OBJECTIVES. Over the past 30 years there has been a dramatic increase in the number of women entering higher education and the sciences. The purpose of this paper is to describe what is known about the status of women in pharmacy education.

METHODS. Information was obtained from existing national databases, published reports, and scholarly studies that examined how women fare relative to men with regard to degree completion, faculty rank and tenure status, leadership positions and research awards, salary differences, and barriers to advancement.

RESULTS. Despite the increased number of women faculty members and passage of time, our findings show gender disparities with regard to tenure status, leadership position, achievement awards, and salary at higher ranks.

CONCLUSIONS. We recommend that the Association and its members launch a serious study of these issues and collaborate on new initiatives for change at the departmental, institutional, and national levels.

Keywords: women, pharmacy education, faculty

INTRODUCTION

Over the past 30 years there has been a dramatic increase in the number of women entering higher education and the sciences. Social scientists and historians generally agree that this rapid and visible entry of women into the sciences was due to a convergence of several social, political, and economic events. They include:

• growth of the women’s movement which raised women’s consciousness, challenged cultural myths about their abilities, and encouraged them to pursue new roles and to enter the scientific professions;
• enactment of federal legislation and executive orders prohibiting discrimination on the basis of sex in educational programs and employment;
• mobilization of women’s groups, which pressured educational institutions, regulatory agencies, and the courts to end discriminatory admissions and hiring practices;
• growth of new jobs in pharmacy and other fields with better salaries, status, and hours than traditionally female occupations and professions;
• increased availability of federal funding, such as federal capitation, which encouraged pharmacy colleges to recruit and admit more students; and
• increased availability of faculty positions due to the establishment of new postsecondary institutions and programs.

Given the increased numbers of women in higher education and the sciences, tracking their progress and identifying disparities or issues that need to be addressed is important. In this report, what is known about women in academe, with special emphasis on women in the pharmaceutical sciences, will be reviewed briefly. Critical issues that will be addressed include how women fare relative to men with regard to degree completion, faculty rank, tenure status, leadership positions and recognition, and salary differences. Several possible explanations for the observed gender disparities will be identified.

The report is based on existing national databases, published reports, and scholarly studies that provide information about women’s and men’s status in academe. The American Association of University Professors (AAUP) and the American Association of Colleges of Pharmacy (AACP) regularly publish reports on the salaries and appointments of women and men faculty members in all United States postsecondary institutions and pharmacy colleges, respectively. The AACP and other academic organizations also report the numbers of women and men who receive various degrees and serve...
as department chairs and deans. Researchers also have surveyed women academics to identify problems they experience.3,9-16

INDICATORS OF CAREER ADVANCEMENT

Degree Completion

Since 1970, the percentage of bachelor's degrees awarded to women has increased significantly, with women degree recipients becoming the “new majority” in many academic and professional fields.2 According to Reskin and Roos,4 the most rapid and visible changes in women’s degree completion occurred in traditionally male fields with greater job growth during this period. Between the years of 1971–1981, the percentage of women earning BS degrees jumped from 9% to 37% in business, 12% to 45% in accounting, 14% to 32% in computer science, and 18% to 43% in pharmacy. During this same period there was remarkable job growth in financial management (+189,361 jobs), accounting (+366,367 jobs), computer systems (+95,071 jobs), and pharmacy (+30,000 jobs). By the year 2001, women earned 64% of the 7,000 first professional degrees awarded in pharmacy.17 Also impressive are the steady gains in the percentage of advanced degrees earned by women in the physical and biological sciences from the 1960s to the 1990s. The percentage of PhD degrees earned by women during this period increased from 16% to 40% in biology, 7% to 27% in chemistry, and 0% to 11% in engineering.3 Similar trends are seen in pharmacy where the percentage of PhD degrees awarded to women increased from 2% in the 1960s to 38% in the 1990s (Figure 1). By the year 2001, women earned 44% of all PhD degrees awarded by colleges and schools of pharmacy.17 As Triggle and Miller have noted,18 the overall growth in the number of pharmaceutical science PhD degrees awarded in recent years can be attributed largely to the increased number of women receiving such degrees. While the proportional gains among women PhD degree recipients are encouraging, it is troubling that only 86 female and 122 male United States citizens and permanent residents earned PhD degrees from colleges and schools of pharmacy in 2001.17 This number of individuals is not adequate to replace the increased number of pharmacy educators who will retire in the next 10 years and to meet the continued demand for scientists in the pharmaceutical and biotechnology industries.19

