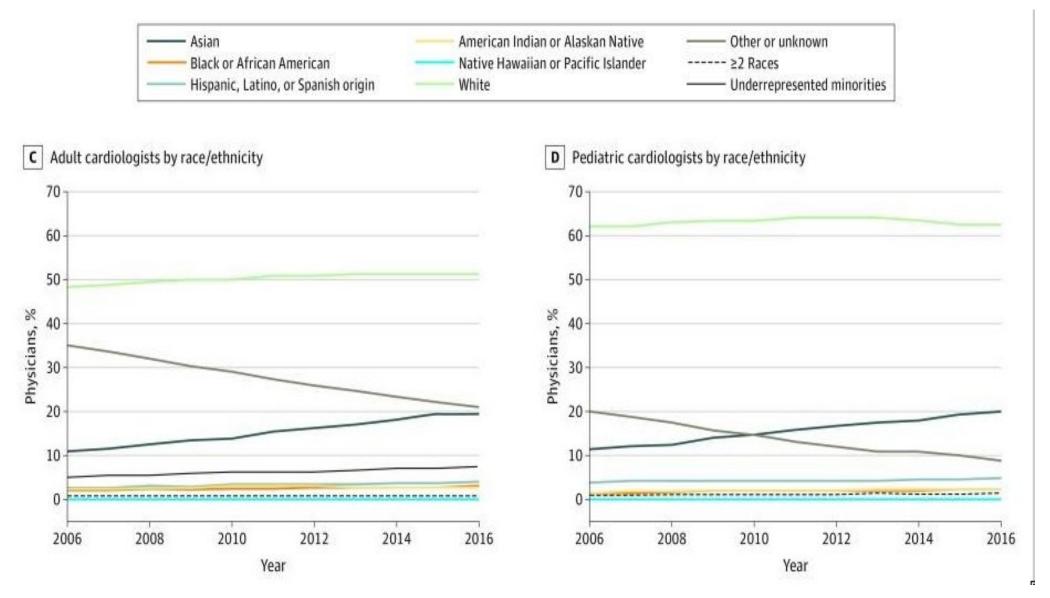
- Women are **less frequently mentored** than men and experience **less sponsorship** for NIH Mentored Career Development grants.
- Because first author roles do not track into later senior authorships as often for women, they represent only 1 in 10 lead authors of cardiovascular trials published in highimpact journals.
- More than one-half of cardiovascular trials published in 3 high-impact factor journals between 2014 and 2018 lacked women investigators on their executive committees.

Workforce Considerations

Contemporary trends in underrepresentation in medicine



Cardiologists by race in the US: Temporal trends



Representation of American race groups in the cardiology workforce

Data from US Census and Association of American Medical Colleges (AAMC)

US Federal Definition	AAMC Terminology	Terminology used in this Review	% of US Population	%of US Adult Cardiology Physician Workforce	% Difference
American Indian or Alaska Native.	Native American	Indigenous	1.3	0.2	-1.1
Asian.*	Asian or Pacific Islander		5.9	19.9	+14.0
Black or African American.	Black	Black	13.4	3	-10.4
Hispanic or Latino.	Latino/Hispanic	Latinx	18.5	4.2 [§]	-14.3
Native Hawaiian or Pacific Islander	Native Hawaiian		0.2	Data not available	Unknown
White.	White	White	60.5	51.2	-9.3

