




# Research articles on volunteering in biomedical journals: a MEDLINE-based bibliometric analysis

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## Abstract

**Objective:** Volunteering, an important aspect of society, is a multidisciplinary issue. However, there few are extensive surveys examining the trend and scope of research on volunteering in biomedical areas.

**Methods:** Publications indexed with the Medical Subject Headings “volunteers” or “hospital volunteers” were downloaded from MEDLINE. We excluded publications indexed with “healthy volunteers” from the analysis.

**Results:** A total 3555 research articles on volunteering were found in 1283 journals, through the end of 2016. The number of publications increased gradually from 1 article in 1953 to 254 articles in 2016. Only 51 journals had published 10 or more articles on this topic. Research articles on volunteering were published in journals with 110 specialties and were most often in journals related to public health, nursing, and health services. The largest proportion of articles was related to psychology. Although 10,853 authors were identified in 3555 articles, only eight authors have published more than 10 research articles on volunteering.

**Conclusion:** Research interest in volunteering in biomedical areas has been growing in recent decades, but the total number of publications on volunteering remains relatively small.

## Keywords

Bibliometric analysis, hospital volunteers, volunteers, MEDLINE, survey, biomedical journals

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## Introduction

In advanced societies, a substantial proportion of welfare work is provided by volunteers.<sup>1</sup> According to the Corporation for National and Community Service in the United States (US), about 62.6 million Americans provided 7.9 billion hours of volunteer service in 2015.<sup>2</sup> Volunteering is unpaid activity by a person to benefit another person or organization.<sup>3</sup> Volunteer services can be provided either independently (e.g., helping neighbors in need or informal volunteering) or through groups, clubs or organizations (e.g., participating in International Volunteer HQ or formal volunteering).<sup>4,5</sup> In the United Kingdom, 70% of adults participated in any volunteering at least once between 2015 to 2016, and 27% of adults served as formal volunteers at least once a month.<sup>4</sup> Volunteering takes place in all walks of life. In the medical area, daily practice in health care facilities is heavily dependent on volunteers.<sup>6</sup> Some Medicare reimbursement programs in the US even mandate the use of volunteers.<sup>7</sup> In the biomedical literature, research interest has usually been focused on the benefits of volunteering on physical and mental health.<sup>8-10</sup> However, extensive surveys regarding the trend and scope of research into volunteering are scarce.

In the current study, we aimed to identify the publication trend of research on volunteering in the biomedical literature, to analyze the categories of journals that have published research articles on volunteering as well as the research subjects of published articles. Our findings will serve to illustrate the development of volunteering in the health care area and help researchers to understand the current trend in research on volunteering, so as to publish more efficiently.

## Methods

### Data source

We downloaded records from the PubMed website using Medical Subject Headings

(MeSH) of MEDLINE. The National Center for Biotechnology Information (NCBI) at the National Library of Medicine (NLM) in the US built the MEDLINE database, which contains more than 24 million bibliographic records of biomedical and life science journal articles published since 1946. The MeSH includes a comprehensive controlled vocabulary of hierarchical structure used to index journal articles in MEDLINE and facilitate searching.<sup>11,12</sup> In the MeSH system, there is one distinct category of volunteers and two subcategories, hospital volunteers and healthy volunteers. The descriptor “volunteers” was introduced into MeSH in 1968 and is defined as “persons who donate their services”;<sup>13</sup> “hospital volunteers” was entered in 1966 with the definition “individuals who donate their services to the hospital”;<sup>14</sup> and “healthy volunteers” was introduced in 2014 and is defined as “persons with no known significant health problems who are recruited to participate in research to test a new drug, device, or intervention as controls for a patient group”.<sup>15</sup>

### Study design

We downloaded records of publications indexed with the MeSH descriptor “volunteers”; we excluded those indexed with “healthy volunteers” because the latter are mainly oriented toward clinical trials. To focus on full research papers, we restricted the records to journal articles with abstracts. The search results were saved as a text file in MEDLINE format and converted into the entity–attribute–value (EAV) structure for subsequent data processing.<sup>16</sup> The entity stood for the PMID of a paper, the attribute for the MEDLINE element (tag), and the value for the data. For instance, for a paper with a PMID 24901841,<sup>6</sup> the EAV structure for the title was “24901841 [tab] TI [tab] Hospice palliative care volunteers: the benefits for patients, family caregivers, and the volunteers.”

