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Scientific Publishing in the Field of Social Medicine in Slovenia

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1. Introduction

Science is cumulative. Science would not exist without the publication of research results. Publishing the results of scientific research is the basic characteristic of the process of scientific information and communication. The purpose of research in social medicine is to achieve enlightenment necessary for considered and effective health care. Social medicine covers the research of social factors that affect health or disease, examine interactions between medicine and society, and highlight social problems that affect health. Therefore, it is very important to publish results of research in the field of social medicine in an individual country, and by publishing in local scientific publications, enlighten the local professional public. Local experts who are aware of the research results can have more of an impact on the health in individual countries than foreign experts, especially if the studies performed are not the result of international cooperation, but the result of cooperation at the local (state) level. On the other hand, foreign experts and the international community should be reserved for presenting results of research at the international level, particularly at international conferences and congresses.

In a text that summarises the research of scientific communication up to the year 2000, it states that in a technological sense, scientific communication in recent decades has changed considerably due to the use of computers, electronic mail, digital libraries, the World Wide Web and the Internet (Borgman & Furne, 2002). But has this changed the behaviour of people involved in this process of scientific communication? Are we witnesses to revolution or evolution?

Bibliometrics is the exploration of the quantitative aspects of the production and the dissemination of written (scientific) information usage. Bibliometrics measures publications, patents, citations and other potential informative units or their properties, and uses them as the base for factors with which it measures and evaluates research, science and technology (Clarke et al., 2007; Costas et al., 2010; Južnič, 1998; Južnič, 1999; Takahashi-Omoe et al., 2009).

Bibliometrics provides a powerful set of tools and criteria for the study of structures and processes of scientific communication. Citation analysis, the most known bibliometric

method, has not only consolidated its supremacy, but is also developing and using the possibilities offered by digital libraries and links in the world wide web, and is co-shaping webometrics (Mur & Južnič, 2006).

The evaluation of scientific publications is very difficult. The most valid and objective assessment of a work would be the response from a wide group of experts who would obtain the work after its publication and inclusion in the global flow of information. A method, which would contribute to the evaluation of published works, is a citation analysis. The amount of references to an article, as a measure of its quality, has initiated further research of citations. The results of these studies are ideas that the frequency of references to scientific articles can be used as a criterion in their evaluation, as an aid for decision-making in research work management in the evaluation of scientific journals, in the selection of a journal best for publishing an article, and in assessing the success or research work of individuals and groups. We must realise that citation analysis measures only the response a work would trigger in the global scientific community and with it the quality of research work, but not the assessment of the entire activity.

Monitoring and dissemination of scientific achievements is an essential element of any research work. Impact is of crucial importance to scientific publications that in the process of scientific communication publish the results of research. Scientists contribute to this visibility with their publications. The result of the language barrier is the lesser visibility and impact of publications. Therefore, in scientific publishing, English has replaced other languages and has become the international language of scientific communication. The growing pressure of co-financiers on academic and research organisations in assessing their work leads to publication in high-profile international journals and often has the opposite effect on scientific communication in the local language.

The impact of a local scientific journal, which does not lag behind an international journal in terms of quality, in an international area, is possible only if it is concurrently published in English. This maintains professional terminology, enables greater international exposure for the contributors, including greater number of received citations, and according to the criteria of the Slovenian Research Agency (ARRS), higher quality publications. According to the results of analyses, we could expect greater financial support by the agency on local tenders for co-financing publishing of scientific journals, which would provide financial cover for translating articles into English. In Slovenia, it is important to ensure the highest quality of research. Since research work is linked to public funds, it commits researchers to present their results correctly (Demšar & Boh, 2006). The Rules of Indicators and Criteria for Measuring Scientific and Technical Efficiency used by the Co-operative online bibliographic system and services (COBISS) are used for monitoring research results in Slovenia. The system COBISS can monitor research achievements of each individual researcher, allowing us to evaluate their research results. Even though bibliometric indicators, including quoting, never constitute the sole criteria for evaluating the quality of research work, they do play an important part. Therefore it is essential to highlight all of its properties, especially in interdisciplinary areas.

The effort invested by an author in the preparation of a publication, is the same for a publication in an international or a local scientific journal. Regardless of where the research work is actually published, the authors more frequently choose to publish in prestigious

international scientific journals. The reputation criterion for a scientific journal is the citation index. The difference is probably whether publication in a prestigious international journal is really a sign of the publication quality.

2. Scientific communication and publishing

The scientific journal as a medium for the transfer of information was associated with the establishment and operation of the scientific societies in the 17th century. The first scientific journal appeared in Paris in 1665 under the name 'Le Journal des Sçavans' (Scholar's journal). As it said in the first issue, it was meant for those who do not have time to read books, but would nevertheless like to satisfy their desire for erudition. Among other things, the journal also covered anatomy. Three months later in London, the first issue of the scientific journal 'Philosophical Transactions', the newsletter of the Royal Society of London was published. The first authentic medical journal appeared in Paris in January 1679, entitled 'Nouvelles découvertes sur toutes les parties de la médecine' (New discoveries in all fields of medicine). The first English-language medical journal was 'Medicine curiosa: or, a variety of new communications in physick, chirurgery and anatomy', published in 1684. During the 18th century, 10 medical journals were being published, while by the 19th century, this figure rose to 436 titles. 'Lancet', one of the most important general international medical journals, started publication in 1823 and is still being published today. The publishing house Elsevier publishes the journal 'Lancet' once a week. As one of the most important general international medical journals, it publishes, summarises and evaluates achievements in clinical medicine. 'Lancet' is an important weekly journal for general practitioners from around the world. It has a very high impact factor; in 2010 it was 33.6 (25.8 in 2006). The journal publishes only about 5 percent of all received articles. Original articles, scientific reviews, editorials, book reviews, and case reports are published in the journal. In 2000, the independent journal 'Lancet Oncology', which covers the field of oncology, started with publication, a year later, 'Lancet Infectious Diseases' started covering the field of infectious diseases, and finally in 2002, 'Lancet Neurology', which covers the field of neurology began publishing. All three journals have an important place in the field they cover, although at the beginning they only published scientific reviews. All three journals have a high impact factor. In 2010, the journal 'Lancet Oncology' had an impact factor of 17.7 (10.1 in 2006), 'Lancet Infectious Diseases' 16.1 (11.8 in 2006), and 'Lancet Neurology' 21.6 (9.4 in 2006). In 1866, the 'Journal of Anatomy and Physiology' the first specialised journal started with publication (Marušić et al., 1996). For the majority of 300 years, scientific communication developed in the direction technologically determined by printing on paper, until electronic publishing appeared at the end of 20th century.

