The Bibliometric Analysis of the Worldwide Research in Forensic Nursing and Forensic Midwifery

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ABSTRACT

As the first responders to forensic cases, nurses and midwives have vital roles in conducting initial interview, physical examination, collecting and recording evidence and maintaining chain of custody. This study aims to map out the evolution of the fields of forensic nursing and forensic midwifery by focusing on the trend topics, the most active journals, top cited authors and publications, author productivity, productive organizations, journals, and countries of collaboration through bibliometric approach. To achieve this aim, we reviewed article title, abstract and keyword categories of Scopus Database using the phrase, «forensic» and «nursing» or «midwifery» and found a total of 2243 publications for the years between 1972 and 2022. As the midwifery publications in the literature are indexed within the «nursing» field, we restricted the research to «nursing» field and found 1385 publications. After removing duplications, we analyzed 1332 research and conducted visualization through ‘VosViewer’ and ‘R biblioshiny’ programmes. Best to our knowledge, this is the first bibliometric analysis which contributes to the related literature and to forensic scientists.

Keywords: forensic nursing; midwifery; bibliometric analysis

INTRODUCTION

Forensic science can be defined as the investigation of any psychological and physical damage caused by intentional, negligent, or imprudent behaviors (Düzgün et al., 2020). According to the International Association of Forensic Nurses, forensic nursing involves the analysis of acts of violence and traumas by using nursing techniques. Forensic nursing is regarded as an area of expertise (Fırat et al. 2016) and has close ties with forensic midwifery (Sadıç & Alparslan, 2021). As the first responders to forensic cases, nurses and midwives have vital roles in conducting the initial interviews, physical examinations, collecting and recording evidence, and maintaining the chain of custody (Aksu & Karaca, 2020). This study aims to do the bibliometric analysis of the research in forensic nursing and forensic midwifery.

Previously known as ‘statistical biography’, bibliometric analysis is a statistical method used for the analyses of documents. This method helps to obtain quantitative information regarding the writer, subject, keyword, location of publication and citation index in specific fields and time periods (Akbulut, 2020). Also called as scientific mapping, bibliometric analysis aims to clarify the current scientific output (Demir & Erigüç, 2018). The Impact Factor (IF), the Normalized Impact per Source by Source (SNIP), and the SCImago Journal Rank (SJR), which demonstrate the citations received from prestigious journals, can be added to these analyses (Vanclay, 2021; Asan, 2010; Demir and Erigüç, 2018). Using the citation relations, VosViewer is among the programs preferred for bibliometric mapping (Van Eck & Waltman, 2010; Kokol et al., 2021; Zan, 2019). Also used for bibliometric analyses, the Bibliometrix and Biblioshiny are open-source packages used within the R language environment, which can be defined as a tool for statistical computing. While Bibliometrix allows completing the scientific literature analysis and data process, Biblioshiny captures the core Bibliometrix code and creates an online data analysis framework (Aria & Cuccurullo, 2017). Biblioshiny enables users to perform bibliometric and visual analysis based on an interactive web interface. By providing visual results, we focused on giving an opinion regarding the research trends, evaluating the current state of publications, institutions and countries, and determining the possible avenues for future research. In other words, we aimed to give an insight into the frequently studied and understudied issues and the journals which may be referred as a guide in the fields of forensic nursing and midwifery.
METHOD

We designed research methodology to conduct bibliometric analysis of the publications in forensic nursing and forensic midwifery. We preferred the multidisciplinary Scopus database in the analyses as this database has a broader coverage in comparison with other databases (Powell & Peterson, 2017; Mongeon & Paul-Hus, 2016). We accessed Scopus database, which covers data from 1972 regarding forensic nursing, from Tokat Gaziosmanpaşa University library on 21 July 2022. We made the search under the categories of ‘article title, abstract, keyword’ and with the keywords «forensic» and «nursing» or «midwifery». Having no temporal limitation, this process helped to find a total of 2243 publications for the years between 1972 and 2022. As we searched the literature on midwifery within the scope of ‘nursing’, we narrowed the subject area to ‘nursing’. After searching all types of resources in Scopus database, we found 1385 publications and following to the removal of 53 duplicate records through Mendeley, we included a total of 1332 publications in the analysis (Table 1). Table 1 provides the strategy for the search and the results.