Faculty Rank and Tenure

National databases show that the percentage of full-time faculty positions held by women has increased at every rank and at all types of institutions in recent years.2,6 Unfortunately, rates of growth have been slower at higher ranks and slower in some disciplines than others.2 Between 1985–1986 and 2002–2003, the percentage of women faculty members in all United States institutions increased from 36% to 46% of assistant professors, 23% to 38% of associate professors, and 12% to 22% of full professors (Figure 2). Women faculty members were less likely to be on tenure track and were promoted and received tenure less rapidly than men faculty members.2,9 Similar trends are evident in pharmacy.
Between 1985–1986 and 2002–2003, the percentage of women faculty members in pharmacy increased from 30% to 55% of assistant professors, 12% to 33% of associate professors, and 4% to 15% of full professors (Figure 2). Further analysis of AACP data showed more rapid gains in some disciplines than others, with the percentage of women faculty members increasing from 36% to 53% in pharmacy practice, 21% to 31% in the social/administrative sciences, and 13% to 18% in the pharmaceutical sciences (pharmacetics, pharmacology, and medicinal chemistry) (Figure 3). This means that the percent change was 47% in pharmacy practice.
In 2002–2003, 41% of pharmacy faculty members were tenured; 20% were on a tenure track, but not yet tenured; and 39% were in non-tenure track positions. A special analysis of the 2002–2003 AACP faculty database revealed several interesting findings regarding the tenure status of women faculty members (S. Meyer, PhD, unpublished data, American Association of Colleges of Pharmacy, February 24, 2003). First, the data showed that 58% of full-time women faculty members were in non-tenure track positions, compared with 28% of men. The high percentage of females on non-tenure track was due in part to the over-representation of females in pharmacy practice: 84% of non-tenure track women faculty members were in pharmacy practice. In addition, female faculty members were less likely than their male colleagues to be on tenure track even after controlling for discipline, age group, and full-time status. In 2002–2003, the percent of females on tenure track was lower than the percent of males in 8 of 9 discipline-age combinations examined (Table 1). The largest disparities were found among pharmacy practice faculty members. In this discipline, 40% of males and 25% of females were on tenure-track in the 30–39 year age group, 11% lower in the 40–49 year age group, and 8% lower in the 50–59 year age group. The percent of non-tenure track women than men in the pharmaceutical sciences and from 7% more to 14% fewer women than men in the social and administrative sciences.

Second, while the AACP database could not be used to determine whether women received tenure at the same pace as men in their cohort, gender differences were evident when the data were reviewed for full-time tenure-track faculty members in specific age groups. Women were less likely than men to be tenured in 7 of 9 discipline-age combinations examined (Table 2). In the pharmacy practice discipline, the percent of women (vs men) having tenure was 4% lower in the 30–39 year age group, 11% lower in the 40–49 year age group, and 8% lower in the 50–59 year age group. The percent of women (vs men) having tenure ranged from 5% to 8% fewer women than men in the pharmaceutical sciences and from 7% more to 14% fewer women than men in the social and administrative sciences.

While it is encouraging to see more women completing advanced degrees and more women entering pharmacy education, many issues remain. It is important to ask why women faculty members remain underrepresented in the pharmaceutical sciences, why women faculty members in pharmacy practice are less likely than male peers to be on tenure-track appointments, and why women on tenure track are less likely that their male peers to be tenured. Similar questions have been asked about the disparities between women and men scientists in the larger academic community. In the 2000 book, *Athena Unbound*, researchers addressed the question, “Why so few women in science?” They found that “women’s entry into and leakage from the ranks of graduate school education and university departments differ from men’s.” Their findings suggested several barriers to advancement, including significant differences in the mentoring of men and women assistant professors. In other words, the problem is not simply due to the smaller “pool” of women