Women in cardiovascular medicine

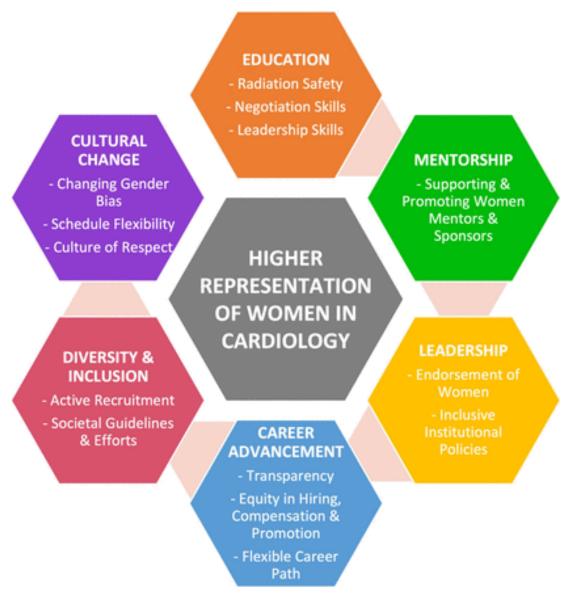
Women are only

- 18% of cardiology fellows
- 10-15% of practicing cardiologists
- 4% of interventional cardiologists

Optimizing CV health requires diversification of the cardiology workforce

Present Challen	ges Intervo	A HIVARGA SHA E AHITSHA E HITHRA
Disparities	Health	Enhanced Health for All; Equitable Healthcare Quality
Homogeneity	Workforce	Educational Excellence; Enriched Cultural Competence; Exceptional Science
Attrition	Academic Environment	Retention; Trainees and Faculty are Supported, Fulfilled, and Productive
Exclusion	Access to Education & Training	Equitable Recruitment and Creation of Educational Opportunities for All
Meritocracy	Opportunities	Holistic Appreciation of Individuals from Various Backgrounds
Racism	Societal Issues	Shifting Societal Paradigms that Foster Social Justice and Equity

Six pillars of increasing the proportion of women in cardiology



Eshtehardi P et al. Open Heart. 2022 Feb;9(1):e001967

How to improve (gender) diversity in clinical trial leadership?

Scientists

- · Implicit bias training
- Avoidance of gender stereotyping
- Diverse research teams
- Equal opportunity
- Harassment-free culture

Grant Agencies

EDI policies

Ending Gender Inequality

in CV Clinical Trial Leadership

Journals

 Diverse editorial board Blinded reviews

 Publication contingent on diverse research teams

EDI policies

- Charters with academic institutions
- Diverse reviewers
- Transparent reporting

Implicit Bias Awareness

Avoidance of Gender Stereotyping & Language Asymmetries

Catalyzers

- Advocacy
- Talent directories
- Research networks
- Training, mentorship, sponsorship

Industry

- EDI policies
- Open calls, objective criteria for trial leadership
- Equal pay
- Transparent reporting

Mentorship to Women and Under-represented Groups

Diversity in

Research Teams

Equal Opportunity for Team Members

Academic Institutions

- EDI policies
- Open calls and objective criteria for recruitment, advancement, and internal funding

Professional Societies

Leadership and Institutional Accountability

Harassment-Free Culture

Underrepresentation of women and minorities in cardiology and underrepresentation of women and minorities in cardiovascular research go hand in hand!



Women as One

Proactive Solutions for Diversifying Clinical Trial Leadership

Our Story





Women as One was founded in 2019 by **Dr. Roxana Mehran & Dr. Marie-Claude Morice**, two
internationally recognized leaders in cardiovascular
care and research.

Our mission is to promote talent in medicine by offering women physicians unique professional opportunities. By doing this, we aim to build a more inclusive, diverse and just workforce in medicine.

Our Mission

CLIMB Research Scholars



Uplifting women in clinical trial leadership

Congratulations to the 2023 Awardees



Erin Bohula MD, PhD Harvard Medical School, United States



Caroline Coats MBBS, MSc, PhD Queen Elizabeth University Hospital, Scotland



Sonali Gnanenthiran, MD, PhD Concord Hospital, Australia

Join the Talent Directory to be eligible for the 2024 program www.womenasone.org/talent-directory



THE 2024 ESCALATOR AWARDS

- Gain professional visibility with targeted financial support
- Access to mentorship and exclusive networking opportunities

Focus on mentorship for 2024

- Pairs fellows-in-training (mentees) to women with more than 10 years of professional experience (mentors).
- Together, the match will develop a project that can be carried out over the course of the 12-month award cycle.