Table 1. Search Strategy in Scopus Database in the field of Forensic Nursing

<table>
<thead>
<tr>
<th>Type</th>
<th>Criteria</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database</td>
<td>Scopus</td>
<td></td>
</tr>
<tr>
<td>Search string</td>
<td>(TITLE-ABS-KEY (forensic) AND TITLE-ABS-KEY (nursing) OR TITLE-ABS-KEY (midwifery))</td>
<td>2243</td>
</tr>
<tr>
<td>Subject area</td>
<td>(TITLE-ABS-KEY (forensic) AND TITLE-ABS-KEY (nursing) OR TITLE-ABS-KEY (midwifery)) AND (LIMIT-TO (SUBJAREA, &quot;NURS&quot;))</td>
<td>1385</td>
</tr>
<tr>
<td>Time span</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>Document Type</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>Source of the</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>Search date</td>
<td>July 21, 2022</td>
<td></td>
</tr>
<tr>
<td>Duplications</td>
<td>July 21, 2022</td>
<td>53</td>
</tr>
<tr>
<td>TOTAL Documents</td>
<td>1332</td>
<td></td>
</tr>
</tbody>
</table>

We analysed the publication dates, journals’ yearly IF, SNIP and SJR values, the variation in the journals’ publication numbers in years, number of citations, the rate of published review articles, the most published subjects, the most prolific researchers, the most supportive institutions, and countries with the highest number of publications with bibliometric method. Together with the VosViewer, an effective program for the visualization of bibliometric research, (Van Eck & Waltman, 2010; Kokol et al., 2021; Zan, 2019) we used “The biblioshiny for bibliometrix”, which is a tool for R program, (Aria & Cuccurullo, 2017). Whilst we used the VosViewer (Version 1.6.18) to prepare co-occurrence network maps, we used Bibliometrix (Version 4.2.1) to visualize the outcomes of the evaluations of Lotka law, Bradford law, keyword cloud and thematic evolution.

RESULT

Development of Publications

Table 2 shows the information related to the publications in forensic nursing and midwifery. As demonstrated in Table 2, there were 1332 publications in 179 sources between the years of 1972 and 2022. While 998 and 149 publications were respectively research and review articles, 1332 publications were produced by 2271 researchers and the average citations per document was 8.04. While 584 (25.71%) of these researchers published their work as single-authored documents, 1687 (74.29%) of these researchers produced their work as multi-authored documents. The value of the co-authors per document was 2.36 (Table 2).
Table 2. Basic Information about the Publications in the field of Forensic Nursing

<table>
<thead>
<tr>
<th>Description</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAIN INFORMATION ABOUT DATA</strong></td>
<td></td>
</tr>
<tr>
<td>Timespan</td>
<td>1972:2022</td>
</tr>
<tr>
<td>Sources (Journals, Books, etc)</td>
<td>179</td>
</tr>
<tr>
<td>Documents</td>
<td>1332</td>
</tr>
<tr>
<td>Average citations per document</td>
<td>8.04</td>
</tr>
<tr>
<td><strong>AUTHORS COLLABORATION</strong></td>
<td></td>
</tr>
<tr>
<td>Authors</td>
<td>2271</td>
</tr>
<tr>
<td>Authors of single-authored documents</td>
<td>584</td>
</tr>
<tr>
<td>Authors of multi-authored documents</td>
<td>1,687</td>
</tr>
<tr>
<td>Co-Authors per document</td>
<td>2.36</td>
</tr>
<tr>
<td><strong>DOCUMENT TYPES</strong></td>
<td></td>
</tr>
<tr>
<td>Article</td>
<td>998</td>
</tr>
<tr>
<td>Review</td>
<td>149</td>
</tr>
<tr>
<td>Other (Book, editorial, conference paper etc.)</td>
<td>185</td>
</tr>
</tbody>
</table>