### Table 1. Percent of Full-time Pharmacy Faculty on Tenure Track by Discipline, Gender, and Age in 2002-2003*

<table>
<thead>
<tr>
<th>Age</th>
<th>Pharmacy Practice</th>
<th>Pharmaceutical Sciences†</th>
<th>Social and Admin Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>30-39 years</td>
<td>39.8</td>
<td>25.3</td>
<td>81.0</td>
</tr>
<tr>
<td>40-49 years</td>
<td>56.2</td>
<td>32.7</td>
<td>86.5</td>
</tr>
<tr>
<td>50-59 years</td>
<td>64.8</td>
<td>42.3</td>
<td>93.4</td>
</tr>
</tbody>
</table>

*Calculated from 2002-2003 AACP faculty database (unpublished data, American Association of Colleges of Pharmacy, S. Meyer, October 15, 2003). Faculty members in other disciplines and departments are excluded from this table due to small numbers.

†Includes medicinal chemistry, pharmaceutics, and pharmacology.

### Table 2. Percent of Full-time Tenure-Track Faculty Members Who Were Tenured by Discipline, Gender, and Age in 2002-2003*

<table>
<thead>
<tr>
<th>Age</th>
<th>Pharmacy Practice</th>
<th>Pharmaceutical Sciences†</th>
<th>Social and Admin Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>30-39 years</td>
<td>23.3</td>
<td>19.6</td>
<td>16.2</td>
</tr>
<tr>
<td>40-49 years</td>
<td>69.3</td>
<td>58.0</td>
<td>64.4</td>
</tr>
<tr>
<td>50-59 years</td>
<td>92.4</td>
<td>84.4</td>
<td>93.4</td>
</tr>
</tbody>
</table>

*Calculated from 2002-2003 AACP faculty database (unpublished data, American Association of Colleges of Pharmacy, S. Meyer, October 15, 2003). Faculty members in other disciplines and departments are excluded from this table due to small numbers.

†Includes medicinal chemistry, pharmaceutics, and pharmacology.
available for faculty positions. Issues related mentoring, retention, and barriers experienced by women faculty members after being hired also must be addressed. These issues will be discussed later in this report.

Leadership Positions and Recognition

It often is assumed that increased numbers of women faculty members combined with the passage of time will automatically remedy past disparities in appointment to leadership positions and recognition. This assumption is not warranted. Despite significant increases in the numbers of women faculty members, few women serve as department chairs and deans in traditionally male-dominant professional schools such as medicine, dentistry, law, and architecture.2 Others have noted that women scientists continue to be less visible and underrepresented as members of national academies of science and recipients of major research awards.9(p47) These gender differences in leadership and recognition are not trivial matters since department chairs make critical decisions about faculty hiring, salaries, and the distribution of resources, and since research awards can affect salary increases and incentives for future work.2,9 Similar trends exist in the fields of elementary and secondary education where women are “strikingly underrepresented at administrative and policy-making levels,” although they have constituted the majority of elementary and secondary teachers for quite some time.20

Women also are underrepresented as pharmacy deans and department chairs. In 2002–2003, only 43 women (compared with 210 men) served as department chairs and only 12 women (compared with 69 men) served as deans of pharmacy schools (Figure 4). The percentage of department chairs held by women ranged from 6% in the pharmaceutical sciences (medicinal chemistry, pharmaceutics, and pharmacology) to 19% in the social and administrative sciences and 29% in pharmacy practice. Further research is needed to determine the aspirations of women and men pharmacy faculty members and the extent to which they are encouraged and prepared for administrative positions.

Women pharmaceutical scientists increasingly have been recognized for their contributions in recent years.14 However, women continue to be underrepresented among recipients of research achievement awards. From 1981–2002, only 1 woman and 39 men received the Research Achievement or Tyler Awards from the American Pharmacists Association (Figure 5). During the same period, only 4 women compared with 59 men received the Chalmers Distinguished Educator, Dawson, Volkwiler, or Service Awards given by the American Association of Colleges of Pharmacy (Figure 5). From 1987–2002, the American Association of Pharmaceutical Scientists named 73 men and no women as recipients of 11 types of research achievement awards.21 Additional data are needed to determine the number of men and women nominated for various awards and other possible reasons for the underrepresentation of women among the recipients of these prestigious awards.