The Talent Directory

The Talent Directory is a global community of **2300**+ women cardiologists.



For women physicians, the Talent Directory unlocks professional advancement opportunities.



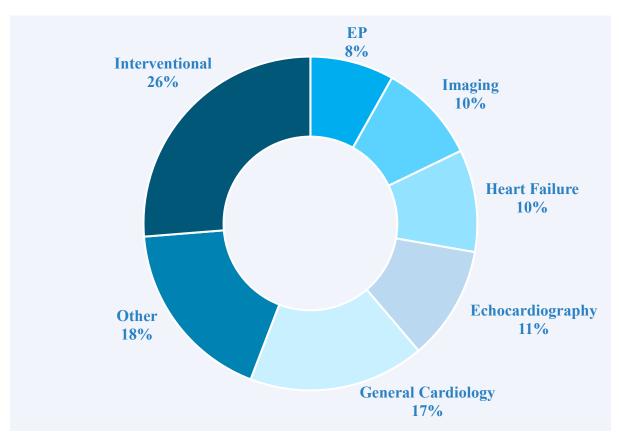
For organizations, the Talent Directory provides access to the insights and qualifications of a global pool of women physicians.



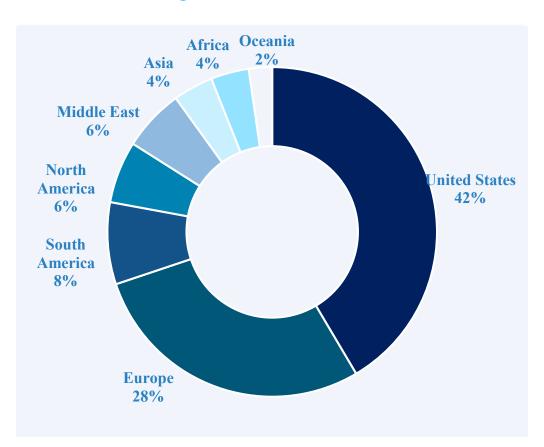
Breakdown of the Talent Directory

2345 total registrants
99 countries represented
Full CVs collected, sortable data

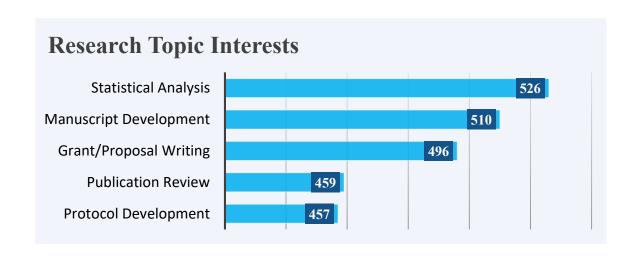
Subspecialty



Region

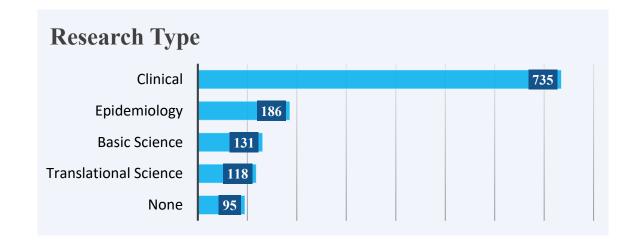


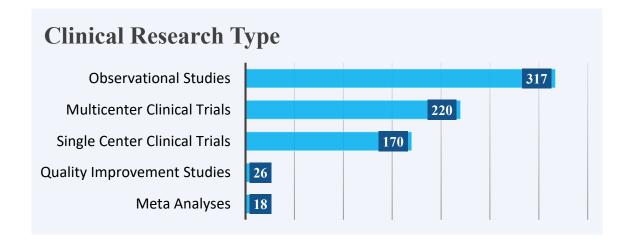
Researcher Registrant Snapshot



1017 Completed Research Profiles

- 222 registrants have Clinical Trial Leadership Experience.
- 435 registrants are interested in Clinical Trial Leadership.