In addition to the annual trend in publications, we analyzed the distributions of journals, article categories, languages, authors, and countries of publication. Although MEDLINE began to index each author's full name in 2002, not all original publications listed the author's full name.<sup>17,18</sup> In calculating the article count for each author, we used only the surname plus the initials of the first name to designate an author. For the most prolific authors, we looked up the full author name of each paper, to address name ambiguity (i.e., different authors with the same surname and first name initials) and to further determine their affiliations from recent publications. For journals that published more than 15 articles on volunteering, we retrieved the impact factors from InCites Journal Citation Reports.<sup>19</sup> We also analyzed the category of journals according to broad subject term. For each journal indexed in MEDLINE, the NLM assigns one or more broad subject terms, such as public health, health services, and nursing, to describe the journal's overall scope. There are 125 broad subject terms that are also valid MeSH headings.<sup>20</sup> The number of journals in each category of MEDLINE were also retrieved for comparison.

### Data processing and statistical analysis

We used the Perl (<https://www.perl.org/>) scripts to convert the data and for data calculation. The results are presented using descriptive statistics, e.g., frequency and percentage.

## Results

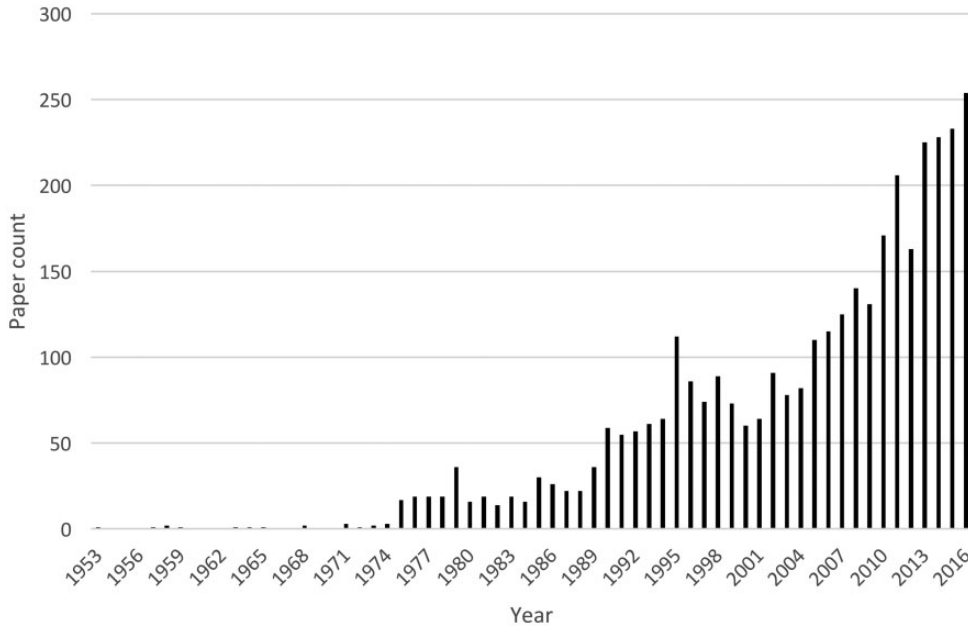
Initially, we identified 10,115 records in a search on April 21, 2018. We then restricted the publication type to journal articles with abstracts and retrieved 3724 articles, among which 3555 articles were published before the end of 2016. The earliest indexed article

was published in 1953. The annual number of publications on volunteering research peaked in 2016, with 254 articles (Figure 1).