Salary Differences

National surveys conducted by AAUP5-7 have documented substantial salary disparities between men and women faculty members at every rank and every type of
institution (doctoral, master’s degree, baccalaureate degree, 2-year colleges with ranks, and institutions without ranks). In 2002–2003, women earned less than men in 19 of 20 combinations of institution and rank, with a mean salary difference of 7.6% less for assistant professors, 6.4% less for associate professors, and 11.2% less for full professors.7 The greater disparity among women and men full professors has been a pattern since 1975.2,6

Salary data collected by AACP also revealed substantial disparities between women and men faculty members even after controlling for rank, age, and years in rank. In 2002–2003, women on full-time, calendar-year appointments earned less than men in 13 of 17 same age-rank groups with sufficient data to permit reporting (Table 3). Consistent with AAUP data, the greatest disparities were at the senior faculty members and administrative levels. Female full professors earned approximately $11,000 or 10% less than male professors in the 40–49 year age group and the 50–59 year age group. Female assistant deans earned approximately $14,000-$18,000 or 15%-17% less than male assistant deans in the 40–49 year age group and the 50–59 year age group. In comparison to male associate deans, female associate deans earned $7,823 or 7.7% less in the 40–49 year age group and $18,165 or 14.9% in the 50–59 year age group. At the dean level, females earned $5,265 or 3.4% less than their male counterparts in the 50–59 year age group.

Similar trends were found after controlling for years in rank.8 In 2002–2003, women faculty members in full-time, calendar-year appointments earned less than men...
in 14 of 21 same years-rank categories with sufficient data to permit reporting. Table 4 shows that the size of these differences varied by rank, with the largest differences at the senior faculty and administrative levels. Women’s earnings fell below men’s in 1 of 4 categories at the assistant professor level, 3 of 5 categories at the associate professor level, and 5 of 5 categories at the full professor level. In comparison to men with similar years in rank, women full professors earned $11,932 or 12% less in the 0–1 year category, $7,737 or 7% less in the 2–5 year category, and $11,433 or 10% less the 6–10 year category. Only 21 females were in full professor rank for 11–20 years; they earned 2% to 3% less than their 208 male counterparts.

One might ask how the 2002–2003 salary data compare with previous years and whether the salary gaps at higher ranks show signs of narrowing. Figure 6 provides some insights with regard to salary gaps over the past decade. Since disproportionate numbers of women have obtained faculty positions in recent years, this analysis was limited to faculty members in rank for 0–5 years for selected years since 1990. Several trends were evident. First, the salary gap between female and male assistant professors in rank for 0–5 years has declined and remained fairly stable since the early 1990s (Figure 6). Continued monitoring is necessary to determine whether the 2002 figure represents an end to unequal salaries at the assistant professor level. Second, salary gaps between female and male associate

### Table 4. Salary Difference Between Female and Male Full-Time Pharmacy Faculty by Rank and Years in Rank, 2002-2003

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th>0-1 year % ($)</th>
<th>2-5 years% ($)</th>
<th>6-10 years% ($)</th>
<th>11-15 years% ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean</td>
<td>Na</td>
<td>Na</td>
<td>4.8 (7,907)</td>
<td>Na</td>
</tr>
<tr>
<td>Associate Dean</td>
<td>Na</td>
<td>-13.8 (15,787)</td>
<td>-3.4 (-3,711)</td>
<td>Na</td>
</tr>
<tr>
<td>Assistant Dean</td>
<td>Na</td>
<td>-14.5 (-13,815)</td>
<td>4.8 (-3,711)</td>
<td>Na</td>
</tr>
<tr>
<td>Professor</td>
<td>-11.7 (-11,932)</td>
<td>-7.4 (-7737)</td>
<td>-10.2 (-11,433)</td>
<td>-2.4 (-2,798)</td>
</tr>
<tr>
<td>Assoc. Professor</td>
<td>-1.1 (-905)</td>
<td>-1.9 (-1509)</td>
<td>3.2 (2,648)</td>
<td>1.3 (1,082)</td>
</tr>
<tr>
<td>Asst. Professor</td>
<td>0.5 (360)</td>
<td>0.8 (566)</td>
<td>1.4 (1031)</td>
<td>-5.2 (-4050)</td>
</tr>
<tr>
<td>Instructor</td>
<td>Na</td>
<td>6.3 (4037)</td>
<td>-12.3 (-9391)</td>
<td>Na</td>
</tr>
</tbody>
</table>

