Beyond family and societal attitudes to retain women in science

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Several reports earlier have focused on providing facilities for women scientists based on the premise that family and societal factors are responsible for women dropping out of science. The views of male scientists who constitute the majority in science reflect these popularly held notions. However, the present study points towards systemic biases that operate at the organizational level as a significant contributing factor. The study sample represents the diversity among women scientists and includes men scientists, emphasizing the need for policies to take into consideration the differences across these groups.

Keywords: Organizational factors, perception, retention, societal attitudes, women scientists.

DESPITE the increasing number of women in higher education in science, their participation at higher levels of science in tenured research positions has shown little increase[1]. Although women constitute over one-third of the total science graduates and postgraduates, they comprise only 15–20% of the tenured faculty across research institutions and universities in India[2]. Further, the relatively higher representation of women is seen in jobs such as junior/ad-hoc faculty, temporary research associates, postdoctoral fellows, etc. that have been vacated by men. However, as Bal[1] pointed out, a permanent position with an ability to undertake research projects with appropriate institutional facilities, advise doctoral students and publish, are important for a stable career in science. As competition to remain and advance in science careers begin soon after Ph D, it is important for women to establish themselves during their early 30s, a period that coincides with marriage and family commitments for most Indian women. Breaks or temporary research positions of 3–5 years during this period do not offer the advantage of climbing up the ladder at a later stage when family commitments take less time. Thus, a large number of qualified women scientists opt for undergraduate or school-level teaching, whereas others completely drop out of science.

Even though there is recognition of this 'winding career path'[3] for women, science policy makers often ignore the willingness and need for women to stay active in research despite other responsibilities. Absence from active research through breaks cannot be compensated for at a later stage in the highly competitive environment of science. Therefore, policies designed to provide extended maternity breaks or temporary research projects may not address the central problem and may instead work against the interests of women.

Keeping these factors in mind, a study was sponsored by the Indian Academy of Sciences (IASc), Bangalore in collaboration with the National Institute of Advanced Studies, Bangalore to develop a set of recommendations from the data obtained from women scientists who are not a homogenous group[4]. Efforts were made to include women who have continued in science and those who have dropped out. Although several recommendations of this study have appeared in earlier reports, an attempt has been made here to qualify these recommendations with nuanced field data to overcome major hurdles during their implementation.

Sample and methodology

A survey was conducted with 568 women scientists, of whom 312 were engaged in science research (WIR); 182 were not engaged in positions other than long-term science research (WNR) [WNR includes those in undergraduate or school-level teaching, temporary research positions such as DST women scientists schemes, and consultancy or administrative posts. The defining feature of the category was working on jobs that may not require training at the Ph D level.]; 74 were not working (WNW). In addition to representing the diversity among women, another aspect of the study was the inclusion of men scientists (161) as a comparative group.

The survey was conducted using a pre-coded questionnaire that contained approximately 100 questions regarding personal and family details, education, employment and organizational details, and research and productivity factors. In addition, qualitative data from interviews were also recorded.

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The analysis was conducted at two levels: first, a comparison was made across the three groups, WIR, WNR and WNW. Second, a comparison was made between WIR and men in science research (MIR) to understand whether significant differences existed in performance and experiences of the two groups.

Results

Comparison of women in research, not in research and not working

The data showed that most of the women scientists from all three groups were married (86% of WIR, 88% of WNR and 92% of WNW; Figure 1). However, a higher proportion of WIR reported being never married (14%) and this group was spread across all age cohorts (30–70 years). Thus, a small group of women in science prefer-staying single to keep their careers on track. However, a majority of the women scientists have shown the ability to balance both their career and family.

The highest proportion of WNW (46%) have spouses who were doctorates (compared to 39% of WIR and 30% of WNR). They also reported that their spouses were working in science research, teaching and/or consultancy. The difference with respect to qualification of spouse for the three groups is significant at 0.05 level. Several science institutions have informal policies that prevent the employment of spouses in the same organization, and the higher number of WNW having spouses in science may perhaps be a reflection of this. Several respondents stated that implementation of such informal policies may have affected their prospective employment in the same organization as their spouses. Such policies may be a significant factor for women dropping out of science.