Among 1283 journals with studies of volunteering published from 1953 to 2016, only 51 journals had published 10 or more articles; 91 journals had published 5 to 9 articles, and 1141 journals had published fewer than 5 articles. The *American Journal of Hospice and Palliative Care* published the most articles ( $n = 64$ ), accounting for 1.8% of the 3555 articles, followed by *Social Science & Medicine* ( $n = 47$ ) (Table 1). When we further narrowed the calculation to the previous 10 years (2007–2016), 793 journals had published 1876 articles, equal to 52.8% of all articles on volunteering indexed in MEDLINE. The *American Journal of Hospice and Palliative Care* still ranked first with 43 articles, followed by *Gerontologist* and *PLoS ONE* (24 each). *Academic Medicine* has the highest journal impact factor (5.25) among the journals publishing more than 15 volunteering articles.

The overwhelming majority of articles were written in English (3382 articles, 95.1%). More than half of articles (1883 articles, 53.0%) were published in the United States, followed by 927 in England (26.1%) and 116 articles in The Netherlands (3.3%). Japan (56 articles, 1.6%) ranked seventh among all countries and first among countries other than those in North America and Europe. When broad subject terms were used to categorize journals, 110 specialties were identified among the 1283 journals. Among the 3555 volunteering articles, 424 (11.9%) were published in 106 “public health” journals, followed by 388 (10.9%) in 150 “nursing” journals and 306 (8.6%) in 80 “health services” journals (Table 2).

There were 14 subcategories of “volunteers” and 13 subcategories of “hospital volunteers” (Table 3). “Hospital volunteers” did not include the subcategory “manpower”. Of the 3555 articles, 3406 were indexed with the category volunteers and 153 with the



**Figure 1.** Publications of volunteer-related research from 1953 to 2016.

category hospital volunteers. A total 1409 articles (39.9%) were indexed with subcategories of volunteers and 75 (2.1%) with subcategories of hospital volunteers. Most articles with subcategories were related to psychology (683 articles).

There were 10,853 authors among the 3555 articles. Most (90.0%,  $n = 9765$ ) authors had published 1 article, followed by those who had published 2 to 5 articles (9.7%,  $n = 1058$ ) and those who had published 6 to 10 articles (0.2%,  $n = 22$ ). Only 8 authors published more than 10 articles; the full names of these authors and their affiliations are found in Table 4. The most prolific author was Stephen Claxton-Oldfield with the Department of Psychology at Mount Allison University in Canada.

## Discussion

In the current study, first, we found that the annual number of publications in biomedical areas regarding volunteering has increased

with time, especially in the past decade. Second, we found that volunteering articles have been published in journals with diverse specialties. Third, journals of public health, nursing, and health services are more likely to publish volunteering articles. Fourth, the largest proportion of articles have been related to psychology. Finally, the most prolific authors were in the US and Canada.

The increase in the annual number of publications on volunteering might indicate that research interest is growing regarding volunteering in biomedical areas. The coverage of journals in MEDLINE might also have a substantial role. According to the U.S. NLM, only 2241 journals comprising 151,635 articles were indexed in MEDLINE during fiscal year 1965. Fifty-one years later, 5623 journals with 869,666 articles were indexed during fiscal year 2016.<sup>21</sup> Nevertheless, it remains uncertain how the accuracy and comprehensiveness of indexing practices in different years influences the calculation of published volunteering articles.