Calculated from: 2002-2003 Profile of Pharmacy Faculty, Table 16. Gap expressed as percent of male salaries and dollars for full-time pharmacy faculty women (versus men) with calendar-year appointments; na= not available due to small numbers. Persons in rank > 16 years are not shown due to small number of women versus men.
professors also declined in the early 1990s, but the gaps generally were larger and fluctuated to a greater degree than at the assistant professor level.

Third, salary gaps between female and male full professors also declined in the early 1990s. However, the gaps remained substantial and actually widened in the late 1990s. Between 1990 and 1994, female full professors in rank 0–5 years earned on average 9.5% less than their male peers. Between 1996 and 2002, female full professors in rank 0–5 years earned on average 12.1% less than their male peers. This lack of progress at higher ranks suggests that female faculty members begin their careers on fairly equal salary footing and then fall behind male peers as their careers progress. The size and persistent nature of the disparities also point to systemic patterns and fundamental problems that will not go away just by waiting for change to occur. The observed disparities also are consistent with earlier research in which most female pharmacy faculty members reported salary inequalities at their institutions.13

BARRIERS TO ADVANCEMENT

Studies examining the status of women in academia repeatedly show that women have not reached parity with men academics in terms of faculty rank and tenure status, leadership positions, recognition, or salary.1-3,5-7,9-16 To better understand these disparities, scholars have examined 4 potential barriers to advancement by women academics: (1) family roles and mobility, (2) work values and activities, (3) gender schemas and biases, and (4) lack of support and marginalization of women at the department level.

Family Roles and Mobility

Researchers have posited that women’s domestic and parental roles adversely affect their professional work and career advancement; however, results are mixed. Studies show that married women scientists publish as often as single women scientists, and those women who have children publish as often as women who do not have children.9 Research examining the status of full-time regular faculty members also demonstrates that female faculty members earn 8% less than males even after controlling for marital status, whether they have dependents, and other variables that can affect productivity and earnings.23 On the other hand, women scientists are more likely than men to report limited geographic mobility due to family obligations.9 This limited mobility may undermine women’s ability and motivation to obtain equal salaries, salary adjustments, and/or outside offers. As one MIT professor noted:

Women get hit with a triple whammy. They are less likely to get (outside) offers because they are typically viewed as less movable; women are also less likely to use an offer as leverage unless they are extremely serious and set to leave; and, finally, there is some evidence that women may be less likely to get counteroffers.23

In addition, many men assume fewer domestic and parental responsibilities than women, resulting in more time for their professional work. Hewlett15 surveyed high-achieving business executives, professionals, and academics and found that fewer than 10% of the men assumed primary responsibility for grocery shopping, meal preparation, cleaning, organization of children’s activities, taking time off from work if a child is ill, and or helping children with home work. In contrast, 40%-50% of the women assumed primary responsibility for these duties even though they were working full-time as a business executive, professional, or academic. It is not known whether this “second shift” is a significant barrier to career advancement or whether it simply causes greater stress for women in these situations. However, pharmacy researchers have found that most women faculty members experience major issues with regard to family, stress, and workload.13 Further research is needed to clarify the problems experienced and how they can be alleviated for all faculty members committed to gender equality and family care.