Over time, science increasingly developed, the number of scientists grew, and with them, the number of scientific publications. A single person (editor) could no longer cope with the selection of publications in a given publication. This led to the introduction of the peer review process. Experts from the specific subject matter the article described gave their views, comments, and reviews. Such reviews helped editors of scientific journals in deciding on the publication and the categorisation of each article. The peer review process has been developed to improve and enhance the quality of scientific information. Reviewing and

evaluation is necessary and beneficial for all those involved in scientific communication, as it helps science develop better and more successfully. Editors choose to work with reviewers from the field covered by the scientific journal. Usually, articles are reviewed by two or three reviewers. Articles that pass through the peer review process are categorised into three basic groups: original scientific article, scientific review paper, and preliminary note. Reviewers assess the quality of the article according to the criteria used by the scientific journal. Their assessment decides whether the article will be published or not. Scientists involved in scientific communication know which scientific journal has higher standards. Publishing a work in such journals is more difficult, but such publication is a guarantee for the high quality of the article, and consequently the impact of the article. This system of peer review provides scientists with access to exemplary scientific information. (Hebrang Grgić, 2004)

Publishing in the field of scientific communication has only really developed after World War II, primarily for natural sciences (Čuk, 2001), with the other scientific disciplines following. Scientific societies are no longer able to follow the great growth and changes in scientific communication, so publishing has continued by publishing houses. Publishers organise the evaluation of scientific articles by peer reviews, they edit and issue journals, and provide for their distribution. A trend of merging is present in publishing due to increased competition and lowering costs. The greater portion of published scientific periodicals is held by a relatively small number of publishers. After merging with the American publisher Harcourt General in 2001, the publisher Reed Elsevier had a 20 percent market share and issued around 1,700 individual scientific journal titles. Merging also increases the profit of publishers, allowing control over the intellectual production of universities in the western world. The contracts that the authors of scientific articles conclude with publishers dictate that these remain at the publishers' disposal another 80 years after their death. Research and studies are funded by universities; scientists research and publish their results and provide peer review of publications, while the copyrights, and thus the earnings are relinquished to the publishers.

In 1958, Dr Eugene Garfield borrowed 500 dollars from the bank and founded the Institute for Scientific Information (ISI) in Philadelphia. Current Contents of Chemical, Pharmaco-Medical & Life Science was their first collection, which included 286 journals. In 1961, on behalf of the National Institutes of Health (the funding body of research work in the world, which funds research in the field of biomedicine), the first citation index - Genetics Citation Index was composed. In 1964, the collection evolved into the Science Citation Index (SCI). The organisation quickly developed. By 1972, a million researchers worldwide were using the database. In 1978, two citation indices were printed, for the field of natural sciences (SCI) and for social sciences (Social Sciences Citation Index - SSCI). Since then, ISI has continuously grown and has remained the concept of documentation in the field of science (Južnič, 1999). In 1997, ISI launched a database with citation indices - Web of Science (WoS), which allows electronic access to the following databases: SCI-Expanded, SSCI, and Arts & Humanities Citation Index (A & HCI). After more than four decades of existence, the ISI database includes more than 16,000 international journals, books, and congress proceedings from the fields of science, social science, and humanities (Testa, 2003).

The online WoS provides access for three citation index databases SCI, SSCI and A & HCI to virtually all researchers. Data from 1970 onwards is included, and the databases are regularly updated. This means that what Adamič (1993) pointed out years ago, that the original purpose of this database, which is a base for citation analysis, is to link articles of related content through citations and allow efficient searching, has even more importance since. Evaluation of the success of a research work was at the time a secondary use, even though today, it is the most common and well known. He also points out that, because of the large differences in citations of articles between individual fields of medicine, it does not make sense to compare the citation of authors, research groups or institutions from different fields. One should only compare two equals. Such a comparison, especially in medicine, is practically impossible in a small country like Slovenia, as we do not have numerous research centres engaged with the same subject. Consequently it is necessary to always view comparisons of an international scope. The citation indices combined in WoS are losing their monopoly and exclusiveness (Scopus, Google Scholar, to name only two of the most famous competing tools), but nevertheless remain of paramount importance as the basis for the data employed in various bibliometric analyses. Especially in view of who their operators are. Elsevier, the largest publisher of scientific journals owns Scopus, which includes over 16,000 scientific journals and covers medicine (it fully covers the Medline database, which WoS does not), chemistry, physics, mathematics, engineering, biotechnology and ecology very well. It even has greater coverage of sociology, psychology and economics than WoS. The current advantage of using WoS rather than Scopus is that it has much more extensive archives, covering a longer period, and includes the arts and humanities. Another advantage of using WoS over Scopus is that it has tradition and, due to the long years of use, is very well established among scientists. Though, it is most likely due to competition that WoS has started to extend its own assortment of journals.