Figure 1. Marital status of women scientists surveyed. WIR, Women engaged in science research; WNI, Women not engaged in long-term science research, and WNW, Women not working.

Further, 68% of WNW reported that they 'did not get jobs' they applied for. The corresponding responses for WIR and WNR were 28% and 42% respectively. Family reasons have also been more frequently reported by WIR (13%) and WNR (14%), but less frequently by WNW (3%) (Figure 2). The difference among the three groups with respect to reasons for not taking previous jobs applied for is significant at 0.01 level.

These data reveal an important point: although marriage (especially to men scientists) and other family factors may place indirect constraints on women, organizational biases and discriminatory policies may be constraining factors that lead to women dropping out from science.

The data obtained on breaks also indicate a similar trend. Despite a larger number of WNW (28%) having receiving no help with childcare when compared to the other two groups (3% WIR and 5% WNR), childcare and eldercare have been less frequently stated by them as a reason for breaks. Only 41% of the responses from WNW show this to be the reason compared to 48% from WIR and 51% to WNR, for the same.

Although the nuclear family set-up and lack of childcare facilities may have been factors that affected WNW from continuing in science, they reported difficulties in finding jobs, institutions or advisors. A significantly higher proportion of WNW (22% responses) have reported this compared to WIR (6% responses) and WNR (7% responses). The difference among the groups with respect to breaks is also significant at 0.05 level.

The findings reiterate not only the lack of institutional support to balance family and work, but also the lack of opportunities for women to continue in science. Further, the data question commonly held notions that family factors by themselves affect the chances of women to continue in science.

The present results also suggest that organizations play a vital role in affecting the career of women. This is also reflected in the facilities that have been perceived as useful by women scientists. Though some differences are seen, all the three groups agree on flexibility in timings to be the most useful organizational facility. Here it is useful to define the nature of flexibility that is considered important. The nature of flexibility perceived to be useful is to be able to undertake the mandatory number of hours of work within extended office timings, that allows one a choice to come-in early and leave early, or start late and continue late. The commonly held belief that this facility exists for most premier institutions does not necessarily imply that this is true of all scientific institutions and universities.

The study also revealed facilities for accommodation and transportation by WIR (18% responses), better HR policies and higher salaries by WNR (17% responses) and

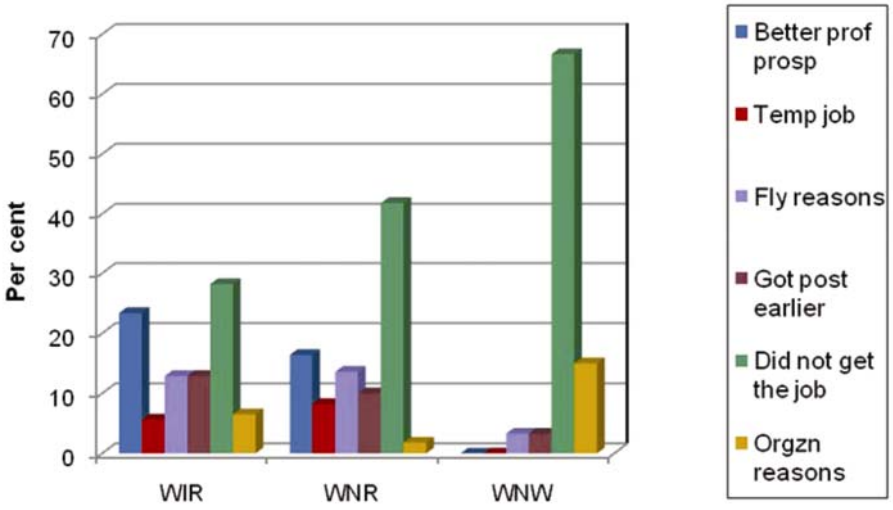

Figure 2. Reasons reported by women scientists for not taking up jobs applied for.

better childcare facilities by all three groups. Refresher programmes and fellowships have also been considered useful by WNW (13% responses).