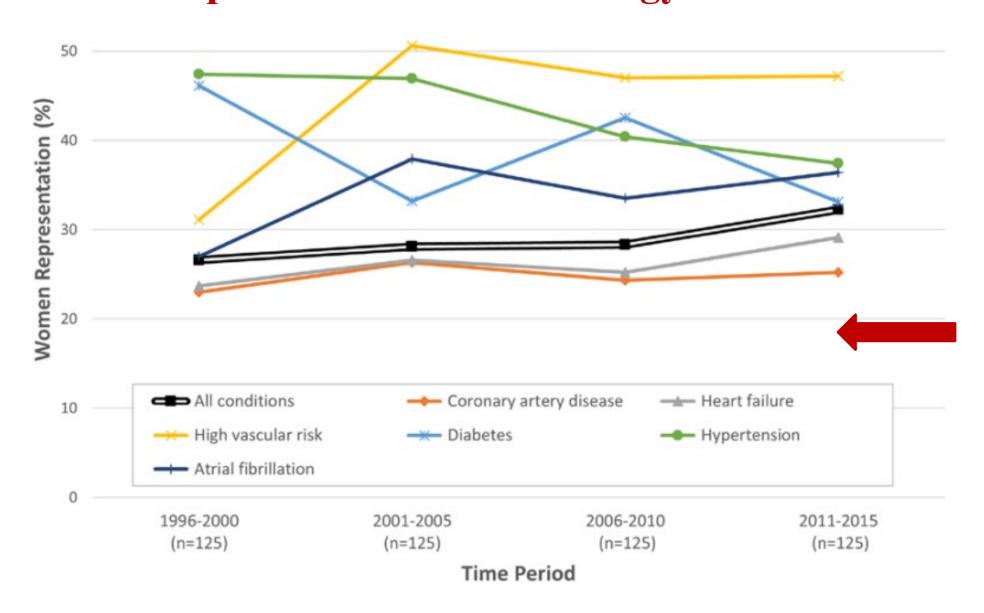
Women as One Institute for Research Innovation

Increasing and enhancing the participation of women within cardiovascular clinical research.

- ✓ Training, identification & qualification of women investigators
- ✓ Funding & promoting women researchers
- ✓ Consultancy services to increase representation of women in trials
- ✓ De novo study development
- ✓ Development & dissemination of best practices

COMING IN 2024

Female representation in cardiology trials over time



Colchicine in patients with chronic coronary syndromes:

LODOCO

Nidorf SM et al. N Engl J Med 2020;383:1838-47

Table 1. Characteristics of the Trial Patients at Bas	seline.*	
Characteristic	Colchicine (N = 2762)	Placebo (N = 2760)
Age — yr	65.8±8.4	65.9±8.7
Female sex — no. (%)	457 (16.5)	389 (14.1)
Country — no. (%)		
Australia	951 (34.4)	953 (34.5)
The Netherlands	1811 (65.6)	1807 (65.5)

Colchicine in patients with chronic coronary syndromes: Nidorf SM et al. N Engl J Med 2020;383:1838-47

LODOCO

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The Netherlands	1811 (65.6)	1807 (65.5)

4S	stu	dy:
- ~	~	

Pedersen TL, et al Lancet 1994	Placebo (n=2223)	Simvastatin (n=2221)
No (%) of patients		
Male	1803 (81)	1814 <i>(82)</i>
Female	420 (19)	407 (18)
Age ≥60 yr	1126 (51)	1156 (52)

A Placebo-Controlled Trial of Percutaneous Coronary Intervention for Stable Angina NEJM nov 2023 ORBITA-2

Characteristic	PCI (N = 151)	Placebo (N=150)	Overall (N = 301)
Age — yr	65±9	64±9	64±9
Male sex — no. (%)	120 (79)	118 (79)	238 (79)

A Placebo-Controlled Trial of Percutaneous Coronary Intervention for Stable Angina

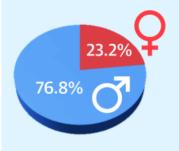
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33 randomized clinical trials



