

# Gendered Innovations in Biomedicine and Public Health Research

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Innovations surrounding sex and gender have transformed many aspects of biomedical and public health research in the past three decades. Cardiology offers one of the best developed examples of gendered innovations: Sex and gender analyses have shown, for example, that cardiovascular disease (CVD), long defined as primarily a male disease, is the number one killer of adult women. Analyzing sex differences in CVD has led researchers to understand that heart attack symptoms differ by sex,<sup>1</sup> that diagnostic tests, such as the exercise treadmill, differ in efficacy between men and women,<sup>2</sup> and that aspirin is not a good primary preventive measure against heart attack in women.<sup>3</sup>

It is important to understand that “sex and gender” relate to men as well as women. Osteoporosis, by contrast to CVD, has traditionally been seen as a disease affecting postmenopausal women. One third of all osteoporosis-related hip fractures, however, occur in men, and men have twice the mortality rate of women with similar fractures.<sup>4</sup> Osteoporosis researchers began to break the gender paradigm in the late 1990s by acknowledging the need for research in men. By 1997, men’s bone quality was being evaluated through comparison to the bones of healthy young men rather than healthy young women.<sup>5</sup>

This introduction places gendered innovations in biomedical research within the larger context of changes in the study of women, gender, and science over the past several decades. In order to understand the complex connections between women, institutions,

and concepts of sex and gender in medicine, I set out three distinct levels of analysis: the participation of *women* in science, gender in the *institutions* of science, and gender analysis in *research*.

## 2.1 Fixing the Numbers of Women in Science and Medicine

The first and most straightforward level of analysis focuses on increasing the participation of women in science. Efforts in this area began in the USA in the 1980s and were spearheaded by the US National Science Foundation (NSF), which gathered statistics on women in the scientific workforce and provided a number of programs to enhance women’s careers.<sup>6</sup> In 2000, the European Union’s Directorate-General for Research established its important European Technology Assessment Network (ETAN), and in 2003 published its first *She Figures*, reporting trends in women’s participation across its member states.<sup>7</sup>

The idea behind these programs was to jump-start women’s careers by increasing funding for women’s research and teaching them how to negotiate for salary, set up mentor networks, or, more generally – how better to succeed in a man’s world. Let me point out the problems with this approach. Several years ago, Stanford University decided to teach its women faculty how to negotiate – for salary and resources, such as lab space. The idea was that women’s salaries continue to be lower because, when women are offered a job, they tend to say “thank you very much; I can’t believe you chose me.” When men are offered a job, by contrast, they tend to say, “I couldn’t possibly work for that salary.” This small pay gap increases exponentially over a lifetime.<sup>8</sup>

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Stanford's program was excellent. Women faculty, especially those in the medical school, went back and negotiated, but they hit the same brick wall they always hit. The problem is that the training was for women faculty only – and not also for administrators. If such programs are to succeed, the basic ways that universities do business need to change.

Supporting women's research and careers is crucially important, but simply focusing on women is not enough. Research and educational institutions themselves need to be transformed.

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## 2.2 Fixing the Institutions: Transforming Structures and Removing Barriers

Despite claims to objectivity and value-neutrality, academic institutions have identifiable cultures that have developed over time – and, historically, in the absence of women.<sup>9</sup> To the extent that Western-style science has been replicated around the world, institutional structures, cultural stereotypes, and social divisions of labor disadvantage women's participation. The second general approach governments and universities have taken to the issue of gender equality is reforming research institutions. In 2001, the US NSF launched its robust ADVANCE program that assists institutions (not individuals) in implementing structural changes to improve women's success. Institutional reform ranges from counteracting subtle gender biases in hiring and promotion practices to restructuring work/life balance by offering parental leave, supporting dual careers as well as child- and elder-care, and allowing for career breaks.<sup>10</sup>

Much remains to be done to restructure research and educational institutions to remove barriers that limit women's full participation. The goal is to create institutions in which all faculty can achieve at the highest level. For a review of issues, programs, and best practices, see the European Union's Meta-Analysis of Gender and Science Research.<sup>11</sup>

This second approach focuses on restructuring institutions while often assuming that what goes on inside institutions – research and knowledge production – is gender neutral. Restructuring institutions is important, but must be supplemented by efforts to eliminate gender bias from research. Change needs

also to come at a third level: gendered innovations in basic and applied research.