The first document in forensic nursing field was published in 1972 in ‘Nursing Times’, which was the sole journal until 1990. From 1972 to 1990, 11 articles were published in Nursing Times. During the 90’s, Soins Psychiatrie and Journal of Psychiatric and Mental Health Nursing emerged as the new journals. While the former contributed to the field with one article in 1991, the latter contributed to the field with five articles in 1995. International Journal of Mental Health Nursing and Journal of Forensic Nursing respectively contributed to the field with 2 and 21 articles in 2002 and 2005. Since its first publication in 2005, Journal of Forensic Nursing proved to be the most active journal with 421 publications (Figure 1).

Figure 1. The Documents per year by source in the field of Forensic Nursing

**Journal Metrics**

Table 3 gives the names and metrics of the five journals having most of the publications in 2021. With reference to CiteScore (IF), International Journal of Mental Health Nursing had a high value in contrast with the Nursing Times, which had no IF value after 2018 (Table 3, Figure 2). International Journal of Mental Health Nursing had the highest IF value (5.4), SNIP value (1.570) and SJR value (0.937) (Table 3). As to the number of review articles, Journal of Psychiatric and Mental Health Nursing had the highest percentage (16.30%) (Table 3). Between the years of 1996 and 2017, Nursing Times had the highest number of publications (Figure 3). Nursing Times also had the highest number of citations until the year of 2006 (Figure 4). While Journal of Psychiatric and Mental Health Nursing had the highest citations from 2006 to 2021, International Journal of Mental Health Nursing had the highest citations as of 2021 (Figure 4).
<table>
<thead>
<tr>
<th>Name of the Journal</th>
<th>The Most Current Publication Date</th>
<th>Number of Publication</th>
<th>IF</th>
<th>SNIP</th>
<th>SJR</th>
<th>Number of Citations</th>
<th>Review Articles Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal of Forensic Nursing</td>
<td>2021</td>
<td>421</td>
<td>1.2</td>
<td>0.759</td>
<td>0.387</td>
<td>504</td>
<td>4.76</td>
</tr>
<tr>
<td>Journal of Psychiatric and Mental Health Nursing</td>
<td>2021</td>
<td>98</td>
<td>3.1</td>
<td>1.154</td>
<td>0.552</td>
<td>3670</td>
<td>16.30</td>
</tr>
<tr>
<td>Soins Psychiatrie</td>
<td>2021</td>
<td>84</td>
<td>0.3</td>
<td>0.383</td>
<td>0.235</td>
<td>73</td>
<td>6.25</td>
</tr>
<tr>
<td>International Journal of Mental Health Nursing</td>
<td>2021</td>
<td>69</td>
<td>5.4</td>
<td>1.570</td>
<td>0.937</td>
<td>3910</td>
<td>12.84</td>
</tr>
<tr>
<td>Nursing Times*</td>
<td>2018</td>
<td>63</td>
<td>0.5</td>
<td>0.366</td>
<td>0.138</td>
<td>774</td>
<td>0</td>
</tr>
</tbody>
</table>

*As the last IF value of the Nursing Times belongs to the year of 2018, the remaining metrics are also given according to the year of 2018.

