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Gender Equity in Epidemiology

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Executive Summary

Women hold more than 40% of research positions in developed nations including the United States, European Union, Canada, Australia, and Brazil. Yet the majority of these positions are among early career faculty. Women hold fewer positions on editorial boards, lack equal representation in speaking engagements at conferences, and are less likely to publish or receive top tier grant funding. A global comprehensive report examining research in 12 countries and in 27 subject areas over 20 years highlights the gender gap across scientific disciplines. Reasons for these inequities range from unconscious bias, biased promotion systems, and traditional norms in the division of family life and labor in our society leading to the attrition of women in academia. Addressing the problem of gender equity will provide an ethical basis to advance innovation. We call on academic institutions, professional societies and associations, and editorial boards relevant to epidemiology (as well as other academic disciplines more broadly) to take meaningful action to address gender inequities in research, teaching, policy and practice. Career development and mentoring programs, institutional support, and programs to address bias are some of the necessary steps required to achieve gender equity.

Context and importance of the problem

The under-representation of women in leadership or esteemed positions in scientific fields presents a serious problem because diversity is integral to innovation and creativity, and provides new context for interpreting research relevance [1]. Gender is a key component of diversity and yet its inequality is an injustice and violation of human rights leading to loss of gender talent in epidemiology, as well as in other fields.

The following, while not intended as a comprehensive review, summarizes some of the key dimensions and determinants contributing to gender-equity gaps, particularly in developed countries and among white-collar professions. Our goal is to recognize these issues and begin work to address them.

Importantly, we accept and support the fact that gender identity and gender expression are fluid. Our analysis describes gender primarily as a binary concept. To be complete and inclusive, this fact will need to be brought into focus as the profession addresses gender inequity.

Salary

Gender pay gaps are common worldwide in scientific, academic and clinical fields. For example, the Workplace Gender Equality Agency in Australia conducted an analysis of national salary data and found a 25% pay gap in the “professional, scientific and technical services” fields [2]. A significant gender gap was also identified among newly trained physicians in the U.S. and has been growing over time; in 2008, newly trained male physicians made \$16,819 more, on average, than newly trained female physicians, compared to a \$3,600 difference in 1999 after adjusting for inflation [3]. This difference could not be explained by specialty choice, practice setting, work hours, or other characteristics.

A survey conducted by a leading professional society of engineers and scientists in Australia found among full-time scientists “a significant relationship between responsibility-level and gender and their effect on remuneration. While female respondents tended to be paid equivalent to their male peers in lower-level roles, male respondents were better remunerated in middle career roles” [4]. Childbearing and childrearing only partly explain the gender pay gap, as even women without children who have worked full-time continuously have been shown to experience substantial salary disadvantages post-PhD [5].

Leadership positions, funding and academic advancement

A recent survey (weighted for non-responders) of epidemiology departments found that fewer women held faculty positions overall (48%) and only 32% of full professors were female [6]. This has a flow-on effect for other aspects of leadership in epidemiology such as board and committee membership [6]. With respect to publication metrics in epidemiology, females were more likely to be first authors, but less likely to be last authors, and were less likely to have highly cited articles, after adjusting for potential confounders including seniority [6]. This gap in authorship opportunities may begin as early as graduate school, which can strongly influence the establishment of a productive career path [7].

Women faculty also face additional obstacles to receiving research funding, exacerbated by women holding fewer prestigious postdoctoral positions or institutional start-up resources, receiving less credit for team-science contributions, receiving fewer invitations to peer review, and being cited less frequently than equally positioned male authors [8]. Women also tend to have higher service-related workload and are less likely to negotiate for their own interests [8]. A study using recent data from the Canadian Institutes of Health Research showed that gender gaps in grant success rates were significantly larger when there was an explicit review focus on the principal investigator rather than on the science [9]. One study showed that an intervention of a grant-writing bootcamp for women in the STEM fields run over an 18-month period led to a substantial increase in the number of grants and total funding awarded [8].

Board and committee membership

There is little data on the gender distribution of board membership in academic fields. A recent study examined the gender distribution across U.S. epidemiology societies and editorial boards [6]. The authors found that women constituted just over half (54%) of society members but, among the reviewed editorial boards of six journals, only males held the editor-in-chief position, only 25% of editorial board members were women, and only 31% of associate editors were women. This is in stark contrast to the graduating epidemiology doctoral students (between 2013 and 2015) who were mostly female (73%) [6].

