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# RESEARCH

# Publication Rates for Pharmaceutical Sciences Faculty Members at Nonresearch-Intensive US Schools of Pharmacy

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**Objective.** To provide benchmarking data for faculty productivity by determining publication rates for pharmaceutical sciences faculty members at nonresearch-intensive schools and colleges of pharmacy between January 2010 and December 2013.

**Methods.** Scopus and Web of Science databases were searched using faculty names from the AACP faculty and professional staff roster. Annual publication rates were calculated and compared for various demographic subcategories.

**Results.** The average annual publication rate for the 4-year period was 0.82 per faculty member, and 10.95 per institution. Publication rates were significantly higher in departments offering a PhD program or with NIH funding.

**Conclusion.** Because institutional missions are diverse, it can be useful to evaluate faculty scholarly productivity in relation to similar organizations. Pharmaceutical science faculty members at nonresearch-intensive institutions contribute to the literature despite institutional missions less focused on research.

**Keywords:** publications, scholarship, faculty, pharmaceutical sciences, faculty member productivity

## INTRODUCTION

Faculty members at schools and colleges of pharmacy are traditionally expected to be active in 3 areas: teaching, scholarship, and service. Teaching serves an obvious purpose within educational institutions, being the means by which students are prepared for success after graduation. Scholarship is a way to keep faculty members up to date in their field and help improve their teaching, to generate funding from external sources, and to demonstrate their institution's quality. Service provides self-governance for the institution, reinforces connections of the institution to its local community, and promotes and advances the professional communities to which faculty members belong. Overall faculty effectiveness in all 3 areas is important for the institution and helps achieve its mission. The balance of time spent by faculty members in these 3 areas varies with institutional mission and often with job description and career goals of individual faculty members. In order to advance through the promotion and tenure process, faculty members must document their effectiveness in these areas.

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Faculty members self-evaluate and mentors advise regarding progress and development prior to applying for promotion and/or tenure. It can be difficult to accurately gauge performance compared to peers (eg, how productive faculty members of similar rank and position are in other departments; what the standards are by which effectiveness is measured). These standards are typically institution-based, because the promotion and tenure process is designed by each institution in accordance with its mission. However, external reviewers are often included as part of the peer-review process in promotion and tenure decisions. The external reviewers are most familiar with their own environment and, despite being provided with guidelines from the requesting institution, may lack a larger context in which to place their evaluation.

Of the 3 areas of faculty responsibility, scholarship might be the one most easily evaluated by outsiders, as there are concrete measures of productivity. Grant dollars are easily quantifiable, and, therefore, funding is used as a measure of faculty effectiveness in scholarship. Successful grantsmanship demonstrates an understanding of one's field and an ability to persuade peers that proposed work is worthy of an allocation of financial resources, which may be scarce. This measure of productivity is most easily applied to the scholarship of discovery, whereby new knowledge is generated, as this is typically the type of scholarship most interesting to funding sources.

Boyer developed the idea of different forms of research, beyond the scholarship of discovery, and described scholarship that is much less likely to generate extramural dollars.[1] Since a common attribute of all effective scholarship is communication, output such as publication is another measure of scholarly activity. In fact, number of publications is also used in evaluating faculty effectiveness in scholarship for promotion and tenure decisions.

Bosso et al recommended collecting information on teaching, scholarship, and service of pharmacy faculty members in order to benchmark individuals and departments to their peers.[2] They recommended that publication rates be used as a measure of scholarship and that data be normalized for comparison among institutions with similar missions. This recommendation is consistent with numerous reports over the past several years on publication rates of pharmacy faculty members, such as pharmacy practice faculty members and chairs, pharmacy deans, and experiential education directors.[3-9] Thompson and colleagues examined publication rates for pharmaceutical sciences faculty members, but focused only on research-intensive schools.[10,11] There are no published reports on the publication rates of pharmaceutical sciences faculty members at schools where teaching rather than research is the primary mission. In support of the call by Bosso et al for normalization of benchmarking data, this study evaluates the publication rates of pharmaceutical sciences faculty members at institutions without a primary research focus.

