A Look at the Attrition of Women in STEM

Sumana Sharma, PhD Candidate, Wellcome Trust Sanger Institute

The underrepresentation of women in leadership positions in Science, Technology, Engineering, and Mathematics (STEM) is usually attributed to the 'leaky pipeline phenomenon', according to which an increasing proportion of women leave their occupational fields at each stage along their career paths. This attrition is most pronounced for the academic biological sciences, in which the most significant attrition occurs at the postgraduate-to-group leader transition. To illustrate: in the UK in 2014/15, 66% of bioscience postgraduate students, but only 18% of professors, were female [1]. A huge gender difference in leadership positions is evident across all STEM fields: overall, 82% of all professors are men, as of 2014 [2]. This attrition of women in the STEM workforce raises questions over specific barriers faced by women in this field for career advancement. These barriers can be multi-faceted; thus, accurately identifying the main barriers and designing policies to address them will be essential to resolving gender disparity in the field of STEM.

Researchers have studied the decline in female representation in STEM over the course of a standard academic trajectory and have suggested family choices and work-home balance as the most important contributing factors. The suggestion is that issues such as workplace culture; long weekly working hours; and inflexible schedules make women more prone to leaving their academic jobs [3]. While others agree that these issues account for some attrition, they argue that the importance of these factors has been over-emphasised compared with issues surrounding pay and promotion among women in STEM [4]. Glass et al. (2013) observe a higher attrition rate in STEM compared with other fields, suggesting that the difference between attrition in STEM versus other fields seems to be that women from STEM are moving into non-academic STEM-related fields, rather than out of the job market [5].

This appears true in practice; for example, as one female post-doctoral researcher at the Wellcome Trust Sanger Institute (WTSI) states, "I would like to stay in academic research, but the pressure of producing high-impact papers on a regular basis; moving every few years to a new place; and no job stability makes me look into careers in other science-related sectors." She is not alone. Among female bioscience researchers, many women who leave academia prefer to stay connected to science and often migrate to publishing, research funding, teaching, and science-based industry positions. The prospects of flexible hours, job security and longer contracts with promotion opportunities that are often associated with these jobs may make them more desirable than academia [6].

In addition, when comparing women in medicine with academic biologists, it has been noted that the medical field has been able to successfully retain women despite being less family friendly, with inflexible working hours [7]. This suggests that it is not starting a family itself, but its interaction

with other factors, that drives the decision of women to leave their academic fields. One such factor in academia is fierce competition on the job market. While competition for medical programs is also intense, this occurs at an earlier career stage, at which family formation decisions are usually not paramount [7]. Furthermore, the current requirement for a successful academic career to be continuous is hostile to family- related interruptions, as it requires constant evidence of productivity (e.g. publication records). An analysis of the Biotechnology and Biological Sciences Research Council (BBSRC) grant application process in the UK has suggested that mid-career women are less successful because when they take time out, they lose their presence in the field [8].

The loss of skilled women from the STEM workforce in academia has not gone unnoticed. In the UK, programs like the Equality and Diversity Challenge Athena SWAN Charter have been established in order to address unequal gender representation across academic disciplines. Institutions, departments, and universities can apply for an Athena SWAN award based upon their commitment to addressing gender imbalance. This initiative has led to 'good practices'[1] being implemented by various organisations across the UK. For example, post-doctoral coaching and mentoring programs are being used widely by research institutions in order to provide support and encouragement to female scientists in their early careers. Institutions such as the UCL-MRC Laboratory for Molecular Cell Biology have compiled selected lists of women in science, to provide role models for aspiring female scientists. To address disadvantages caused by career gaps, various re-entry programs[2] are being implemented, in order to facilitate the return of female STEM professionals after career breaks. Fellowships such as Dorothy Hodgkin Fellowship that allow flexible working have also been introduced in many institutes for early stage researchers who have parenting responsibilities. Recruitment processes are also being reviewed by many institutions, with measures such as unconscious bias training for interviewers and yearly appraisals, to further guard against unfair disadvantages for women in academic STEM.

Since 2015, the UK government has introduced shared parental leave that allows up to 50 weeks of leave (37 of which are paid) which can be split between partners. Institutions are also making their own changes to the maternity scheme—for example, Queen's University Belfast has made provisions for those taking maternity leave to be exempt from teaching for six months on their return. The University of Reading and the WTSI's own policies allow for shared parental pay to come from the central budget. With such policies, one can hope that issues of women attrition from motherhood are slowly being recognised and addressed.

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Even with policies in place, a change in broader culture will be necessary to precipitate the desired changes. A UK government assessment in 2016 suggested that while 285,000 working fathers are eligible to take shared parental leave, only

[1] Only few examples are cited here; a complete list of 'good practices' can be found at www.ecu.ac.uk.

[2] Some examples of re-entry programs are: the Wellcome Trust Career Re-Entry Fellowship; the Daphne Jackson Trust Fellowship; and the Janet Thornton Fellowship.

2-8% would do so. Organisations can help by, for example, advertising policy changes to staff and keeping track of leave take-ups. High-quality childcare should also be easily available to support parents who wish to return to their academic careers.

Some scholars have argued that the 'leaky pipeline' metaphor may itself exemplify problems for female retention in STEM—arguing that such careers should be viewed not as a linear 'pipeline', but rather as a network of pathways, allowing for movement both in and out [9]. A 'leak in the pipeline' suggests that once one's out, one cannot re-enter; moreover, the metaphor devalues those women who have opted for a career outside of academia. By contrast, the 'network' view is consonant with the above-mentioned re-entry fellowships for those women who wish to return to STEM research after time away from the field.

The competitive nature of academia is unlikely to change, both because of the low number of faculty positions available, and because of the driven nature of those in the field. However, talented women are currently discouraged from academia due to the added pressure of parenting responsibilities, to which the academic environment is hostile. The solutions are twofold: (i) the nature of academia has to change so that it no longer puts researchers with parenting responsibilities or career breaks at a disadvantage; (ii) similarly, caring responsibility has to be truly shared. Now that our consciousness of these issues is raised, it is important for us to develop policies to identify and encourage women wishing to pursue academic careers, but who are discouraged by the current state of the affairs.

References

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About the Author

Sumana is a Ph.D. student at the Wellcome Trust Sanger Institute and the University of Cambridge. Her research focuses on using CRISPR-Cas9 technology to understand extracellular protein interactions involved in cellular recognition. Sumana comes from Nepal and holds a B.Sc. in Biochemistry and Cell Biology from Jacobs University, Bremen, and her M.Sc. in Molecular Biology from the International Max Plank Research School, Göttingen University. Outside of her research, Sumana likes to involve herself in outreach events to attract girls to STEM subjects, and is a Ph.D. student representative for the Athena Swan self assessment team at the WTSI.