**Table 1.** Journals publishing more than 15 volunteer-related articles between 1953 and 2016.

| Journal   | Subject category                   | No. articles<br>1953–2016<br>(N = 3555)<br>n (%) | No. articles<br>2007–2016<br>(N = 1876)<br>n (%) | Journal<br>impact<br>factor |
|---|------------------------------------|--|--|-----------------------------|
| <i>American Journal of Hospice &amp; Palliative Care</i>                          | Palliative care                    | 64 (1.8)   | 43 (2.3)   | 1.28                        |
| <i>Social Science &amp; Medicine</i> (1982)                                       | Health services                    | 47 (1.3)   | 20 (1.1)   | 2.79                        |
| <i>Gerontologist</i>  | Social sciences                    |  |  |                             |
|   | Geriatrics                         | 41 (1.2)   | 24 (1.3)   | 3.50                        |
| <i>The Journals of Gerontology. Series b</i>                                      | Geriatrics                         | 33 (0.9)   | 22 (1.2)   | 3.06                        |
| <i>Psychological Sciences and Social Sciences</i>                                 | Psychology                         |  |  |                             |
|   | Social sciences                    |  |  |                             |
| <i>Resuscitation</i>  | Emergency medicine                 | 28 (0.8)   | 12 (0.6)   | 5.23                        |
| <i>The Journal of Volunteer Administration</i> <sup>†</sup>                       | NA                                 | 27 (0.8)   | 0 (0)  | –                           |
| <i>Caring: National Association for Home Care Magazine</i> <sup>†</sup>           | Health services                    | 26 (0.7)   | 0 (0)  | –                           |
| <i>International Journal of Aging &amp; Human Development</i>                     | Geriatrics                         | 26 (0.7)   | 12 (0.6)   | 0.66                        |
| <i>Nursing Standard</i> (Royal College of Nursing (Great Britain): 1987)          | Nursing                            | 26 (0.7)   | 23 (1.2)   | –                           |
| <i>PLoS ONE</i>   | Medicine                           | 24 (0.7)   | 24 (1.3)   | 2.80                        |
|   | Science                            |  |  |                             |
| <i>Journal of Dental Education</i>  | Dentistry                          | 22 (0.6)   | 14 (0.7)   | 0.92                        |
|   | Education                          |  |  |                             |
| <i>Transfusion</i>  | Hematology                         | 21 (0.6)   | 11 (0.6)   | 3.38                        |
| <i>American Journal of Public Health</i>  | Public health                      | 19 (0.5)   | 4 (0.2)  | 3.85                        |
| <i>Journal of the American College of Dentists</i>                                | Dentistry                          | 19 (0.5)   | 13 (0.7)   | –                           |
| <i>AIDS Care</i>  | Acquired immunodeficiency syndrome | 17 (0.5)   | 8 (0.4)  | 1.82                        |
| <i>American Journal of Community Psychology</i>                                   | Psychology                         | 17 (0.5)   | 2 (0.1)  | 2.10                        |
| <i>Disaster Medicine and Public Health preparedness</i>                           | Disaster medicine                  | 17 (0.5)   | 17 (0.9)   | 1.35                        |
|   | Public health                      |  |  |                             |
| <i>European Journal of Clinical Pharmacology</i>                                  | Drug therapy                       | 17 (0.5)   | 0 (0)  | 2.90                        |
|   | Pharmacology                       |  |  |                             |
| <i>Journal of Community Health</i>  | Public health                      | 17 (0.5)   | 12 (0.6)   | 1.38                        |
| <i>Academic Medicine: Journal of the Association of American Medical Colleges</i> | Education                          | 16 (0.5)   | 7 (0.4)  | 5.25                        |
| <i>BMC Health Services Research</i>   | Health services research           | 16 (0.5)   | 16 (0.9)   | 1.82                        |
| <i>BMC Public Health</i>  | Public health                      | 16 (0.5)   | 14 (0.7)   | 2.26                        |
| <i>Journal of Social Psychology</i>   | Psychology                         | 16 (0.5)   | 10 (0.5)   | 0.84                        |

<sup>†</sup>Not currently indexed for MEDLINE.