All countries, where the language of publication is not English, have the problem of visibility of their scientific contributions. This is also similar in Croatia, where an analysis was carried out that included 13 journals in the field of biomedicine published in the English language. Six journals were examined that are at the cutting edge of scientific publishing in Croatia. All six journals have been published for at least twenty years and all were published in English prior to 1995. Scopus indexed all six journals even before they started publishing in English in their entirety. After the journals started publishing in English, international visibility (they analysed indices in Medline, Scopus and WoS) was noticeable only with two journals (Croatian Medical Journal and Neurologia Croatica), while only one of the analysed journals (Croatian Medical Journal) managed to increase citation with international visibility. The analysis results showed that changing the publication language brings positive changes, including, international visibility of the journal, an international editorial board, increased publication of foreign authors, all of which are the basis for visibility and the integration of local authors into the global circle of scientific communication. (Pulišelić & Petrak, 2006)

Tensions have arisen among the various participants in scientific communication (Odlyzko, 1997). To ensure their existence, scientists as authors must publish; publishers market their journals and set high prices, while libraries cannot increase their procurement costs, and

scientists as readers are deprived. Yet it is scientists as authors who can decide in which journal to publish their work, their decision affected by the reputation of the journal, which usually has a high price.

Höök (1999) wrote that the increasing number of medical articles is not closely related to the increasing number of scientists in medicine, but in most countries is dependent on the scientific policy. Most doctors in university hospitals publish due to the phenomenon of 'publish or perish'. At times he wonders if there is hope that the flood of scientific information will not suffocate us. All that scientists can do is to raise the quality of scientific publishing. Authors should write and write their articles, and if they discover that they have not written anything new or important, they should rather abandon or bin their work. If scientists in small countries decide to publish their best papers in journals with high impact factors, then the fate of local journals is very grim. The result of not publishing the best articles is the lowering quality of local journals. In the long-term this spells the stagnation of locally published scientific journals.

2.1 Slovenian Journal of Public Health – Zdravstveno Varstvo (ZV)

In June 1962 the first issue of the journal ZV came out, as a professional newsletter with a clear programme: the dissemination of the scientific basis for implementing Slovenian (preventive) health policy and enlightening the wider and primarily the medical professional public with the evaluations, analyses and results of sociomedical research, (Kramberger, 1992).

In 2003, the new editorial board of the ZV set new content objectives. The basic concept of the journal remains the same. The journal discusses public health and primary health care; it encourages the publication of papers on public health issues and the development of public health, particularly in Central and Southeastern Europe. The contributions are divided into two basic categories. The first group of contributions includes editorials, review and research articles and short reports. The other contributions include technical reports, letters to editors and news. Special attention is dedicated to a better peer review process, which is inspired by the criteria that apply in all reputable journals. The most prominent local and foreign experts are invited to participate. They decided that by 2003, the journal will be published concurrently in Slovenian and English. In this way, they wish to continue to cultivate Slovenian professional terminology, but also allow foreign authors to publish contributions in the journal that could be read even by experts who are not familiar with the Slovenian language. From 1962 to 2002, the journal ZV was issued infrequently as a monthly, since 2003, the ZV has recorded regular publication with four issues annually (Švab, 2002).

As the publisher of the ZV, one of the objectives of the National Institute of Public Health is that the journal should be included in the SSCI in the coming years. Indexing in SSCI will show the visibility of the journal ZV, and thus the visibility of the contributions of our authors abroad. To achieve this objective, the following is necessary: the journal must be published in accordance with international standards; the contributions should also be in English and thus accessible to a wider circle of experts; the journal must be accessible over the Internet; it must be published regularly; special attention should be dedicated to a better and stricter peer review process - the most prominent local and foreign experts should be

invited to participate in the evaluation; authors who are already established in the international scientific community should be invited to participate in the editorial committee; authors who are already recognised and have published in journals with impact factors should be invited to write for the journal.

In recent years, a great progress of the ZV has been noticed compared with previous years. This is most likely due to the efforts of the editors and editorial board desiring to increase the quality of the journal with stricter peer review processes and compliance with standards for journal publication. Based on the registration for mass media in 2003 and the annual applications for co-financing the publication of periodicals, the Slovenian Research Agency (ARRS) has been co-financing the publication of the ZV since 2003. The share co-financed by ARRS is quite modest, and does not even cover half the printing costs in one year.

In 2009 the journal ZV was included in the SSCI-Expanded list indexed in WoS, and in 2010 was also included into the CAB Abstracts and Global Health databases.

By raising the quality and increasing the impact of the journal ZV in professional circles, motivation and interest to publish in the ZV will grow among experts in the field of public health. This was also confirmed by the bibliometric analysis for the period 2003-2009 when compared with the analysis results for the period 1992-2003 (Miholič, 2005, 2010). With the inclusion of the ZV into SSCI-Expand, the motivation for local authors to publish is greater, as according to the Rules of Indicators and Criteria for Measuring Scientific and Technical Efficiency, publishing is worth points, which the authors will need for scientific and research success in Slovenia. The more points the authors earn, the higher they rank, and the more chances they have with tenders for co-financing research projects by ARRS. Results of a quantitative analysis of the ZV 2003-2009 showed that, throughout the period analysed, more sources were cited per individual article (26.36) than in the period 1992-2003 (14.17). The share of articles with more than one author was also higher in the period 2003-2009 (between 2.3 and 3.3) than in the period 1992-2003 (between 1.17 and 2.31). Both analyses showed similar results: the predominantly cited material was published in English; articles were the most cited, followed by monographs. Comparative analysis of the periods 1992-2003 and 2003-2009 showed that more material in English was cited in the latter (63%, 78%), more articles were cited (56%, 65%), followed by monographs (33%, 23%). The authors cited mostly newer sources from the last five years (47.7%, 38.4%).