Searched 4 academic databases for randomized clinical trials reporting interventions resulting in reduced mortality or hospitalization for heart failure (1995-2021)



104,972 total enrolled trial participants

31 of the 33 randomized clinical trials were mentioned

CLINICAL PRACTICE GUIDELINE: FULL TEXT

2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure

A Report of the American College of Cardiology/American Heart Association

Representation of women in heart failure with reduced ejection fraction trials

Funding source:

Industry-funded trials



Governmentfunded trials



Enrollment region:

North American and multiregional trials





European trials



Temporal trends:







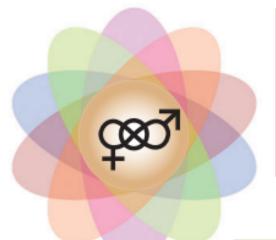
Figure 4. Parameters Through Which Sex May Affect an Individual's Response to Pharmaceuticals

Absorption

- Enterohepatic and renal handling
- Gastric enzymes
- Pulmonary function
- Transport proteins

Pharmacodynamics

- Membrane receptor sensitivity
- Interactions with macromolecules (eg, hormones, enzymes)
- Target organ response, adverse events



Distribution

- Body fat composition
- Cardiac output, regional blood flow
- Total blood, plasma, and RBC volumes
- Total body, intracellular, and extracellular water

Elimination

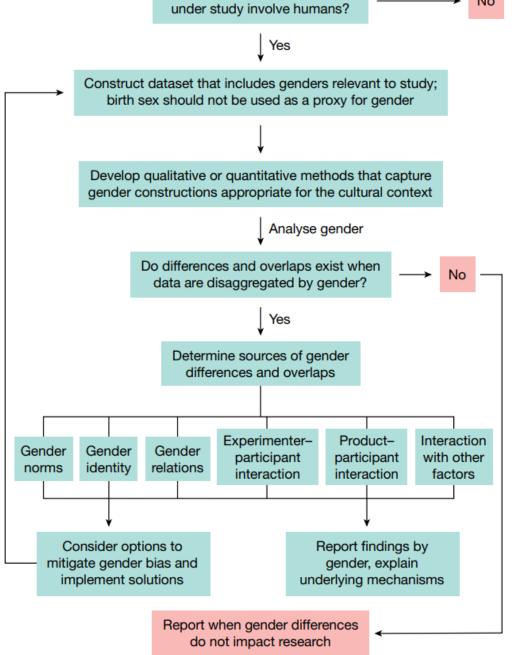
- Glomerular filtration rate
- Renal blood flow
- Tubular secretion, reabsorption

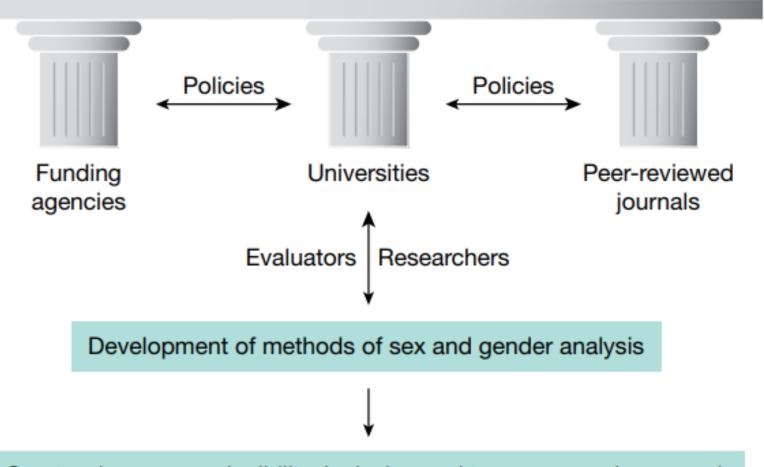
Metabolism

- Dose
- Lipid solubility
- Protein binding and cytochromes P450
- Route of exposure