Work Values and Activities

Another hypothesis is that disparities between women and men faculty members may be due to gender differences in work values and approaches, number of publications, or percent time spent on teaching and service (vs research). Scholars have also noted that traditional promotion criteria are more characteristic of male work values than female work values and thus are more apt to support the promotion of men and slow the promotion of women. According to Creamer,11(p75) these traditional criteria include:

1. Utilize the number of citations to the candidate’s work as a major criterion for evaluation.
2. Assume that the candidate only took a major conceptual role in articles where he or she appears as the senior or sole author. Devalue collaboration with students.
3. Expect the topic of scholarly research to be embedded in an area with a lengthy intellectual tradition.
4. Regardless of academic field, rely on total journal article production as a primary measure of productivity. Ignore other types of scholarly communication because they cannot be verified by readily available sources.
5. Expect letters from external referees to be from eminent, male scholars in the field.
Gender Schemas and Biases

A third type of barrier relates to “gender schemas” and biases that adversely affect women academics. In her book titled, Why So Slow? Valian defines gender schemas as implicit or nonconscious beliefs and ideas about sex differences that “affect our expectations of men and women, our evaluations of their work, and their performance as professionals.”10(p2) These implicit or unconscious beliefs, expectations, and biases affect both men and women and operate in subtle ways. They can include biased or inaccurate evaluations of deans, department chairs, colleagues, students, and/or other individuals who underrate women’s and overrate men’s potential abilities and performance as teachers, researchers, managers, and/or leaders. These evaluations then affect a variety of decisions and practices that, ultimately, keep women from achieving parity in salary and rising to higher positions despite their competence and effort.5,10 In a now classic experiment,26 fictitious résumés were mailed to 147 university department heads who were asked to indicate the professorial rank at which the individual should be hired. The names were assigned in a way that the same résumé sometimes carried a male name and other times a female name. Despite identical qualifications, résumés with male names were assigned a higher rank than those with female names.

Psychology experiments also have shown that many men and women have internalized gender biases in the sense that men often view their work as worth more than women do, and often view themselves as entitled to more pay than women do.10 Consequently, many men may feel a greater sense of entitlement than women, who may not want to appear greedy or ungrateful. These gender-linked beliefs may explain why many men faculty members are believed to negotiate salaries more aggressively than women27 and why men are believed to seek and obtain more outside offers and counteroffers than women.23 A complicating factor is that many institutions link salary increases to outside offers, a practice that may discriminate against female professors who are less mobile and/or less willing to use outside offers as leverage in obtaining equal salaries.23 According to Donna Euben, staff counsel for AAUP, “Many institutions have this informal practice of only matching outside offers, which can disproportionately affect women who don’t always feel as comfortable playing those kinds of games.”23(pC3)

These issues warrant further review by the Association and its members. This review should include an examination of traditional criteria for evaluating men and women faculty members and existing standards and structures for monitoring salary negotiations. It is important to determine whether and how various informal practices affect women and men faculty members.

Lack of Support and Marginalization at the Department Level

Empirical studies also suggest that women faculty members are more likely than men faculty members to experience other subtle forms of bias, lack of support, and marginalization in their department, especially when that department lacks a critical mass of women faculty members. Etzkowitz and his colleagues3 conducted in-depth interviews and focus groups with faculty members in 5 scientific disciplines at 11 universities. Their findings suggest that science is a “social process” and that there are “dual scientific worlds,” one male and one female. While untenured male faculty members were included in informal departmental networks, untenured female faculty members were not. On average,
mentors may systematically avoid female protégés.29 This sexual harassment legislation is that men in positions of mentor. Unfortunately, a potential negative effect of gender roles or publication rates. Rather, they find that women faculty members are more likely than men faculty members to experience subtle exclusions and biases, to feel as if their contributions are undervalued or not taken seriously, to experience an “accumulation of disadvantages” or lack of support, and to feel “marginalized” in the “outer circle” of the scientific community.2-3,9-10 Taken together, these findings are provocative and have important implications for women in pharmacy education. They suggest that women academics are confronted with a complex set of issues regarding their work and personal lives, professional networks and departmental climate, and tangible resources and support necessary for success in academe.

We urge the Association and member schools to initiate a serious study of these issues and ways to remedy them.21 We also urge the Association, member schools, and individual faculty members to become more familiar with studies and remedies that have been attempted in other academic fields.2-3,10 to survey both female and male pharmacy faculty members to better understand their perceived concerns and barriers to advancement,13,16 and to collaborate on innovative initiatives for change at the departmental, institutional, and national levels.2-3,10 As initiatives for change are pursued, it would serve all stakeholders to study and collaborate in their efforts to
address the issues described in this report in hopes that all faculty members reach their full potential.

ACKNOWLEDGEMENTS


REFERENCES