2.2 European Journal of Public Health (EJPH)

The EJPH is a multidisciplinary journal covering the fields of public health, social medicine, epidemiology, research in the field of health care, management, ethics, the law and economics of health care, ecology, and the field of sociology. The EJPH has been indexed in citation indices since 1999 (Table 1). Up to 2004 it was published four times a year, and in 2005 it began publication as a bimonthly journal. The journal publishes original scientific papers, articles covering current topics, book reviews, news, letters to the editor, and event announcements. The journal has a section for discussion and polemics on current topics of public health, especially concerning countries of the European Union. The journal is indexed by the following important databases: CAB Abstracts, CINAHL, Current Contents / Clinical Medicine, EMBASE, PubMed, and Science Citation Index.

year	impact factor
1999	1
2000	1.165
2001	1.152
2002	0.624
2003	1.281
2004	1.051
2005	1.118
2006	1.481
2007	1.91
2008	2.176
2009	2.313
2010	2.267

Table 1. EJPH impact factor

3. Review of the development of social medicine

In the past, medicine was mainly oriented towards the treatment of diseases. It began shaping as a science in the Middle Ages. Little attention was focused on factors that caused disease, and there was neither interest in the social environment and other environments in which man lived, nor in what the implications of disease were for human society, and their impact on human health (Pirc, 1980).

During the middle of the 19th century, medicine began to develop primarily as a pure natural science. Disease and health began to be associated with the operation of then discovered biological, chemical and physical factors that affect the human body and act in it. At that time, medicine began to ever increasingly focus on the causes of disease. Hygiene, the first science of protecting and improving health, appeared and deliberately started to discover the role of social environments. The activity occupied with the effects of hygiene, preventive medicine, and public health increasingly established itself and soon independently evolved into social medicine that began to explore the aetiological role of socioeconomic and educational conditions in which man lives, in the development of disease. Consequently, medicine became a socionatural science (Pirc, 1980).

Medicine, like any other branch of science and technology, is based on theory. It is perfectly possible to treat people, not being aware of the theory, let alone doubting the theory. Scientific information in medicine is derived from observations or experiments. Thus, in the 20th century, scientific achievements accumulated in natural sciences and medicine, and are still accumulating. Genetics, biochemistry, chemotherapy, surgery, psychoanalysis were all developed. As in all the centuries before, medicine in the 20th century reflected social and political conditions. Poverty, hunger, infectious diseases were all the main issues of health policy. Such conditions were fertile ground for the operation of social models in medicine, which at that time formed from the foundations of modern scientific achievements. According to the principal tasks, medicine is divided into curative medicine (with the objective of treating disease), prevention (aimed at preventing disease), and social medicine (which examines the socioeconomic determinants of health and disease). In Yugoslavia (Urlep, 1992) represented a sociomedical model of health care, thought up by the Croatian

doctor Dr Andrija Štampar during the 1920's. Andrija Štampar based all medical fields related to population health (hygiene, epidemiology, and other) on social medicine and human health. He was the first major proponent of this modern principle. He worked in former Yugoslavia, and was also one of the founders of the World Health Organization (Švab, 2004).

In Slovenia, we quickly followed the trends in preventive medicine by establishing the Central Institute of Hygiene, Ljubljana as early as 1923 (B. Pirc & I. Pirc, 1938), which became the National Institute of Public Health with the extensive network of regional institutions.

The aim of research in social medicine is to achieve enlightenment necessary for efficient and effective health care. Social medicine discusses health and health care based on the findings or results obtained from mass observation (Pirc, 1980). Health care is care for the health and progress of an entire regulated society, and for all social and economic activities that must accept this care as a task for the entire society, with each of them contributing in their field (Pirc, 1980).

3.1 Definition of social medicine

The term 'social medicine' was first used by Jules Guérin in Paris in 1848. Guérin divided social medicine into social physiology, social pathology, social hygiene and social therapy (Jakšič, 1994).

Here are some definitions of social medicine (Pirc, 1980) by the most famous authors in this field of medicine. The first definition is from 1904, formed by the first founder of social medicine, Alfred Grotjahn, and reads: '... as a descriptive science, it is the study of the conditions from which generalisation of the culture of hygiene, of communities, individuals and their descendants who live in local, temporal and social community, is dependent ... as a normative science, it is the study of measures which aim to achieve the generalisation of the culture of hygiene among all individuals and their descendants who live in the local, temporal and social community.'

In 1923, Prof Dr Andrej Štampar in his inaugural lecture as professor of hygiene and social medicine at the Medical Faculty in Zagreb defined social medicine as follows: '... science that deals with the study of interlinked social and pathological conditions in the life of the population, and with the development of measures of a social nature for improving human health.'

In 1962, Radomir Gerič wrote in his book *Social medicine*: 'Social medicine means care by the community, the state, and society as a whole for the health and wellbeing of the entire population. Ultimately, this would mean that social medicine is the same as population health care.'

In 1962, Mervyn Susset and William Watson wrote in the book *Sociology in medicine*: 'Social medicine is thus a complex and important branch of medical science in that it attempts to capture the nature of social processes as well as their relationship complicated with health and disease.'

From these definitions we can summarise that social medicine discusses disease and health from the perspective of society and its functions in health care relative to the social factors

that are present in real social communities and the entire population. It considers in its scientifically founded proposals both the interests of a defined society and the actual possibilities in it.

Everything is changing, so it is important to adapt to new conditions when we try to implement principles such as concern for the social conditions of life, an integrated approach to health care, and the importance of learning. The future must not repeat the past, but must spring from it. Social issues are not only a biological phenomenon, but are linked to the social sciences and culture that emphasise the importance of moral issues (Jakšić, 2004).

4. Bibliometric analysis of the ZV and EJPH

Data from a review of the ZV and EJPH publications were collected from the year 2003 to 2010 inclusive. Throughout the period analysed, the journal ZV was published as a quarterly. In the analysed eight-year period, 32 regular issues of the ZV were reviewed. The analysis included all original and review scientific papers; contributions published as editorials, letters to the editor, reports and necrologies were not included. 164 articles were reviewed in the analysed period. All articles included in the analysis had cited references. On average, 26.36 references were cited per article (Table 2).