Sex and Gender reporting in Science: Will the phenomenon or product

Will the phenomenon or product under study No affect organisms with biological sex? Identify adequate numbers of all sexes for inclusion in experiments Analyse by sex Does a difference exist when data No are disaggregated by sex? Determine the source of the sex difference Gender Gender Gender Experimenter-Environmental Genetic Hormonal Anthropometric identity relations norms participant interaction Consider options to Report findings by sex, explain underlying mechanism mitigate gender bias and implement solutions Report when sex differences do not exist





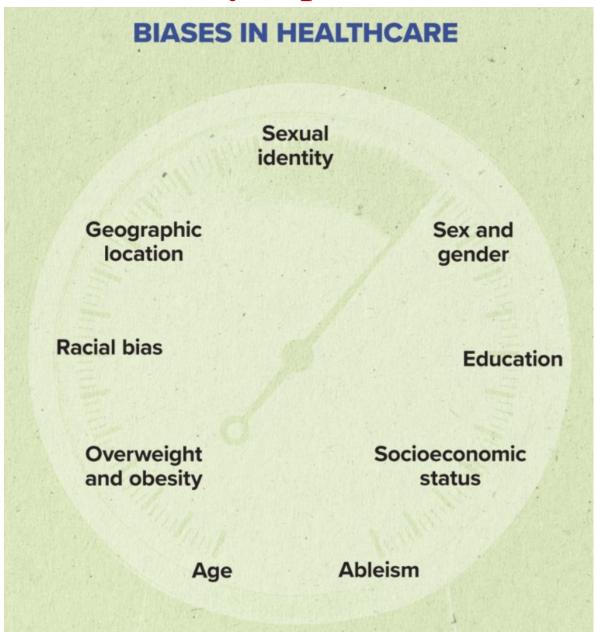
Greater rigour, reproducibility, inclusion and transparency in research

Sources of bias in healthcare, even by experts:

2030







What is being done from a governmental, federal, scientific-community and industry based standpoint for diversity in clinical trials?



NOVEMBER 17, 2023

Launch of White House Initiative on Women's Health Research



On November 13, President Biden announced the first-ever White House Initiative on Women's Health Research, an effort led by First Lady Jill Biden and the White House Gender Policy Council.

Aims:

- ✓ Deliver concrete recommendations to advance women's health research
- ✓ Take a targeted, high-impact approach
- ✓ Engage the scientific, private sector, and philanthropic communities



Under the 2023 Consolidated Appropriations Act (December 29, 2022)

- lawmakers have instructed FDA to require diversity plans for all Phase 3 clinical trials conducted for drugs and biologics
- the same **for all devices** and diagnostics that use the 510(k), premarket approval (PMA), de novo, and investigational device exemption (IDE) pathways

Diversity, Equity, Inclusion, and Accessibility (DEIA) – targeted by the FDA and others

- **Diversity** means the practice of including the many communities, identities, races, ethnicities, backgrounds, abilities, cultures, and beliefs of the American people, including underserved communities.
- Equity means the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment.
- Inclusion means the recognition, appreciation, and use of the talents and skills of employees of all backgrounds.
- Accessibility means the design, construction, development, and maintenance of facilities, information and communication technology, programs and services so that all people, including people with disabilities, can fully and independently use them. Accessibility includes the provision of accommodations and modifications to ensure equal access to employment and participation in activities for people with disabilities, the reduction or elimination of physical and attitudinal barriers to equitable opportunities, a commitment to ensuring that people with disabilities can independently access every outward-facing and internal activity or electronic space, and the pursuit of best practices such as universal design.

FDA diversity plan draft

Diversity Plans to Improve Enrollment of Participants from Underrepresented Racia and Ethnic Populations in Clinical Trials Guidance for Industry

DRAFT GUIDANCE

This guidance document is being distributed for comment purposes only.