## METHODS

Demographic information collected for each school in the study, included US census regions (Northeast, South, Midwest, and West); date of establishment/accreditation; whether the school was private or public; and number of pharmaceutical science faculty members, according to the American Association of Colleges of Pharmacy (AACP) faculty/professional staff roster on the AACP website. Information was also collected on the level of 2012 NIH funding and whether the school was a Carnegie-rated research-intensive institution, was part of an academic health center, or offered a PhD program. A school determined to be Carnegie-rated or receiving more than $5 million in NIH funding in that year was defined as research-intensive for the purposes of this study. Because school funding levels are clustered, this value represented a natural breakpoint and reduced the inclusion of schools identified as research-intensive by Thompson and Nahata, without leaving an excessive number of schools unaccounted for in either study.[10]

Faculty members at US schools of pharmacy were identified using the AACP faculty/professional staff roster on the AACP website as of January 2014. Faculty members were filtered by discipline (biological sciences, biomedical sciences, pharmacokinetics/pharmacodynamics, pharmacogenetics, medicinal chemistry/pharmaceutical chemistry/pharmacognosy, pharmaceutics/pharmacy, pharmacology/toxicology) and rank (professor, associate professor, assistant professor, instructor, lecturer). All other filters were left at "none selected," and 2055 names were returned in the search results.

To maintain consistency with previous pharmacy publication rate studies and because analysis functions are available on Scopus and Web of Science, these databases were selected for this study. Faculty names from eligible schools were submitted to the Scopus database for a search of publications from January 2010 through December 2013. For simplicity, a single query was generated for each school using faculty name as listed in the AACP faculty/professional staff roster search results (AUTHOR-NAME), the institution name (AFFIL), the United States (AFFILCOUNTRY), and year (PUBYEAR). To ensure the accuracy of the citations, results were manually verified by a researcher. This allowed identification of citations from authors of similar names but different departmental affiliation at individual institutions. In situations where it could not easily be determined that at least one of the authors belonged in the pharmaceutical sciences department being searched, patterns of collaborators and/or of research topics were used to infer the likelihood of 2 related but different names (eg, T.J. Bloom and Tim Bloom) referring to the same faculty member. In the absence of such information, a citation was discarded as not belonging to a pharmaceutical sciences faculty member. The citation information, including author names and publication title, source, type, and year was downloaded into an Excel spreadsheet.

Faculty names were also submitted to the Web of Science (WOS) database, using the advanced search function to locate publications from January 2010 through December 2013. For simplicity, a single query was generated for each school using faculty name (AU) as listed in the AACP faculty/professional staff roster search results, the institution name (OG), and publication years (PY). Search results from the database were verified using the same approach as for the Scopus search. Once records were verified, the same kinds of citation information as in the Scopus search were downloaded into an Excel spreadsheet. Results from the Scopus and WOS database searches were combined and duplicates were identified and removed. Publications by the authors were counted

regardless of author order on the publication. Publications with multiple authors in one department were counted as one publication for the department, while those with authors from multiple departments were counted as a publication for each department.

Descriptive statistics (percentages and ranges) were calculated for the demographic information. Demographic information was sorted into subcategories, including public vs private institution, fewer than 12 vs 12 or more faculty members, presence vs absence of a PhD program, presence vs absence of an affiliation with an academic health center (self-reported by each school in the AACP Pharmacy School Admissions Report), presence vs absence of NIH funding in 2012, establishment of the school fewer than 50 years ago vs 50 or more years ago, and census region (East, South, Midwest, or West). Publication rates per faculty member per year were calculated and compared for each demographic subcategory. Statistical analyses of the data were performed using SPSS, v22 (IBM, Armonk, NY). Descriptive statistics were used to analyze demographic variables. General linear modeling was performed to determine which covariates were independent predictors of publication rates (publications per faculty member per year). Covariates with a $p \leq 0.05$ after bivariate analysis were entered into the multivariate model.

Rates for the various types of publication (abstracts, articles, books, chapters, conference papers, editorials, letters, notes, reviews, or short surveys) identified by Scopus and WOS were calculated for each school based on the average per faculty member over the 4-year span examined.

## RESULTS

Fifty-nine schools of pharmacy met the criteria of an accredited nonresearch-intensive school during the entire 2010-2013 evaluation period (Table 1). The largest percentage (39.1%) of schools were in the South region, as defined by the US census. The remaining schools were evenly distributed between the East, Midwest, and West