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## 2.3 Fixing the Knowledge: Enhancing Excellence by Mainstreaming Gender Analysis into Basic and Applied Research

Research over the past 30 years has demonstrated how gender inequalities, built into society and research institutions, have influenced science and medicine.<sup>12</sup> Gender bias in research limits the potential benefit of science to society. And gender bias can be expensive: Between 1997 and 2000, ten drugs were withdrawn from the US market because of life-threatening health effects – four of these were more dangerous to women. The problem has been traced to preclinical research where testing was done primarily in male animals.<sup>13</sup>

It is crucially important to identify gender bias and understand how it operates in science and medicine. But analysis cannot stop there: Focusing on bias is not productive. Gender experts in science, biomedicine, and public health are now shifting emphasis away from critique toward positive research programs that employ sex and gender analysis as *resources* to stimulate gendered innovations.<sup>14</sup>

Granting agencies and institutions have taken note. Since 1990, the US National Institutes of Health have required researchers to reconceptualize medical research to include women and ethnic minorities in federally funded research.<sup>15</sup> In 2002, the European Union implemented a cutting-edge policy requiring that grantees applying for large grants (Integrated Projects and Networks of Excellence grants) include a “gender dimension” in research. As stated in the call for proposals, research design must specify in “whether, and in what sense, sex and gender are relevant in the objectives and the methodology of the project.”<sup>15</sup> Elsewhere, too, sex and gender analysis is considered important to basic research. The World Health Organization mainstreams gender analysis into all “research, policies, programmes, projects, and initiatives.”<sup>16</sup> The Canadian Institutes of Health integrate sex and gender into health research at all levels.<sup>17</sup> In Europe, Germany's Charité Universitätsmedizin and Sweden's Karolinska Institute both have institutionalized active centers for gender medicine that promote sex and gender analysis in basic and clinical health research.<sup>18</sup>

Methods of sex and gender analysis serve to enhance objectivity in science. They are important as yet another control – one among many – providing critical rigor in biomedicine and public health research. As with any set of methods, new ones will be fashioned and others discarded as circumstances change. Some transfer easily from science to science, others do not. The value of their implementation depends, as with other research methods, on the creativity of the research team. Sex and gender analysis opens the door to innovation in science, biomedicine, and public health.

*Sex and Gender Aspects in Clinical Medicine* undertakes the important task of summarizing the results of the best research in sex and gender differences in particular specialties, such as cardiology, nephrology, pulmonology, and pharmacology. Prepared by experts in the field, this practice-oriented textbook gathers in one place the important research done in gender medicine over the past 30 years. It is intended for researchers, clinicians, and medical students.

In summarizing the work in the relatively new field of gender medicine, this textbook raises as many questions as it answers. One thing that is still crucial is the development of methods of sex and gender analysis that can serve as a baseline for understanding better how sex and gender function in basic and applied research. This should be an international effort, as recommended in the 2010 genSET *Consensus Report* and the 2010 United Nations Expert Group Meeting on Gender, Science and Technology.<sup>19</sup>

The European Union scaled back its innovative requirements seeking to mainstream sex and gender analysis into basic and applied research in 2007 because few researchers know how to do this work.<sup>20</sup> Stanford University is currently collaborating with the European Union to develop such methods in the Gendered Innovation in Science, Health & Medicine and Engineering project, launched at Stanford in 2009 and engaging the European Union research community in 2011.

## 2.4 Moving Forward

Once we have made headway developing gender analysis methods useful to scientists and engineers, how do we mainstream this type of analysis in the day-to-day work of science? There are several next steps:

1. Develop internationally agreed-upon methods of sex and gender analysis (as discussed above). This is underway in the Gendered Innovations project.
2. Train researchers, evaluators, clinicians, and medical students in gender medicine. This is where *Sex and Gender Aspects in Clinical Medicine* comes in. Sex and gender analysis should be taught across the medical school curriculum.
3. Hold senior management accountable for developing evaluation standards that take into account proper implementation of gender analysis in research. There are several practical ways to encourage researchers to develop proficiency in sex and gender analysis:
  - (a) Granting agencies, such as the European Union Directorate-General for Research, the US National Institutes of Health, the World Health Organization, the Deutsche Forschungsgemeinschaft, etc., can require that all applicants specify whether, and in what sense, sex and gender are relevant in the objectives and the methodology of their project. Research projects that fulfill this criterion might achieve a higher score for funding. Researchers might also achieve this score by demonstrating that sex or gender is not relevant to a particular project. It is important, however, that the issue be addressed.
  - (b) Hiring and promotion committees can evaluate researchers and educators on their success in implementing gender analysis. Knowledge and use of methods of sex and gender analysis can be one factor taken into consideration in hiring and promotion decisions.
  - (c) Editors of peer-reviewed journals can require sophisticated use of sex and gender methodology when selecting papers for publication. A number of journals do this: the *Journal of the National Cancer Institute*, the *Journal of the American College of Cardiology*, and *Circulation*, a journal of the American Heart Association. *Nature* is considering adopting this policy.<sup>21</sup>

Innovation has been placed at the heart of the Europe 2020 strategy.<sup>22</sup> Innovation is seen as a way to address major social problems to improve human health and well-being. Gendered innovations in science, medicine, and public health employ sex and gender analysis as a *resource* to stimulate creativity, and by doing so enhance the lives of both men and women. As this volume demonstrates, employing sex and gender

analysis has added spark and creativity by asking new questions and opening new areas to research. Can we afford to ignore such opportunities?

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