Figure 2. The Citescore Publication by year in the field of Forensic Nursing

Figure 3. The Source Documents by year in the field of Forensic Nursing
Number of Citations and Active Authors, Institutions and Countries

The analyses indicated that Peternelj-Taylor is the most productive author (48 documents) (Figure 5), the University of Saskatchewan is the most supportive institution (52 documents) (Figure 6), the United States has the highest number of publications (473 documents) (Figure 7), and the original research article is the most prevalent type of publication (998 documents) (Figure 8). Regarding the geographical location, we observed that the countries located in Northern America (The US, Canada) and Europe (The UK) is the most productive. With respect to citations, Beck’s article, published in the Archives Psychiatric Nursing Journal in 2011, attracted attention with 235 citations, which was the highest global number of citations (Figure 9). In this article, Beck underlined the secondary traumatic stress incurred by forensic nurses (Beck, 2011). Omalu’s articles, published in the Journal of Forensic Nursing in 2010, achieved the second (185) and third (119) highest citations (Figure 9).
Figure 6. The Documents by Affiliation in the field of Forensic Nursing

Figure 7. The Documents by Country or Territory in the field of Forensic Nursing
Keywords

By using the keywords, this study produced a network visualization map which involves the cluster of collaboration with seven different colours. In the network maps prepared with VosViewer, the size of circles is in direct proportion to the examined characteristic. Thickness of the lines and the colours respectively indicate the strength and cluster of collaboration. The green cluster with the ‘forensic nursing’ headline was the biggest one indicating the high number of studies (Figure 10). In a similar manner, the keyword cloud formed with the Bibiometrix demonstrated that the most frequently used keyword was “forensic nursing” (n=213) (Figure 10). We observed that the second most repeated keyword was “sexual assault” (n=66). The cluster of keywords shows that the researchers need to employ a multidisciplinary approach. Given as a part of Figure 10, the frequency table makes both the cluster of keywords and word cloud more understandable.
Figure 10. The Visual of Keywords in the field of Forensic Nursing

Collaboration between the countries

In the Vosiewer analyses, we observed 18 countries and five different clusters (or colours) of collaboration of countries. The green cluster showed that the highest rate of collaboration on forensic nursing and midwifery was between the United States and Canada (Figure 11). While the collaboration between the United Kingdom and Australia ranked second, the collaboration between France, Norway and Netherlands ranked third. In the data obtained from the Bibliometrix, while the blue colour from light to dark indicates the increasing number of publications of countries, the thickness of pink colour represents the direction and intensity of the collaboration between countries. As seen in Figure 11, the publication productivity of USA, Australia, New Zealand and United Kingdom is noteworthy and the collaboration between the United Kingdom-Australia and USA-Canada is remarkable.
Thematic Analysis

Sankey diagram depicts the evolutionary pathways of themes and how the cluster of themes interacts with each other (Figure 12). In this diagram, we illustrated the themes with nodes, blocs and rectangles. The nodes were labelled with the most repeated keywords in a specific time period and the nodes’ dimensions were in direct proportion to the number of keywords. The width of nodes equals to the number of interrelated themes. The flow between the nodes shows how the themes have evolved and increased in time.
We divided the time period into two due to the distinct increase in the number of publications after 2010. While we grouped the research between 1972 and 2010—the first time period—under three themes, we grouped the research under four themes between 2011 and 2022—the second time period. The ‘human’ theme, which had a great volume in the first time period, proved to be a resource for the research themes in the second time period. The theme, “forensic medicine” in the first period, has evolved into the theme, “forensic nursing”, in the second period and it seems that the forensic nursing theme, non-existent in the first period, nourished from the first period themes of “human” and “forensic medicine”. We observed that the “forensic psychiatry” theme is divided into “forensic psychiatry” and “female” themes in the second period and the ‘female’ theme, non-existent in the first period, nourished from the first period themes of “human” and “forensic psychiatry” (Figure 12).

**Thematic Evolutionary Analysis of Research Themes**

The thematic maps in Figures 13 and 14 depict the development and thematic evolutionary analysis of the research themes on forensic nursing and midwifery. In these maps, we defined four types of themes in view of the Callon’s centrality and density. While the Callon’s centrality is a measure of the importance of a subject, Callon’s density is associated with the development and evolution of a subject (Aria et al., 2020).
We divided the thematic map into four parts as follows; (Cobo et al., 2011; Nasir et al., 2020):
1. The themes in the upper right quadrant (Motor); Developed and vital for the configuration of research.
2. The themes in the lower right quadrant (Basic); Important for research but not developed.
3. The themes in the upper left quadrant (Niche); Important for the development of research themes but not developed enough.
4. The themes in the lower left quadrant (Emerging or declining); Underdeveloped and not important for the research themes.