During the period from 2003 to 2004, the journal EJPH was published four times a year; from 2005 onwards it was issued as a bimonthly, entirely published in English. In the analysed eight-year period, 44 regular issues or 711 articles were reviewed. All the 711 analysed articles from the EJPH cited references. With 22,080 references listed in the 711 articles, that is an average of 31.05 references per article (Table 2).

Since in Slovenia the Rules of Indicators and Criteria for Measuring Scientific and Technical Efficiency determine that a scientific paper must be at least four pages long, otherwise it is considered a short scientific contribution and is estimated only with 80% points, the analysis only included articles that were comprised of four or more pages.

4.1 Results of the bibliometric analysis of the ZV and EJPH

In the period 2003-2010, a total of 454 authors published 164 articles in the journal ZV. Table 2 shows the number of authors per year of publication and the number of authors per article in each year. Throughout the period analysed for the ZV, the ratio ranged between 2.3 and 3.3. Compared with the ZV analysis for the period 1992-2003 where the ratio ranged between 1.17 and 2.31 (Miholič, 2005), the ratio has increased, reflecting a trend also present in the world (Cronin et al., 2003; Cronin & Franks, 2006); namely, that the authorship of an article belongs to more than one author.

If we compare the results of the ZV with the results of the EJPH, where the ratio varies between 3.89 and 4.78 (in the period 2001-2005, the ratio ranged between 3.4 and 4.55) (Miholič, 2007) and the findings of the Radiology and Oncology analysis (in the period 1992-2001, the ratio ranged between 2.51 and 3.93) (Musek et al., 2003), we can see that multiple authors are present in all journals, which shows that articles not only reflect teamwork on research projects, but also the collaboration of authors from various scientific disciplines.

Multiple authors both increase the credibility of a research work and the possibility of co-financing research projects.

In both the ZV and EJPH journals, the de Solla Price (1971) theory on separating articles into scientific and unscientific utilising the number of citations (scientific articles are those with between 10 and 20 citations, unscientific articles are those without citations), shows that all published articles were actually scientific articles. Similar results were also obtained at the Radiology and Oncology journal (in the period 1992-2001, there was an average of 18 references for each article) (Musek et al., 2003).

year	ZV					EJPH				
	no. of authors	no. of articles	r*	no. of citations	r**	no. of authors	no. of articles	r*	no. of citations	r**
2003	47	19	2.47	438	23.05	230	59	3.89	1529	25.91
2004	56	24	2.33	452	18.83	360	79	4.55	2250	28.48
2005	64	21	3.04	466	22.19	448	103	4.34	2830	27.47
2006	46	20	2.3	566	28.3	411	93	4.41	2945	31.67
2007	49	18	2.72	445	24.72	415	90	4.61	3004	33.38
2008	65	20	3.25	658	32.9	453	97	4.67	3316	34.18
2009	66	20	3.3	648	32.4	435	91	4.78	2985	32.08
2010	61	22	2.77	651	29.59	458	99	4.63	3221	32.54
total	454	164	2.76	4324	26.36	3210	711	4.51	22080	31.05

Legend:

r* - ratio no. of authors / no. of articles

r** - ratio no. of citations / article

Table 2. The number of authors and citations in the analysed articles, 2003-2010

In eight years, articles in both Slovenian and English were published in the journal ZV. Figure 1 shows the number of articles by individual years in Slovenian and English. Most of the articles in English were published by Slovenian authors. In 2003, four of the articles in English were by authors from the United Kingdom, Netherlands and Sweden, and three by authors from Slovenia. In 2004, one English-language article was by an author from Finland and one article by a Slovenian author. In 2005, the sole article in English was by a Slovenian author. In 2006, two articles in English were the result of international collaboration; one article was by authors from Slovenia and Germany, the other by authors from Slovenia and the United Kingdom. The authors of the remaining four articles were from Slovenia. In 2007, one article in English was by authors from Serbia, and five articles again by authors from Slovenia. In 2008 and 2009, all articles in English were by authors from Slovenia, while in 2010 one article was by authors from Albania, and one article was again the result of collaboration by authors from Slovenia and the Netherlands. All the remaining five articles in 2010 were again written by Slovenian authors. Publishing foreign authors in the journal ZV was more of an exception; the reason Slovenian authors published articles in English may well be the result of those articles being written and prepared for publishing in a foreign journal, then due to a possible rejection, the Slovenian authors decided to publish in local journals. The English-language articles published by Slovenian authors were the result

of research carried out at the local and state level, and not from studies resulting from international cooperation, with the exception of articles in 2006, which were published in collaboration with foreign researchers. Despite the fact that the article in 2010 originated by collaboration with a foreign researcher, it was the result of research related to health policy in Slovenia and not in the international arena.

