**SYSTEMIC REVIEW: GENDER DISPARITY IN THE FIELD OF CARDIOLOGY**

Kristen N. Brown, MD, Jennifer Nickol, DO, Ayesha Azmeen, MBBS, Radha Kanneganti, MBBS, Kali Gagnon, DO, Niyada Naksuk, MD and Poonam Velagapudi, MD

Division of Cardiovascular Medicine, University of Nebraska Medical Center, Omaha, NE

**Background**

Gender disparities are known to exist within the field of cardiology. This systemic review aims to identify that for which has previously been investigated and highlighted on gender disparity within cardiology and identify what areas have yet to be examined.

**Methods**

Articles released between January 2011 to August 2021, on gender disparity in cardiology were systematically reviewed using the PRISMA (Preferred Reporting Items for Systemic Review and Meta-Analysis) statement. Articles were identified using the PubMed database. The search terms included (“Gender Disparity” AND “Cardiology” AND “Women” OR “Female”). The literature review mainly included original retrospective cohort studies and surveillance studies published in English. The most relevant papers examining gender diversity within cardiology were selected. An abstract was prepared based on the authors’ consensus opinion, with the aim to provide a balanced perspective.

**Results**

Our systematic review included data from 18 articles. All articles investigated and identified a significant sex disparity within the field of cardiology and its subspecialties (Figure 1). Some articles report trends of increasing numbers of females (F) and female authors within the field of cardiology. Several articles, which reported an increase in female cardiologist also highlighted a disproportionate lag between the expected and the true female to male author ratio as well as a significant payment gap.

**Conclusions**

There has been much focus and investigation into the gender disparity within cardiology. However, the full breadth behind this gender gap has not been fully identified and it is important to continue to bring awareness and encourage proactive strategies to improve gender disparity within cardiology.