**Table 2.** Top 10 Broad Subject Terms for Indexed Journals publishing research on volunteering.

| Broad Subject Terms for Indexed Journals <sup>†</sup> | No. articles, n (%)<br>(N = 3555) | No. journals in current study, n (%)<br>(N = 1283) | No. journals in MEDLINE, n (%)<br>(N = 5235) <sup>‡</sup> |
|---|-----------------------------------|--|---|
| Public health   | 424 (11.9)                        | 106 (8.3)  | 375 (7.2)   |
| Nursing   | 388 (10.9)                        | 150 (11.7)   | 774 (14.8)  |
| Health services                                       | 306 (8.6)                         | 80 (6.2)   | 306 (5.8)   |
| Geriatrics  | 268 (7.5)                         | 44 (3.4)   | 113 (2.2)   |
| Medicine  | 248 (7.0)                         | 113 (8.8)  | 859 (16.4)  |
| Psychology  | 242 (6.8)                         | 66 (5.1)   | 276 (5.3)   |
| Social sciences                                       | 183 (5.1)                         | 36 (2.8)   | 105 (2.0)   |
| Psychiatry  | 148 (4.2)                         | 69 (5.4)   | 343 (6.6)   |
| Palliative care                                       | 145 (4.1)                         | 15 (1.2)   | 20 (0.4)  |
| Education   | 133 (3.7)                         | 34 (2.7)   | 87 (1.7)  |

<sup>†</sup>A journal in MEDLINE may be indexed with more than two broad subject terms at the same time; e.g., “Social Science & Medicine” is indexed as “Health Services” and “Social Sciences”. Therefore, the percentages shown in this table are likely overestimated.

<sup>‡</sup>From [https://www.nlm.nih.gov/bsd/num\\_titles.html](https://www.nlm.nih.gov/bsd/num_titles.html), accessed on May 6, 2018.

**Table 3.** Distribution of “volunteers” subcategories according to MeSH subheadings.

| Subcategory                   | No. articles under “volunteers” | No. articles under “hospital volunteers” | Total, n (%)<br>(N = 3555) <sup>†</sup> |
|-------------------------------|---------------------------------|--|---|
| Psychology                    | 673                             | 10                                       | 683 (19.2)                              |
| Education                     | 314                             | 14                                       | 328 (9.2)                               |
| Organization & administration | 188                             | 17                                       | 205 (5.8)                               |
| Statistics & numerical data   | 154                             | 5  | 159 (4.5)                               |
| Legislation & jurisprudence   | 27                              | 4  | 31 (0.9)                                |
| Utilization                   | 17                              | 13                                       | 30 (0.8)                                |
| History                       | 26                              | 0  | 26 (0.7)                                |
| Classification                | 6                               | 1  | 7 (0.2)                                 |
| Supply & distribution         | 1                               | 3  | 4 (0.1)                                 |
| Economics                     | 1                               | 3  | 4 (0.1)                                 |
| Trends                        | 0                               | 3  | 3 (0.1)                                 |
| Standards                     | 1                               | 2  | 3 (0.1)                                 |
| Manpower                      | 1                               | -  | 1 (< 0.1)                               |
| Ethics                        | 0                               | 0  | 0                                       |

<sup>†</sup>An article in MEDLINE may be indexed with more than two MeSH subheadings at the same time. Therefore, the percentages shown in this table are likely overestimated.

However, although the annual number of volunteering articles has increased, the total number is relatively small compared with the number of articles published in other specialties. For example, the total number of publications in PubMed in 2016 was more than

1,200,000, but the number of volunteer-related articles was only 254.