However, it is interesting to note that despite reporting organizational factors as important in job selection and breaks, when asked to provide reasons for 'Why women drop out of science?', they perceived 'family responsibilities' to be the reason. This may be a result of distancing oneself from other women in science. Discrimination, marginalization, harassment, lack of flexible timings, shortage of mentors and role models, fewer women in decision-making posts, etc. have been perceived as significant factors leading to women dropping out of science (2–5% of the responses indicate these organizational reasons). The fear of getting identified and targetted within the relatively small science community, despite assurances of confidentiality, may have affected the nature of responses given to questions pertaining to one self. It is therefore important to open the 'black box' of the organization and study these factors more closely in the future.

The data debunks the common assumption that domestic responsibilities and gender-role status of women are responsible for the drop-out. These assumptions invoke explanations of social attitudes and values, and need for change at the societal level for the poor retention of women in science. Instead, the study shows that these factors can be easily addressed through a revision at the organizational and policy level.

Comparison between women and men in research

The data showed that only 2.5% of men were never married compared to 14% of women. The difference in marital status of the two groups is significant at 0.01 level. It indicates that for men family responsibilities and consideration of marriage and children are not significant hurdles to pursue science.

Further, 86% of men compared to 74% of women reported having children. However, a higher proportion of women (47%), compared to men (34%), reported working between 40 and 60 h per week when their children were growing up. Men have reported working above 60 h per week (24% men compared to 8% women) and less than 40 hours (29% men compared to only 19% women). The difference between the groups with respect to the time spent at work when children were growing up is significant at 0.01 level.

During the normal course also, the working pattern was significantly different for WIR and MIR. Eighty-three per cent of women compared to 75% of men reported spending more than 40 hours per week at work (Figure 3). The difference is significant at 0.01 level.

Despite family and childcare responsibilities, women work in different ways to put in the ideally required number of 8–10 h per day for research. While this may not be an indicator of quality, the findings disprove the myth that women cannot provide enough time for work and research after marriage and childbirth due to family responsibilities.

Most women and men have reported professional advantages and opportunities to be significant factors in the selection of jobs. A higher proportion of women have, however, indicated not taking up previous positions due to organizational factors such as long, inflexible hours, no room for professional growth and lack of childcare facilities (7%) compared to men (1%). Similarly, more women have indicated taking up their present positions due to organizational factors such as convenient location,

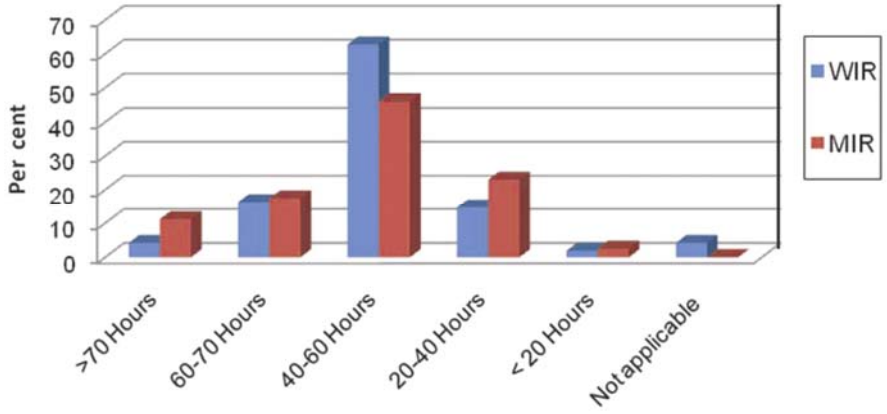

Figure 3. Average number of working hours per week reported by WIR and MIR.