April 2022

Enhancing the Diversity of
Clinical Trial Populations —
Eligibility Criteria,
Enrollment Practices, and
Trial Designs
Guidance for Industry

November 2020

FDA diversity plan draft

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Sites and sponsors now know they need to:

- Explain their specific diversity goals
- Justify why they chose those goals based on the disease they're treating
- Describe how they plan to reach those goals

FDA workforce DEIA plan

Building on President Biden's Executive Order 14035 "Diversity, Equity, Inclusion, and Accessibility (DEIA) in the Federal Workforce



7 objectives aimed at improving DEIA in the FDA and beyond



Objective 1: Increase inclusion of diverse groups by investing in community building and education

Invest in developing agency-wide Employee ce Groups/Affinity Groups (ERG/AGs) with formal ity priorities through agency actions. Increase hat celebrate diverse backgrounds and connect

ng performance evaluations. and development opportunities



nue to promote a fair and protective workplace for all

pardized and centralized processes, procedures, and workflows, including technology- enabled tracking, and launch a systematic and widespread approach to communicate and educate employees

Objective 4: Enhance the collection, analysis, and reporting of demographic information Drive a set of tactical initiatives to enhance the availability and quality of demographic information available across the employee lifecycle, starting with the recruiting process, and a commitment to analyze available





Objective 5: Enhance outreach, recruitment, and retention efforts to increase representation of underrepresented groups

Understand barriers to achieving representation that reflects the civilian workforce within each grade level and establish targeted programs to remove those barriers across various stages of the employee lifecycle.

Objective 6: Improve accessibility across the agency

Assess and bolster the effectiveness of practices used to provide accessibility for FDA employees and prospective employees, including reasonable accommodations, workplace accessibility, and accessibility in information and communication technologies.





Objective 7: Leverage innovation and creativity to meet Center/Office-specific DEIA needs Provide Center/Office leaders additional flexibility in meeting the DEIA needs of their workforces. Center/Office-specific initiatives that do not align to Strategic Objectives 1-6 will be captured under Objective 7 and the measurement approach will be defined on an initiative-by-initiative basis.

NIH DEIA plan

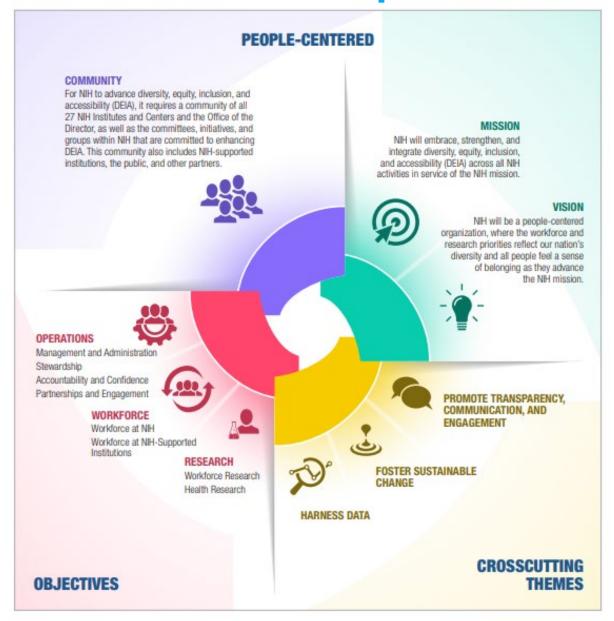
NIH-Wide Strategic Plan for Diversity, Equity, Inclusion, and Accessibility



Three objectives:

- growing and sustaining diversity, equity, inclusion, and accessibility through structural and cultural change
- implementing organizational practices to center and prioritize diversity, equity, inclusion, and accessibility in the biomedical and behavioral research workforce
- advancing diversity, equity, inclusion, and accessibility through research

NIH DEIA plan





Inclusion of Women and Minorities as Participants in Research Involving Human Subjects

Proposals

- All NIH-funded studies must address plans for the inclusion of women and minorities
- Any exclusions based on sex/race/ethnicity must include a rationale and justification
- Appropriate outreach programs and activities to recruit and retain the proposed study population
- Valid analysis of group differences on the basis of sex/race/ethnicity