Of the 23 journals that have published more than 15 volunteering articles, only 1 is a mega journal, *PLoS ONE*.<sup>22</sup> A mega journal is characterized by its broad scope,

**Table 4.** Authors publishing more than 10 studies on volunteering from 1953 to 2016.

| Author                   | No. articles | Affiliation  |
|--------------------------|--------------|--|
| Stephen Claxton-Oldfield | 23           | Department of Psychology, Mount Allison University, Sackville, New Brunswick, Canada   |
| Linda P. Fried           | 18           | Mailman School of Public Health, Columbia University, New York, NY, USA  |
| Michelle C. Carlson      | 15           | Department of Mental Health, Johns Hopkins University, Bloomberg School of Public Health, Baltimore, MD, USA                                 |
| Jane Claxton-Oldfield    | 13           | Department of Psychology, Mount Allison University, Sackville, New Brunswick, Canada   |
| Stuart M. McGill         | 13           | Department of Kinesiology, University of Waterloo, Waterloo, Ontario, Canada   |
| George W. Rebok          | 13           | Department of Mental Health, Bloomberg School of Public Health, and Center on Aging and Health, Johns Hopkins University, Baltimore, MD, USA |
| Nancy Morrow-Howell      | 11           | Brown School of Social Work, Washington University, St. Louis, MO, USA   |
| Morris Alan Okun         | 11           | Department of Psychology, Arizona State University, Tempe, AZ, USA   |

open access with payment made by the authors, and a large publication volume each year.<sup>23–25</sup> Although mega journals are usually multidisciplinary, they are not chosen very frequently by authors of volunteering studies as journals in which they wish to publish. In addition, of the above 23 journals, the *Journal of Volunteer Administration* (renamed the *International Journal of Volunteer Administration*) was the only journal fully dedicated to volunteering; however, this journal has not been indexed in MEDLINE since 1997. This might be one reason for the diversity of journals that publish volunteering research studies. However, it remains uncertain whether the publication of volunteering articles in a variety journals is an obstacle to researchers during article submission.

That volunteering articles were most frequently published in journals of public health, nursing, and health services might be related to the nature of volunteer work.<sup>26,27</sup> However, the number of publications might be influenced by the number of journals in these subject categories. A total

of 1455 journals in public health, nursing, and health services are currently indexed in MEDLINE. In contrast, although only 20 journals of palliative care are indexed in MEDLINE, the number of volunteering articles published in these journals ranked ninth among all subject categories.

In research into volunteering, psychology is the most prevalent issue. The timeline of indexing might lead to underestimation of the number of articles in each subcategory. For instance, the earliest article on volunteering was published in 1953,<sup>28</sup> but the subcategory “volunteers/psychology” was established in 1978.<sup>29</sup> Psychological studies deal with a wide range of topics, such as motivation among different groups, stress while volunteering, and psychological rewards from volunteering.<sup>30–33</sup> However, training volunteers to help people who have a psychological problem is another important aspect.<sup>34–36</sup>

Although international volunteering has become increasingly popular in recent years,<sup>37</sup> most volunteering work remains community-based service<sup>38</sup> and studies are

most likely published in domestic journals in the local language.<sup>39–41</sup> Because local journals outside North America are usually not indexed in MEDLINE, the number of prolific authors on volunteering outside the US and Canada might be underestimated.

## Conclusions

Research interest regarding volunteering in biomedical areas has been growing in recent decades. Volunteering articles have been published in journals of various specialties, showing the diversity of volunteer issues. However, the total number of publications regarding volunteering is relatively small compared with the number of publications in other specialties. As volunteers play an important role in current medical practice, volunteering research deserves greater attention.

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## Author's contributions

Bo-Ren Cheng and Tzeng-Ji Chen conceived and designed the study. Bo-Ren Cheng and Tzeng-Ji Chen computed the original data; Bo-Ren Cheng, Hsiao-Ting Chang, Ming-Hwai Lin, Li-Fang Chou, and Shinn-Jang Hwang analyzed the data; Bo-Ren Cheng wrote the paper; Tzeng-Ji Chen revised the manuscript.

## Declaration of conflicting interest

The authors declare that there is no conflict of interest.

## Ethics and consent statement

There were no animals or humans involved in this study.

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