Table 1. Schools Included in Analysis of Publication Rates

| Albany | Palm Beach Atlantic |
|---|---|
| Belmont University | Regis University |
| Butler University | Roseman University |
| California Northstate University | Samford University |
| Campbell University | Shenandoah University |
| Chicago State University | South Dakota State University |
| Creighton University | South University |
| Drake University | Southern Illinois University |
| Duquesne University | Southwestern Oklahoma State |
| East Tennessee State | St. Louis College of Pharmacy |
| Ferris State University | St. John's University (NY) |
| Florida A&M | Sullivan University |
| Hampton University | Texas Southern University |
| Harding University | Thomas Jefferson University |
| Idaho State University | Touro University - New York |
| Lake Erie College of Osteopathic Medicine | Touro University - California |
| Lipscomb University | University of Arkansas |
| Loma Linda University | University of Hawaii at Hilo |
| Long Island University | University of Louisiana Monroe |
| MCPHS University - Worcester | University of Montana |
| MCPHS University -Boston | University of New England |
| Mercer University | University of the Pacific |
| Midwestern University | University of Puerto Rico |
| Midwestern University - Arizona | Union University |
| North Dakota State University | USP Philadelphia |
| Northeast Ohio Med University | Western University of Health Sciences |
| Notre Dame Maryland | Wilkes University |
| Nova Southeastern University | Wingate University |
| Ohio Northern University | Xavier University |
| Pacific University Oregon | |

regions with 20.3% per region. The majority of schools (72.9%) did not offer a PhD program or have an affiliation with an academic health center (84.7%). Private schools represented 72.9% of programs. Schools established less than 50 years ago accounted for the majority of programs (57.6%). Schools established 50 to 100 years ago accounted for 20.3%, and those established more than 100 years ago accounted for 22.1%. While the average NIH funding in 2012 for all schools was $326 703 (range from $0 to $4 037 863), 32 schools (54.2%) had no NIH funding. NIH funding of up to $1 million was reported by 23 (39%) schools and 4 (6.8%) reported more than $1 million in NIH funding (Table 2).

A search of the AACP faculty/professional staff roster identified 721 pharmaceutical science faculty members affiliated with the 59 nonresearch-intensive US schools of pharmacy. Schools averaged 12.2 faculty members per department with a range of 5 to 33. The faculty members contributed a total of 2584 publications from January 2010 through December 2013, averaging 646 publications per year. Faculty members contributed 556 publications in 2010, 621 in 2011, 684 in 2012, and 723 in 2013. Departments averaged 43.8 publications over the 4-year period, with a range from 0 to 206. Across the 4 years, departments averaged 10.95 publications/institution/year but the average publications per institution increased from 9.4 in 2010 to 12.3 in 2013. Individual faculty members averaged 0.82 publications per year with a range from 0 to 3.0 and an interquartile range of 0.86. The average yearly publications per faculty members were lowest in 2010 at 0.68 publications per faculty member and highest in 2013 at 0.92.

When evaluating publication types, articles accounted for 1824 of the 2584 publications (70.6%), while abstracts accounted for 321 (12.4%) of the publications, and reviews accounted for 9.3%. The other publication types accounted for less than 3% each with letters, notes, short surveys, and books accounting for less than 1% each. An average of 7.7 articles were published per department per year (30.9 articles per department over 4 years) along with an average of 1.4 abstracts and 1.0 reviews per department per year (5.4 and 4.1, respectively, over 4 years). All other publication types accounted for less than one publication per department per year (Table 3). Of the 11 journals publishing the most articles by pharmaceutical sciences faculty at nonresearch-intensive schools, 3 targeted medicinal chemistry, one focused on pharmaceutics, and one on pharmacology. The remaining 6 journals had broader audiences (Table 4). Articles in these 11 journals accounted for 18.7% of the articles identified in this study.

Although 11 departments contributed fewer than 10 publications, including 1 department that did not publish during the evaluation period, 9 contributed more than 100 publications each over the 4 years evaluated, including one department that contributed more than 200 publications. These 9 departments accounted for 1214 (47.0%) of the overall publications. Only 2 of these departments

Table 2. Demographics of Schools Identified as Nonresearch-Intensive

| **Demographics (59 schools)** | **n (%)** |
|---|---|
| Census region | |
| East | 12 (20.3) |
| South | 23 (39.1) |
| Midwest | 12 (20.3) |
| West | 12 (20.3) |
| PhD offered | |
| Yes | 16 (27.1) |
| No | 43 (72.9) |
| Public/Private | |
| Public | 16 (27.1) |
| Private | 43 (72.9) |
| Part of academic health center | |
| Yes | 9 (15.3) |
| No | 50 (84.7) |
| NIH* funding (2012) | |
| $0 | 32 (54.2) |
| $1 to $1 000 000 | 23 (39.0) |
| $1 000 001 to $5 000 000 | 4 (6.8) |
| >$5 000 000 | 0 |
| Average | $326 703 |
| Range | $0-$4 037 863 |
| Mode | $0 |
| School established | |
| <50 years | 34 (57.6) |
| 51-100 years | 12 (20.3) |
| 100+ years | 13 (22.1) |
| # PS faculty | |
| Average | 12.22 |
| Range | 5-33 |