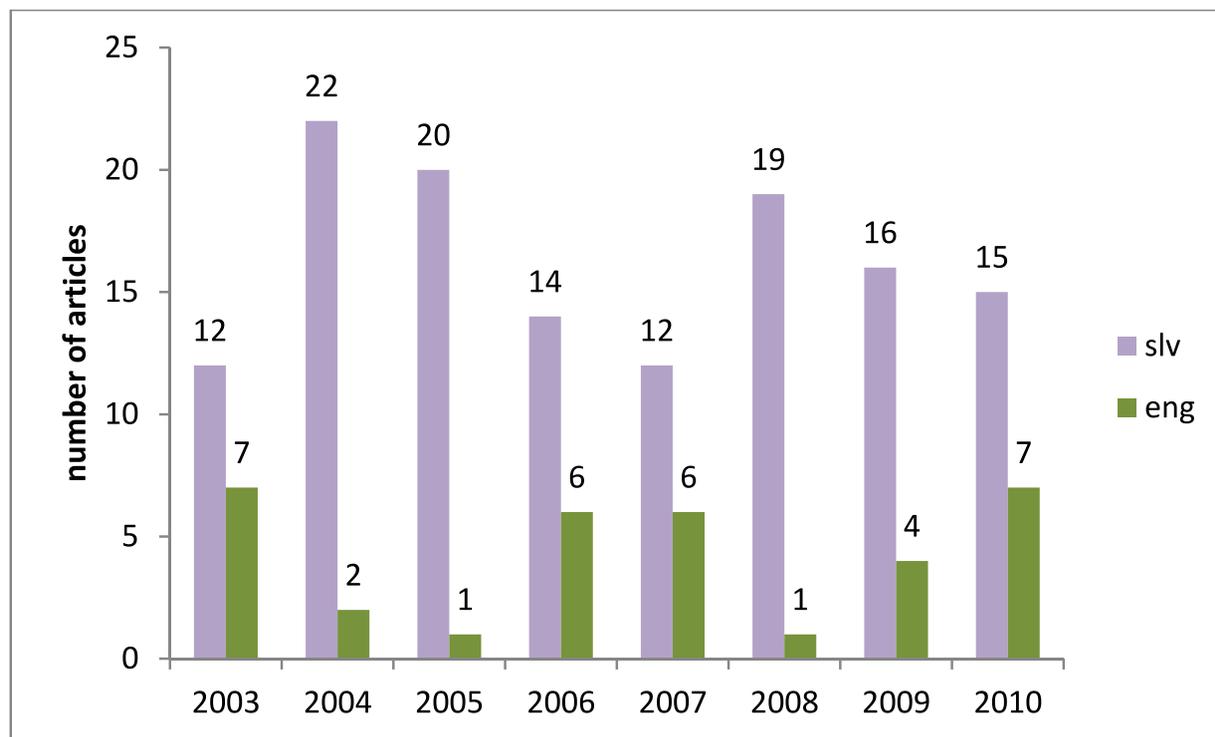


Fig. 1. The number of Slovenian and English-language articles published in the journal ZV, 2003-2010

Since EJPB is an international and multidisciplinary journal, the authorship of published articles belongs to a broader international circle of scientists (Figure 2). Over a period of eight years, authors from all continents, that is, from all over the world published in the journal. Only the most represented and recurrent countries of authors publishing articles in the EJPB in the period 2003-2010 are included in Figure 2. Throughout the entire analysed eight-year period, authors from the Netherlands were the most represented (38, 38, 40, 64, 50, 51, 49, 74). With the exception of one year, they are followed by the British (17, 66, 33, 39, 66, 48, 47), who did not published in 2003, the Spanish (26, 67, 42, 35, 40, 35, 32) who published nothing in 2010, and the Finns (11, 35, 39, 39, 49, 42, 47), who were without any publications in 2005. The Swedes also had many publications (24, 24, 35, 45, 36), except in 2006, 2009 and 2010, when they did not publish a single article. The Italians published (14, 53, 36) in 2003, 2005 and 2010, while the French (39), Germans (34) and Danes (24) had numerous publications only in one year. It is interesting that the majority of the most represented are scientists who come from countries where English is not the native language, with the exception of the United Kingdom, of course. The fact is that scientists strive for greater visibility, not only at the national level but also at an international level, which is why they choose to write and publish articles in English, even though it is not their native language. Despite this fact, scientific journals have a long tradition of publication,

and in some countries (e.g. Italy) insist on publishing a national journal in the field of public health, since it is more natural to read articles in their native language, which most people also prefer (McCarthy & Clarke, 2007; McCarthy & Paná, 2007).