**Figure 1:** Investigations ofGender Disparity within Cardiology within the United States

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| Article | Journal | Title | Type | Location | Subspecialty | Study Years | Study Aim | Results |
| RETROSPECTIVE STUDIES |
| Ouyang et al | Journal of Women’s Health | Sex Disparities in Authorship Order of Cardiology Scientific Publications. Circ Cardiovasc Qual Outcomes | Retrospective | USA | Cardiology | 1980-2017 | Investigate the authors gender of published articles | F authors accounted for 33.1% of all authors; however, they represented only 26.7% of first authors and 19.7% of senior authors. WhenF were senior authors; they published more articles with F first authors and had more F authors. |
| Reza et al | Circulation: Heart Failure | Representation of Women Authors in International Heart Failure Guidelines and Contemporary Clinical Trials | Retrospective | Online | Heart Failure | 2001-2016 | Identify gender disparity within authors for HF guidelines | Higher number of F authors was associated with higher enrollment of women in trials. |
| Rai et al | Circulation: Cardiovascular Quality and Outcomes | National Trends of Sex Disparity in the American College of Cardiology/American Heart Association Guideline Writing Committee Authors Over 15 Years | Retrospective | Online | Cardiology | 2005-2019 | Gender of authors on guidelines within general cardiology and subspecialties | Overtime there has been an increase in F, but the disparity still exists |
| Mehta et al | Journal of the American Medical Association | Current Demographic Status of Cardiologists in the United States | Retrospective | USA | Adult and Pediatric Cardiology | 2006-2016 | Investigate the % of trainees by sex and ethnicity within adult and pediatric cardiology | F cardiologist 8.9% to 12.6% from 2006 to 2016 |
| Capdeville et al | Journal of Cardiothoracic Vascular Anesthesia | Gender Disparities in Cardiovascular Fellowship Training Among 3 Specialties From 2007 to 2017 | Retrospective | Online | Cardiology | 2007-2017 | Identify the trends of female entering cardiology related fields | There has been little change in F within cardiology fields during this 10 years period. |
| Khan et al | Journal of Women’s Health | Women in Leadership Positions in Academic Cardiology: A Study of Program Directors and Division Chiefs | Retrospective | USA | Cardiology | 3/2017-4/2017 | Investigate the gender of roles within cardiology | M > F in program directors (PD) and division chiefs |
| Tong et al | Journal of Women’s Health | The Proportion of Women Authors and the Inclusion of Sex and Gender Content Among the American College of Cardiology Clinical Practice Guidelines | Retrospective | Online | Cardiology | 2008-2018 | Determine the number of women authors on guidelines committees | 22.2% F authors on guidelines |
| Mehran et al | Journal of the American Medical Association | Gender and Disparity in First Authorship in Cardiology Randomized Clinical Trials | Retrospective | Online | Cardiology | 1/2011-10/2020 | Identify the annual proportions and overall trend of female authorship within cardiology RCT | Increasing trend of F authors |
| Raber et al | Journal of the American Medical Association | Gender Differences in Medicare Payments Among Cardiologists | Retrospective | USA | Cardiology | 4/2019-12/2020 | Investigate the CMS payments based on gender of the physician within cardiology | Men received higher payments |
| Vasti et al | Cardiology and Therapy | Gender Disparities in Cardiology-Related COVID-19 Publications | Retrospective | Online | Cardiology | 3/2021-6/2021 | Assess female authorship during COVID pandemic | F authorship continues to lag behind male authorship |
| SURVEY STUDIES |
| Crowley et al | Journal of the American Heart Association | Perceptions on Diversity in Cardiology: A Survey of Cardiology Fellowship Training Program Directors | Survey | USA | Adult Cardiology | 10/2016 | Assess PDs and assistant PDs perception on diversity and identify barriers to increasing diversity within cardiology. | 63% of PDs thought their program was already diverse; 45% F, minorities, or both were not present during applicant ranking |
| Yong et al | Journal of the American College of Cardiology: Cardiovascular Interventions | Sex Differences in the Pursuit of Interventional Cardiology as a Subspecialty Among Cardiovascular Fellows-in-Training | Survey | USA | Interventional Cardiology | 2019 | Determine the factors that influence FITs to pursue IC | Little job-flexibility, radiation exposure, “Old Boys Club” culture, lack of F role models, sex discrimination |
| Abdulsalam et al | Journal of the American College of Cardiology | Gender Differences in the Pursuit of Cardiac Electrophysiology Training in North America | Survey | North America | Electrophysiology |  7/2019- 8/2019  | Identify the factors that influence Fellows in training (FITs) to pursue EP | 8% of F FITs enter EP |

**Figure 2:** Investigations ofGender Disparity within Cardiology Outside the United States

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| Article | Journal | Title | Type | Location | Subspecialty | Study Years | Study Aim | Results |
| Lanocha et al | Kardiologia Polska (Polish Heart Journal) | Does the operator's sex matter? An analysis based on the national interventional cardiology registry. | Retrospective | Poland | Interventional Cardiology | 2014-2017 | Identify gender disparity within operators of IC and outcomes | Low number of F operators and no difference in outcomes based on gender; lower income for F operators, less F in leadership roles |
| Burgess et al | Internal Medicine Journal | Gender equity within medical specialties of Australia and New Zealand: cardiology's outlier status | Retrospective  | Australia | Cardiology | 2015-2017 | Investigate the female representation within specialties with a focus on cardiology | 15% F consultants within cardiology and 5% within IC  |
| Burgess et al | Journal of the American College of Cardiology | Women in Medicine: Addressing the Gender Gap in Interventional Cardiology | Retrospective | Australia and New Zealand | Interventional Cardiology | 2015-2017 | Investigate the number of female IC and fellows. | 4.8% F in interventional cardiology (IC) and 3.8% F cath lab directors  |
| Czerwińska-Jelonkiewicz et al | European Heart Journal | Current status and needs for changes in critical care training: the voice of the young cardiologists | Survey | ESC Countries | Cardiology | 3/2019-7/2019 | Evaluate the current status of ACC training | Male gender was associated with higher reported self-confidence |
| Vladchadis et al | Open Heart  | Work-life balance: a comparison of women in cardiology and other specialties | Survey | Australia and New Zealand | Cardiology | 2021 | Identify the women in cardiology opinions on their field | F reported poorer work-life balance, greater hours worked and on-call commitments and were less likely to perceive their specialty as female friendly or family friendly |