*National Institutes of Health

Table 3. 4-year Average Publications by Type per School

| **Publication Type** | **Average/School** |
|---|---|
| Over 4 Years | |
| Articles | 30.9 |
| Abstracts | 5.4 |
| Reviews | 4.1 |
| Chapters | 1.1 |
| Conference papers | 0.9 |
| Editorials | 0.5 |
| Letters | 0.3 |
| Notes | 0.3 |
| Short surveys | 0.2 |
| Books | 0.1 |

Table 4. Most Common Journals for Published Articles

| Journal Name | 2014 Impact Factor[a] | # of Citations (%) |
|---|---|---|
| *PLoS ONE* | 3.53 | 68 (3.7) |
| *Bioorganic and Medicinal Chemistry* | 2.95 | 41 (2.2) |
| *American Journal of Pharmaceutical Education* | 1.19 | 33 (1.8) |
| *International Journal of Pharmaceutics* | 3.78 | 33 (1.8) |
| *Bioorganic and Medicinal Chemistry Letters* | 2.33 | 31 (1.7) |
| *Journal of Pharmaceutical Sciences* | 3.01 | 29 (1.6) |
| *U.S. Pharmacist* | n/a | 24 (1.3) |
| *Journal of Medicinal Chemistry* | 5.48 | 23 (1.3) |
| *Currents in Pharmacy Teaching and Learning* | n/a | 19 (1.0) |
| *European Journal of Pharmacology* | 2.68 | 19 (1.0) |
| *FASEB JOURNAL* | 5.48 | 19 (1.0) |
| | | 339 (18.7%) |

[a]http://www.citefactor.org/journal-impact-factor-list-2014_B.html accessed 13 January 2014
n/a=not available

reported any NIH funding in 2012. Four departments contributed more than 100 articles each over the 4-year period, accounting for 479 of the 1824 articles (26.3%).

In an analysis of program demographics and the average number of publications per faculty member per year, offering a PhD and having NIH funding were associated with differences in publication rates. Departments offering a PhD published 0.45 publications per faculty member per year more than those without ($p=0.012$). Departments with NIH funding in 2012 contributed 0.42 publications per faculty member per year more than those without NIH funding ($p=0.006$). There were no differences in publication rates for faculty members at public vs private institutions, nor for faculty members at schools established more than 50 years ago vs those established less than 50 years ago (Table 5).

## DISCUSSION

Many papers have been published examining scholarly productivity of pharmacy practice faculty members.[3-9] This emphasis is justified by some authors based on high demands perceived by clinical faculty members, who offer clinical care to the community in addition to the normal faculty responsibilities of scholarly work, teaching, and service. Less research has been published about scholarly output in pharmaceutical science departments.[10,11] The goal of the current work was to look at pharmaceutical sciences faculty members at nonresearch-intensive schools of pharmacy as a way to expand the 2012 work of Thompson and Nahata on publication rates for pharmaceutical sciences faculty members at research-intensive schools.[10]

Table 5. Multivariate Model Comparing Publication Rates by Demographic Characteristic

| | | | 95% Confidence Interval | |
|---|---|---|---|---|
| Parameter | Estimate | Significance | Lower Bound | Upper Bound |
| PhD not offered | -0.4 | 0.01 | -0.8 | -0.1 |
| PhD offered | Referent | | | |
| Public | 0.3 | 0.08 | -0.03 | 0.6 |
| Private | Referent | | | |
| No NIH funding | -0.4 | 0.006 | -0.7 | -0.1 |
| NIH funding | Referent | | | |
| Established <50yr | -0.1 | 0.5 | -0.4 | 0.2 |
| Established >50yr | Referent | | | |

Thompson and Nahata defined research-intensive schools as those having "at least 2 of the following 3 criteria: classification as a Carnegie I research institution; (at least) $500 000 in total research funding over the period of 2005-2009, as listed on the AACP website; and a PhD program."[10] The definition of research-intensive used for this report was classification as a Carnegie I research institution and NIH funding in 2012 of >$5 000 000, as reported on the AACP website. The shorter time frame of one year coupled with a higher funding limit seems more consistent with a research-intensive institution. This is in part reflected by the ability of nonresearch institutions to obtain as much as $300 000 for a single NIH Academic Research Enhancement Award (AREA) grant, which is targeted at enhancing the research environment for undergraduate students at nonresearch-intensive institutions. As a consequence of differences in definition, there were 6 pharmaceutical sciences departments included in this project as well as in the work of Thompson and Nahata. The overlap of schools included in both studies indicates the difficulty of dividing a diverse group of institutions into clear and unambiguous groups.