The upper right quadrant involves motor themes which are developed and have high centrality and high density. In this study, the upper right quadrant was empty; however, having high centrality and low density, the themes of “Forensic psychiatry, psychiatric nursing ve psychoogical aspect” laid right between the ‘Motor Theme’ and ‘Niche Theme’ quadrants. The Basic Theme involves general themes and this theme is open to development. As seen in lower right quadrant of Figure 4, basic theme included the titles of ‘human’, ‘humans’ and ‘article’. Right in the middle of upper and lower left quadrants, we observed Niche and Emerging/eclining themes of ‘forensic medicine’, ‘united states’ and ‘methodology’. These themes had high density and low centrality (Figure 13).

There are distinct differences between the first (1972-2010) and the second periods (2011-2022) due to the emergence of different themes in the latter (Figure 14). While we observed nine themes and three clusters in the first period, we encountered fifteen themes and five clusters in the second period. This appears to be another basis for the use of multidisciplinary approach in forensic research. Although the motor themes are empty in both periods, we observe the themes of ‘female’, ‘adult’ and ‘article’ in the second period with high density and low centrality. While the theme, ‘article’ laid within the basic themes in the first period, this theme is placed together with the ‘female’ and ‘adult’ themes in the second period. In comparison with the first period, the second period’s lower right quadrant involved the ‘nurse’ theme with higher centrality. The second period demonstrated that the themes, ‘forensic nursing’, ‘nurse’s role’ and ‘nurse attitude’ attracted the researchers’ attention and are placed in the upper left quadrant as developed themes with higher centrality and density. The ‘forensic psychiatry,’ ‘psychiatric nursing’, and ‘psychological aspect’ themes, which laid between the Motor and Niche themes in the first period, are replaced with more specific themes like ‘forensic psychiatry,’ ‘nursing’, and ‘psychiatric nursing’ in the second period.

Figure 15, which involves the three-field plot analysis, shows the nodes of main keywords, authors and name of journals in the middle, left and right parts, respectively. The grey lines refer to the nodes’ connection and evolution. Figure 15 delineates the frequently used keywords and the publication of keywords by the journals. For example, Clement, Burgers, Holmes, Campbell and Mason frequently used the keyword “forensic nursing” and most of the publications...
involving the “Forensic nursing” as keyword were published in "Journal of Forensic Nursing". Similarly, Sheridan Dj, Patterson D and Amar AF mostly used the keyword “nursing” and the publications with this keyword were frequently published in "Journal of Forensic Nursing".

Figure 15. The Three-plot Analysis in the field of Forensic Nursing

Lotka Law

According to Lotka law, for a certain subject and within a specified time period, the number of authors publishing two and three articles equals to the 1/4th and 1/9th of the number of authors publishing a single article and hence the number of authors publishing ‘n’ articles equals to 1/n² of the authors publishing a single article. 60% of all the authors comprise of authors who have just one article (Hertzel, 2003). Figure 16 demonstrates the frequency distribution of scientific productivity. The results of this study do not correspond to the Lotka Law as the percentages of authors publishing one, two and three articles in the field of forensic nursing and forensic midwifery appeared to be 81.8%, 10.3% and 4.1%, respectively.

Figure 16. Lotka Law’s Application in the field of Forensic Nursing
Bradford’s Law

According to the Bradford’s Law, if a bibliography is to be prepared in a specified subject, it will be seen that a small group of core and key journals include 1/3 of all publications (Garfield, 1980). Figure 17 shows that Journal of Forensic Nursing (n=421 publications) and Journal of Psychiatric and Mental Health Nursing (n=98 publications) were the core and key journals in the field of forensic nursing and midwifery. The total number of the publications in these two above-mentioned journals (n=519) consist of the 45.24% of the whole publications in the related journals (n=1147). This finding, which is against the Bradford’s Law, may have stemmed from the lack of authors’ cooperation and the scarcity of journals in the related fields. In conclusion, we can refer the two above-mentioned journals as the primary resources for the research in forensic nursing and midwifery.