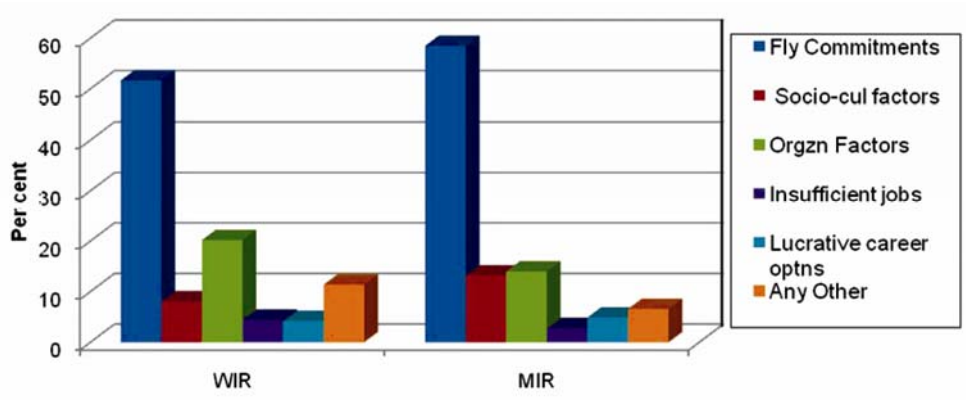

Figure 4. Perceived reasons for women dropping out of science.

daycare facilities, transport, accommodation, congenial work atmosphere, attractive salary, etc. (10% women compared to 5% men). Thus for women, organizational structures that ease the work atmosphere and help balance family life are important. The differences between the groups are significant at 0.01 level.

The study also shows organizational facilities to be important to counter breaks in career. A significantly higher number of women have reported breaks compared to men. The reasons cited for breaks by WIR were childcare/eldercare responsibilities (48%) or transfer of spouse/father (12%). In contrast, there was not any response from MIR indicating these reasons for breaks in career. MIR reported personal factors such as further studies, voluntary retirement, health reasons, etc. as reasons for breaks (86% of responses). The difference is significant at 0.01 level. Thus, it is evident that unless organizations proactively develop mechanisms such as childcare facilities, accommodation of spouses in the same institute, allowing women (or men) to take their jobs along to another city/town when their spouses get transferred, etc., retaining women in science will remain a big challenge.

A final point of discussion based on the data obtained for women and men in research concerns the largely varying perceptions of the groups with respect to women dropping out of science. Majority of the responses by women (52%) and men (59%) have indicated family commitments as the reason for women dropping out of science. However, more women have reported organizational factors as a reason for dropping out (20% of responses), compared to men (14%). Interestingly, more men (13%) have indicated socio-cultural and conservative set-up of society as the reason compared to women (8%) (Figure 4). Thus, for women the perception largely indicates a combination of family responsibilities and lack of organizational support as reasons for women dropping out of science; for men the perception largely indicates the family and social norms of society. The difference in perceptions between women and men in science is significant at 0.01 level. It is important to highlight this difference as social rules and norms are less easily amendable than organizational support structures and policies to retain women in science. With men forming the majority in science organizations and on important committees, the perception that the problem lies in

the socio-cultural realm will prevent the development of proactive policies that can address the issue of lower participation of women in science.

The data compared for the two groups reveals that there is a largely prevalent perception among men that domestic responsibilities hinder the optimal performance of women in science. However, there is a lack of recognition awarded to the commitment and ability of women to manage multiple responsibilities, and the utility of organizational facilities in aiding their management of career and family.

Discussion

In the Indian context, there have been already several reports and recommendations presented to address the issue of lesser participation of women in science[1,5]. Although several of the recommendations of the present study agree with other reports, other new findings, and a nuanced explanation of the previous recommendations with supportive data have been presented in this study.

Going beyond traditional conceptions of family and childcare responsibilities being the reason for women dropping out of science, the present study has highlighted the importance of supportive and facilitative mechanisms at workplace that are crucial to ensure the retention of women in science.

Thus, one of the organizational recommendations made is providing facilities to manage multiple responsibilities – such as provision of accommodation on campus, transportation, childcare and eldercare facilities. Although such facilities are mostly provided on seniority basis, there is a need to prioritize such options for younger couples between the 30 and 40 years age-group. In addition, there is a need to provide flexibility in timings to help them balance family responsibilities along with work.

Further, an important organizational mechanism to retain women would be to introduce mentoring programmes with incentives for mentors. This is crucial because a majority of women in research have successfully balanced career and family. Through guidance and support for women in junior positions, mentors can ensure their long-term retention in science.