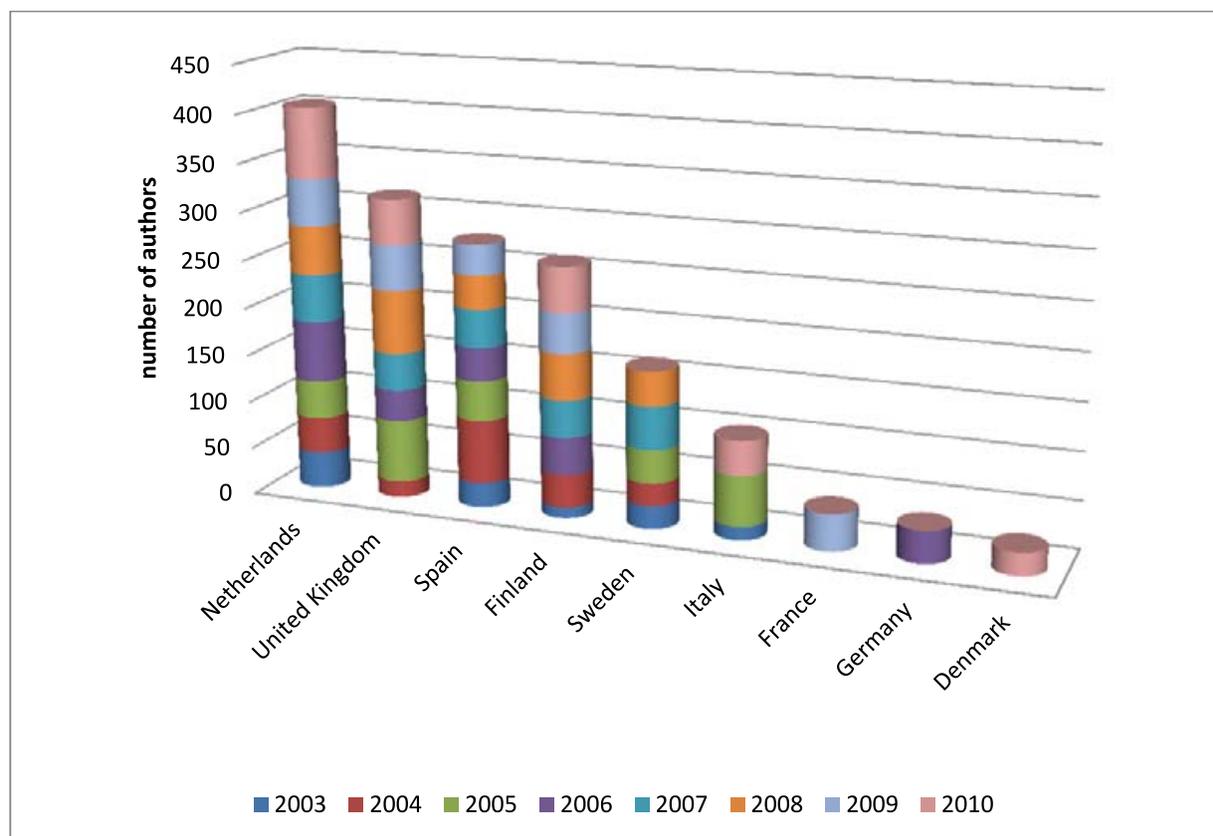


Fig. 2. Authors by country of origin in the journal EJPH, 2003-2010

Figures 3 and 4 show the number of articles relative to the number of authors for each article in a particular year. The dispersion in Figure 3 for the journal ZV in comparison with the EJPH lets us conclude that the Slovenian journal has too few multi-author collaborations, a trend quite present with the journal EJPH and visible in Figure 4. One reason for this could be that the body of potential writers and researchers publishing in the Slovenian journal is smaller than that for the journal EJPH. Since Slovenia is a small country with a small body of scientists researching and publishing in a particular field, which is also apparent by the number of articles published in the ZV, we could reasonably expect that the collaboration of scientists with their colleagues abroad would be more present (Clarke et al., 2007). But unfortunately, it is not. Despite the knowledge that both journals have no restrictions accepting articles and that everyone may publish in the Slovenian journal, including English-language articles removing the language barrier. The cause can also lie with the smaller interest from both local and foreign non-Slovenian authors, since the Slovenian journal does not yet have large recognition, and publishing in the journal does not bring international visibility, or perhaps the reason lies in the insufficient international cooperation of Slovenian scientists with those abroad in the field of social medicine and health care.