![Figure 17](image.png)

**Figure 17.** The Bradford’s Law’s Application in the field of Forensic Nursing

**DISCUSSION**

Bibliometric analysis helps to grasp the overall picture of research in a field. Having quantitative characteristics, bibliometric analysis is useful in comprehending the descriptive features and impact of publications and devising new research strategies (Iftikhar et al., 2019). Although bibliometric analysis was conducted in the fields of midwifery, nursing, obstetrics, forensic medicine, and forensic anthropology (Crookes et al., 2010; Scott et al., 2010; Iftikhar et al., 2019; Demir et al., 2020; Ramakrishnan et al., 2020; Ramirez et al., 2022; Madadin et al., 2022), the literature does not provide any example of bibliometric analysis in the fields of forensic nursing and midwifery. This study, which aimed to fill this gap through the examination of the research published between 1972 and 21st of June 2022 in Scopus Database, investigated the most active journals and these journals’ metrics, the most active authors, universities, countries, collaborative countries, the most frequently used keywords and the change and evolution of themes over time. We expect that this study will be helpful in the recognition of the high-quality studies, journals and trends in the related literature.

The analyses showed that International Journal of Mental Health Nursing had the highest journal metrics (IF, SNIP, SJR) and the highest citation numbers. In respect to number of publications per year, Journal of Forensic Nursing seemed to be at the forefront. We can attribute this result to the scope of this journal which is more specific compared to others. The analyses suggest that Peternelj-Taylor is the most active author and the University of Saskatchewan is the most active institution. While the United States, the United Kingdom, Canada, Australia, France, and Sweden were the most prolific countries in publishing forensic nursing and midwifery research, we can consider Netherlands, New Zealand, Norway and Finland as the emerging regional research hubs. With respect to collaboration, United States and Canada attract attention. Overall, we can deduce that the countries in North America and Europe have a prominent role in research.

The analysis shows that the journals with higher IF, SNIP and SJR values have higher citations. The journals with the highest number of publications appeared to be journals which have specific publication themes. In the forensic nursing
and midwifery research, we can see that the most frequently preferred keyword was ‘forensic nursing’. “Forensic nursing”, laying in the cluster with the highest density, was the most repeated keyword in the keyword cloud. The thematic analysis demonstrates that the concept of ‘forensic nursing’ has evolved in time and became more specific. The concept of “Forensic psychiatry”, on the other hand, has maintained its importance in both time periods. The keyword, ‘forensic nursing’ is mostly used in the research published in the ‘Journal of Forensic Nursing’.

This research used the Lotka Law for determining the authors’ productivity and Bradford’s Law of Scattering for ascertaining the distribution of themes within the journals. As the results of these researches are not in line with these two laws and 75% of all researches consist of original articles, we can say that there is a need for more publications and higher author cooperation in these fields.

This study has several limitations. Firstly, we accessed the documents only through Scopus database and due to the database access date, the analyses involve the documents published before 21st July 2022. Secondly, we searched Scopus database only with the ‘nursing’ subject area as the midwifery publications were indexed within the ‘nursing’ subject area. As scholars underlined, nursing and midwifery fields should be evaluated as separate fields (Sadıç & Alparslan, 2021). Lastly, we may not have accessed several related papers since we conducted the search with certain titles, abstract and keywords.

CONCLUSION

This is the first study providing a holistic evaluation of the articles in the field of forensic nursing and midwifery. This study contributes to literature by outlining the related research in terms of the most prolific authors, the most cooperative institutions, active countries, mostly used keywords and formation and evolution of themes. We expect that this study will provide insights into the future research and be useful to forensic scientists.

REFERENCES