At the policy level, a compulsory gender audit, with mandatory requirements for all research institutions, universities, national laboratories and other institutions to provide a department-wise gender break-up of students and faculty at all levels needs to be implemented to bring about a gradual increase in the number of women in science. In addition, there is a need to implement a time-bound target recruiting system with emphasis on increasing the recruitment of women to premier research institutions.

A crucial factor in recruiting women is the issue of selection. A large number of women in our study (especially those not working currently) have reported 'not getting the job' as the reason for not taking up jobs; an important policy would be on the transparency of selection and evaluation procedures. Along with more studies on selection and evaluation procedures that examine what factors are responsible for the lower number of recruitments and advancements for women, it must be made mandatory for institutions to state beforehand clear criteria that would be used in the selection procedure to ensure transparency, as well as to boost the confidence of women to apply for the post.

The issue of not getting jobs may also be related to the lack of jobs. Hence new means for creating jobs need to be explored. Ways to expand the formal space within science and technology need to be explored to create more jobs suitable for women candidates with a doctoral degree. One method could be to invite venture capital to expand the infrastructure in science with possible patenting provisions for entrepreneurs who have invested in research. Another option would be to create entrepreneurial opportunities in science and technology for scientists who have completed a Ph D in science, engineering or medicine.

There is a need for modification of existing schemes for the re-entry of women to pursue science. The study has revealed that a major problem with such schemes is the short duration of three years, along with delay and lack of efficient renewal process. Thus, after short periods women end up with breaks again. Further, such projects do not help women re-enter science organizations as they are not given much weightage. Thus, there is a need to develop a long-term scheme of five years' duration that can be renewed periodically based on performance. Further, dependence on institutions/guides for obtaining or continuing such projects needs to be reduced, because these clauses have led to breaks for many women. Instead as a method to optimize government science facilities, it must be made mandatory for all government universities, laboratories and research institutions to allow women scientists in these schemes to undertake research at their institutions. An advisory group, in place of a single faculty member, can be constituted to review work and guide these scientists to ensure their autonomy as well as availability of adequate resource personnel to them. Further, it is important to develop a system of weightage for such projects so that it may be useful when women apply for other tenured positions.

Another provision that will increase job opportunities for women is a policy on employing spouses at the same institution. There are no official policies at most institutes that prevent the employment of spouses together. However, data from our study reveal that many women who are not currently working have lost job opportunities due to informal policies that prevent couples from working

together in the same organization. Hence, it must be made mandatory for organizations to state upfront that they would accommodate both spouses based on qualification and merit. Alternatively, options to carry the jobs to other mutually agreed upon institutions in other parts of the country, when the spouse is transferred, should also be introduced to help women continue without breaks in science.

The present study showed significant differences in the perceptions of women and men scientists with respect to the retention of women in science. Therefore, for policies to be effective, it is essential to have at least one-third representation of women on important selection, hiring, promotion, decision-making and policy-formation committees, to reflect the actual experiences of women. Further, the study has also shown large differences among WIR, WNR and WNW, and some differences across age cohorts. Hence it is important to implement a system of rotation by which different committees have new members based on merit across different age-groups, who can provide new insights based on their experiences.

Conclusion

The study presents some findings that have important policy implications. The data show wide variations among the groups of women in science and a need for nuanced policies that are sensitive to the different roles of women. Further, it also demonstrates that with adequate opportunities and facilitative organizational provisions, more women will be able to take up careers in science.

The study advocates for gender-neutral facilities that can be availed both by women and men. Two reasons for advocating these are to prevent negative appraisal of women for availing special opportunities, and as they can go a long way in redefining gender roles by providing opportunities for men also to take on multiple responsibilities.

An essential requirement for these policies is a periodic review to evaluate the extent to which the recommendations have been implemented, or may require modification.

Further, it would also be important to expand the national database of women scientists created by IASc on a mission mode and periodically update and maintain it to be able to assess the impact of these recommendations on reducing the extent of drop-out. In the absence of such a database it would be impossible to trace the women who have dropped out of science.

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