Pharmaceutical sciences faculty members at nonresearch-intensive schools made significant contributions to the scientific literature between January 2010 and December 2013, with the number of publications increasing each year. This growth is consistent with results from other studies of faculty research productivity.[6] Of the publications identified in this study, 92.3% consisted of articles, abstracts, or reviews, nearly identical to the 92% reported for these publication types by Thompson and Nahata.[10] It was somewhat surprising that articles were so much more common than abstracts (institution average of 30.9 vs 5.4 respectively over 4 years), given that it is not uncommon for preliminary research to be presented in a poster prior to final publication as an article. It is also common for work to be presented in a poster and then not pursued further. It is possible that abstracts are not as readily available as articles and other publication types to citation indexes such as Scopus and Web of Science. This availability is dependent in part on whether the abstracts for posters presented at a meeting are published in a journal associated with the meeting's host organization.

The publication rates for pharmaceutical sciences faculty members at nonresearch-intensive schools were less than those reported for pharmaceutical science faculty members at research-intensive institutions but similar to other pharmacy faculty subsets. This study found the average yearly publication rate per faculty member over the 4 years examined was 0.82. Chisholm-Burns et al reported 0.51 total articles per year for pharmacy practice faculty members, while Thompson et al reported either 1.4 or 1.6 publications per year for pharmacy practice chairs, depending on the database used to identify publications.[6,8] Those studies examined pharmacy practice faculty members or chairs from research-intensive and nonresearch-intensive schools without differentiation. Thompson and Nahata reported much higher average faculty publication rates during 2006-2010 for pharmaceutical sciences faculty members at schools they designated as research-intensive, ranging from 2.5 publications per year for pharmacology faculty members to 4.5 publications per year for medicinal chemistry faculty members.[10] This range is similar to that reported by Thompson and Harrison for pharmaceutical sciences faculty members at research-intensive schools during the years 1999-2003.[11] It is unsurprising that faculty members at research-intensive schools would publish at greater rates due to the increased research productivity focus and expectations at those institutions, and it would be interesting to see whether the same difference exists in pharmacy practice departments when research-intensive schools are examined separately.

Publication topic areas for pharmaceutical sciences faculty members at nonresearch-intensive institutions were somewhat similar to what Thompson and Nahata found in research-intensive institutions. They reported that medicinal chemists published at higher rates than pharmaceutics faculty members, who in turn published more than pharmacologists.[10] Based on the subject areas of the most commonly represented journals in the citations for pharmaceutical sciences faculty members in nonresearch-intensive institutions, medicinal chemists seem to be the most productive faculty members, followed by pharmaceutics and pharmacology faculty members. The reason for the consistent difference in publication rates among these fields at research-intensive and nonresearch-intensive institutions is unclear.

Other reports on the scholarly productivity of faculty members have noted the uneven distribution of publication rates, a phenomenon referred to as Lotka's Law.[12] Thompson and Harrison reported that 10% of pharmaceutical sciences faculty members at research-intensive schools contributed 50% of the publications included in their study.[11] Coleman et al reported that 2% of all pharmacy practice faculty members were responsible for 31% of the publications included in their study.[4] The current study also found an imbalance, with 15% of pharmaceutical sciences departments included in this study contributing 47% of the publications during the years examined. Interestingly, there is less publication disparity between pharmaceutical sciences faculty members at research-intensive and those at nonresearch-intensive schools than there is between sciences and practice faculty members. This may reflect differences in research preparation included in the typical training of pharmaceutical sciences and pharmacy practice faculty members.[5]

The current study examined factors that might associate with increased productivity, including offering a PhD program, having NIH funding, or being a public vs private institution. Publication rates were higher for faculty members at institutions offering a PhD program, as well as in those receiving NIH funding in 2012, similar to what was reported by Chisholm-Burns et al.[6] Average publication rates per faculty member were trending higher in pharmaceutical sciences departments at public institutions, consistent with previous reports.[6,8,13] Using a regression analysis, faculty members in larger departments (12 or more) were not more productive than those in smaller departments (fewer than 12), inconsistent with what was reported by Coleman et al for pharmacy practice faculty members.[3] No difference was seen based on association of the school with an academic health science center, in contrast to what was reported for pharmacy practice faculty members.[6,8] This may be

a result of stronger reliance on the academic health center for research opportunities among pharmacy practice faculty members than among pharmaceutical sciences faculty members.