Gender equity issues related to board membership in business and commercial fields are well documented. Women have very low representation in some countries with board membership ranging from about 2% to 42% [10]. The gender gap does not appear to be closing quickly as a recent report found that the rate of increase of female representation on Australian boards has not exceeded 2% per year since 2011[11]. Internationally, countries that have enacted government quota legislation with dissuasive sanctions provide evidence that these quotas work to improve gender equity in board membership [11]. The main justifications that have been put forward for improving female board membership are three-fold: i) ethical, since women are 50% of the workforce and therefore should be represented proportionally, ii) functional reasoning, since boards are more efficient when women are included, and iii) improved financial performance and governance [11].

Invited speaking opportunities at scientific conferences

Invited speaker roles for scientific conferences and meetings are critically important to scientists and academics as they provide opportunities to improve the visibility of the presenter, and allow for wide

and efficient distribution of their research [12, 13]. These speaker roles are used for career and professional advancement and are a recognized measure of esteem. However, research has shown that men dominate conference visibility, even in fields that have a higher proportion of women membership [12]. Based on a review of 21 years of annual meeting data in the field of physical anthropology, it was found that, despite a higher percentage of women in the field, men gave more symposium presentations, with only 47% of symposium presentations given by women [14]. A three-year review of the evolutionary biology field found that women were significantly underrepresented among all speaker roles [15]. Invited speaking engagements were biased towards men compared to regular speaking opportunities [15]. However, the presence of women on conference planning committees improves the number of women presenting [14]. A 3-year retrospective analysis (2011-2013) of 460 symposia in the field of microbiology found that inclusion of at least one woman among the conveners increased the proportion of female speakers by 72% compared with those convened by men alone [13]. Issues around speaker gender balance are complex and diverse [12, 15]; however, several interventions have been proposed, such as developing a speaker policy, collecting and reporting the gender data, being family-friendly, and responding to resistance and supporting women at meetings [16]. Implementation of such approaches have been shown to be effective [17].

Current policy options

Several practical ways to improve gender equity have been proposed [18-26]. However, implementation of these programs or approaches is not widespread, with many academic institutions not offering advancement opportunities that take into account gender bias. Professional skills development and mentorship are important for career advancement, yet sponsorship is a key strategy and model for advancing women to high-level leadership [20]. Universal efforts are needed to effectively advance the careers of women and remove gender inequities in academia [27, 28], irrespective of discipline.

Policy Recommendations

INEP recommends the implementation of individual-level and institutional-level programs with appropriate incentives:

- Adopt the Athena Swan Charter (<http://www.ecu.ac.uk/equality-charters/athena-swan/about-athena-swan/>), paying close attention to potential pitfalls to avoid undermining the impact of the program.
- Develop and implement intentional plans to address gender inequity within academic organizations.
- Require balanced gender representation on conference planning committees for national and international scientific meetings.
- Monitor and report the data on gender for invited conference speaker presentations at all scientific meetings.
- Implement executive leadership programs to provide leadership training for all faculty levels.
- Adopt family-friendly policies such as flexible working hours and financial resources to support individuals requiring child or elder care support.
- Spearhead career advising programs for women and other gender-defined professionals with strong sponsorship of mid-level and senior-level faculty to provide access to senior leaders and professional networks.
- Evaluate progress metrics of implemented programs in support of female and other gender-defined colleagues for academic advancement with awards for meeting goals.

- Facilitate mechanisms to monitor that funding and compensation are equitable between gender groups.

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Endorsements

American College of Epidemiology (ACE)
 Australasian Epidemiological Association (AEA)
 American Public Health Association, Epidemiology Section (APHA-Epi)
 Canadian Society for Epidemiology and Biostatistics (CSEB)
 Collegium Ramazzini (CR)
 German Society for Epidemiology (DGEpi)
 International Society for Environmental Epidemiology (ISEE)
 Romanian Society for Epidemiology (RSE)
 Society for the Analysis of African American Public Health Issues (SAAPHI)
 Spanish Society of Epidemiology (SEE)