Review

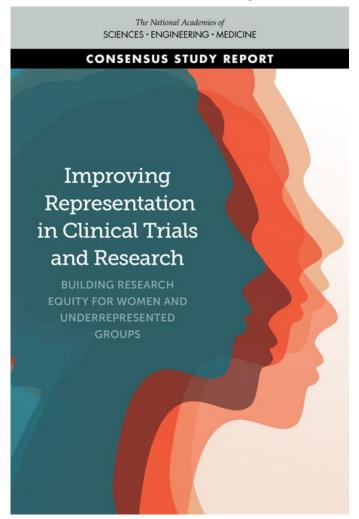
 Scientific Review Groups will assess each application/proposal being acceptable with regard to the inclusion of racial/ethnic minorities/women

Progress

annual report on sex/gender, race/ethnicity in progress reports

Report from the National Academies of Sciences, Engineering, and Medicine (2022)

Kirsten Bibbins-Domingo et al.



Lack of representation may compound low accrual that causes many trials to fail.

Lack of representation may hinder innovation and new discoveries.

Lack of representation costs hundreds of billions of dollars.

SUMMARY

Lack of representation compromises generalizability of clinical research findings to the whole U.S. population.

Lack of representation may lead to lack of access to effective medical interventions.

Report from the National Academies of Sciences, Engineering, and Medicine (2022)

SELECTED RECOMMENDATIONS

Reporting and Accountability

Federal Incentives

Remuneration

Education, Workforce, and Partnerships

- Establish an intradepartmental task force on research equity
- Journal editors, publishers, and the ICMJE should require information on the representativeness of trials
- Require a detailed recruitment plan appropriately reflecting the demographics of the disease or condition

- Enforce existing accountability measures
- Expedite coverage decisions for drugs/devices that have been approved based on representative development programs
- Incentivize community providers to enroll and retain participants in clinical trials by reimbursing

- Ensure that trials provide adequate compensation for research participants
- Federal regulatory
 agencies should develop
 explicit guidance to direct
 local IRBs on equitable
 compensation to
 research participants and
 their caregivers.
- Ensure a diverse and inclusive workforce, especially in leadership positions
- Leaders and faculty of academic medical centers should recognize research and professional efforts to advance community engaged scholarship
- Substantially invest in community research infrastructure



Reaction of the industry



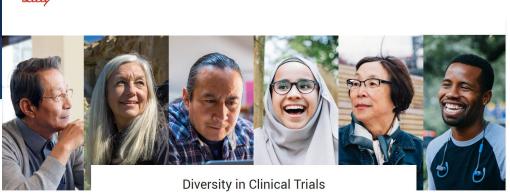
Diversity and equity in our clinical trial research

Diversity in Our Clinical

AMGEN

Home > Science > Clinical Trials > Clinical Trial Diversity and Representation

Clinical Trials







A multitude of diversity

plans exist across the

industry, implementation

is however lacking!

Diversity in Clinical Trials

Enhancing Diversity in Clinical Trials

At Bayer, we know there is strength in diversity - a value which is reflected in our commitment to our employees and the population we serve. Through our vision of "Health for all, hunger for none," we are committed to the goal of inclusive clinical trials that represent the diversity required to address the needs of all patients. To accomplish this, we are working with clinicians, research scientists, vendors, health authorities, ethics committees, and partners in patient engagement to ensure that our purpose of "Science for a Better Life" touches every life, regardless of race, ethnicity, sex/gender, age, or any other characteristic that may present a barrier to clinical trial participation.

Conclusions

- There is not much change in inclusion of women minority populations in CVD trials over recent years
- Increasing diversity among trial participants must be a top priority in order to address health disparities and allow for optimal diagnosis and management of CVD in all
- Increasing diversity in trial leadership is one of the most important strategies to increase diversity among RCT participants
- Further efforts are urgently needed to increase diversity in the cardiology workforce, which will improve clinical trial diversity and cardiovascular health for all
- Approaches from the whole scientific community to tackle the inequality in workforce, trial leadership and trial participants have to be developed

THANK YOU FOR YOUR ATTENTION!