There are limitations to this study. The faculty names used to query the Scopus and WOS databases were obtained from the AACP faculty and professional staff roster. That roster is no longer published in yearly reports, but is continually updated online. As a consequence, it was impossible to verify that all faculty members were at a single school for the entire time period examined. Although efforts were made to confirm each citation, including confirming at least one author was a member of that institution's pharmaceutical sciences department, it is possible some citations were incorrectly confirmed as genuine. Many authors were found to use inconsistent name and affiliation formatting, complicating the confirmation of authors with common surnames. Based on the recommendation of Meho and Yang, complementary databases were used to collect citation information to maximize the coverage of journals used by pharmaceutical sciences faculty members.[14] However, publications in journals not indexed by either Scopus or WOS would not have been identified. Lastly, the seeming underrepresentation of poster abstracts in the citations collected for this research suggests that when the data in this report are used for benchmarking purposes, consideration of abstracts in a promotion and tenure dossier should be made cautiously to avoid misinterpreting the productivity of faculty members with numerous poster presentations.

## CONCLUSIONS

In pursuit of the benchmarking espoused by Bosso et al,[2] this report represents the first analysis of publication rates of pharmaceutical sciences faculty members at schools of pharmacy that are not research-intensive. Because of different missions within institutions, it is important to evaluate faculty scholarly productivity in relation to similar organizations. As shown in this study, pharmaceutical sciences faculty members at nonresearch-intensive institutions contribute to the published literature despite being at institutions with missions less focused on research.

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## REFERENCES

1. Boyer EL. Scholarship reconsidered: priorities of the professoriate. Carnegie Foundation for the Advancement of Teaching. Princeton, NJ 1990.
2. Bosso JA, Chisholm-Burns M, Nappi J, Gubbins PO, Ross LA. Benchmarking in academic pharmacy departments. *Am J Pharm Educ.* 2010;74(8):Article 140.
3. Coleman CI, Schlesselmann L, White CM. Journal publications by pharmacy practice faculty evaluated by institution and region of the United States (2001-2003). *Pharmacy Practice (Internet)*. 2007; 5(4):151-156.
4. Coleman CI, Schlesselman LS, Lao E, White CM. Number and impact of published scholarly works by pharmacy practice faculty members at accredited US colleges and schools of pharmacy (2001-2003). *Am J Pharm Educ.* 2007;71(3):Article 44.
5. Lee KC, El-Ibiary SY, Hudmon KS. Evaluation of research training and productivity among junior pharmacy practice faculty in the United States. *J Pharm Pract.* 2010;23(6):553-559.
6. Chisholm-Burns MA, Spivey C, Martin JR, Wyles C, Ehrman C, Schlesselman LS. A 5-year analysis of peer-reviewed journal article publications of pharmacy practice faculty members. *Am J Pharm Educ.* 2012;76(7):Article 127.
7. Thompson DF, Callen EC. Publication records among college of pharmacy deans. *Ann Pharmacother.* 2008;42(1):142-143.
8. Thompson DF, Callen EC, Nahata MC. Publication metrics and record of pharmacy practice chairs. *Ann Pharmacother.* 2009; 43(2):268-275.
9. Danielson J, McElroy S. Quantifying published scholarly works of experiential education directors. *Am J Pharm Educ.* 2013;77(8): Article 167.
10. Thompson DF, Nahata MC. Pharmaceutical science faculty publication records at research-intensive pharmacy colleges and schools. *Am J Pharm Educ.* 2012;76(9):Article 173.
11. Thompson DF, Harrison KE. Basic science pharmacy faculty publication patterns from research-intensive US colleges, 1999-2003. *Pharm Educ.* 2005;5(2):Article 83.
12. Lotka AJ. The frequency distribution of scientific productivity. *J Wash Acad Sci.* 1926;16:317-323.
13. Mathys ML, Thompson DF. Publication rates of US schools and colleges of pharmacy: A 22-year history. *Pharm Educ.* 2000;1:17-23.
14. Meho LI, Yang K. Impact of data sources on citation counts and rankings of LIS faculty: Web of Science versus Scopus and Google Scholar. *J Assoc Inf Sci Technol.* 2007;58(13):2105-2125.