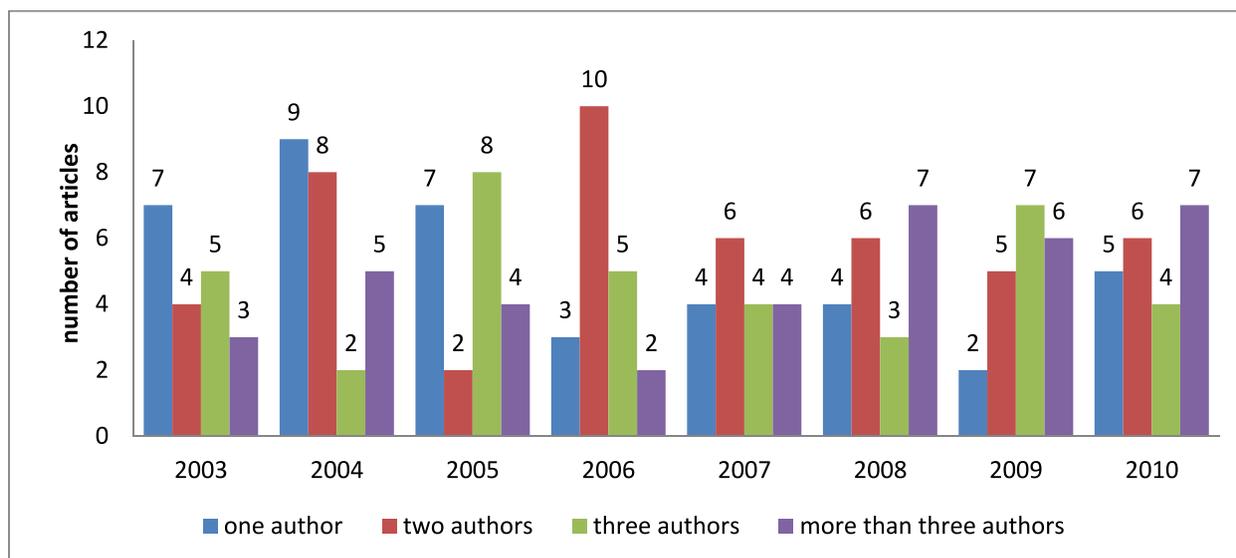


Fig. 3. Number of authors for each article at the ZV, 2003-2010

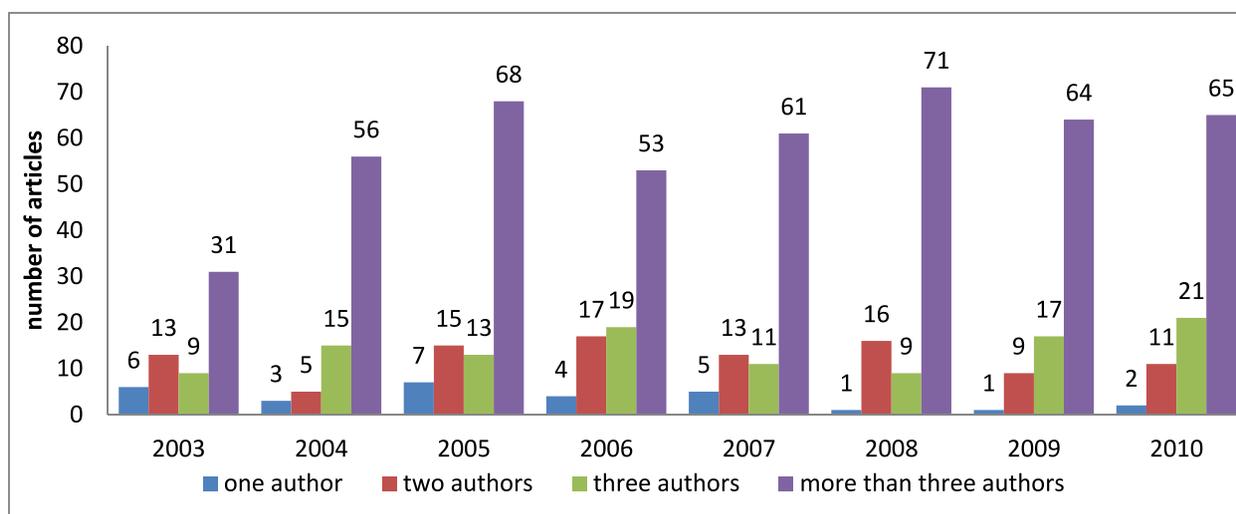


Fig. 4. Number of authors for each article at the EJPH, 2003-2010

Throughout the analysed eight-year period, a quarter of the articles at the journal ZV were written by a single author, almost 29% of the articles had two authors, slightly less than a quarter of the articles were written by three authors, and almost a quarter of the articles had more than three authors. For the EJPH, the ratio was different. Two-thirds of the articles had more than three authors, 16% of the articles had three authors, 14% of the articles had two authors, and only 4% of the articles were written by a single author (Figure 5).

If we compare the results of the journals ZV and EJPH (Figure 3, Figure 4) with the results from the journal Radiology and Oncology (Musek et al., 2003), multiple authors are more

common for the latter two (EJPH, and Radiology and Oncology), which indicates that the articles reflect the teamwork on research projects as well as collaboration by authors from various scientific disciplines. Multiple authors increase the credibility of a research work, and the possibility of co-financing research projects. Studies worldwide have shown that the average number of authors per article in journals included in the Journal Citation Report (JCR), rose from 1.83 in 1995 to 3.9 authors per article in 1999 (Cronin, 2001).

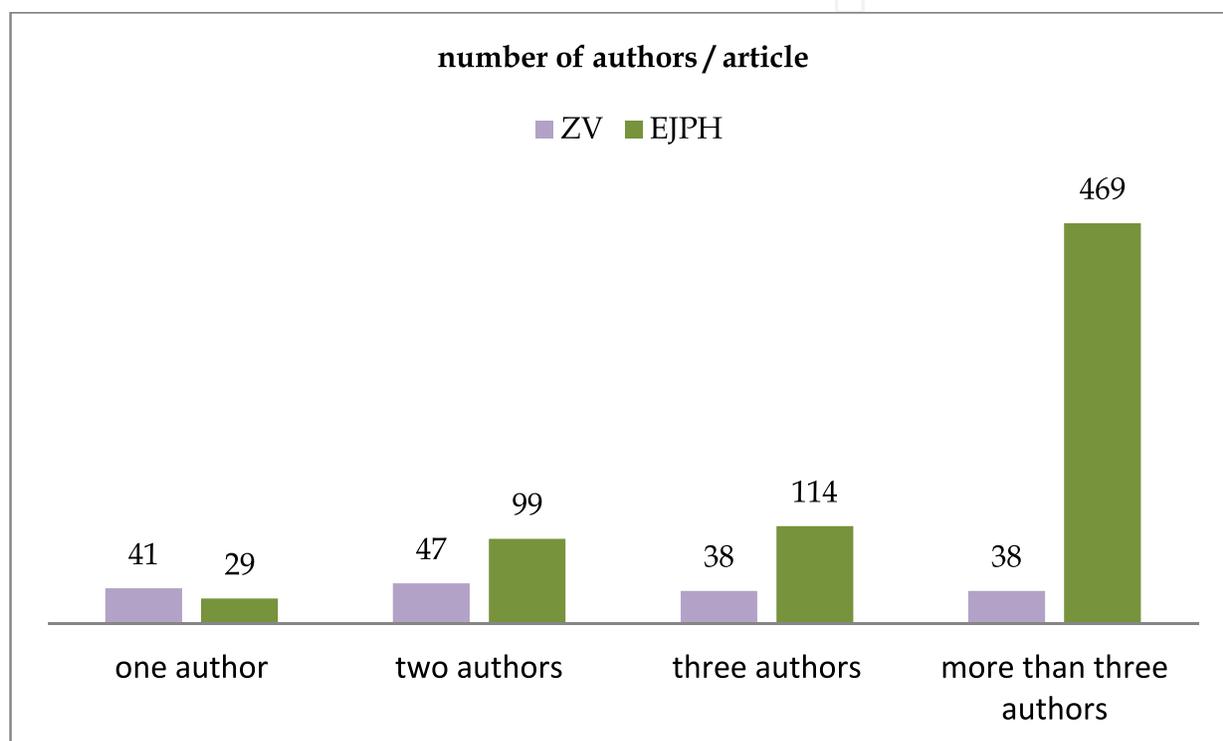


Fig. 5. Number of authors at the ZV and EJPH in the period 2003-2010

4.2 Citation analysis

The citation analysis included all citations and references that authors listed at the end of their articles in the chapter Literature.

In the citation analysis we determined the following article characteristics in the journal:

- language of cited publications (Table 4),
- citation of various sources of information (Table 5),
- citation age (Table 6).

4.2.1 Analysis of cited publication languages

Authors who published in the ZV during the years 2003-2010, predominantly referenced literature in English, the second place was taken by literature in Slovenian, followed by literature in German and other languages such as Serbo-Croatian, Italian, and Swedish (Table 4). Similar results were seen in the period 1992-2003, when authors predominantly used literature in English, followed by Slovenian-language literature (Miholič, 20005). The portion of English-language literature was lower (63%) in the period 1992-2003, while the portion of literature in Slovenian was higher (32%) than in the past eight years (Miholič, 2005). In the analysed period 2003-2010, 78% of the cited literature is in English, 21% in Slovenian, while the portion of other languages is very low (1%). The portion of cited literature in English in the journal EJPH was higher (94%), with almost six percent in other languages, and less than one percent in Slovenian.

year	ZV			EJPH		
	citation language			citation language		
	slo	eng	other	slo	eng	other
2003	69	365	4	0	1347	182
2004	128	312	12	0	2114	136
2005	143	318	5	0	2643	187
2006	113	450	3	17	2755	173
2007	74	366	5	0	2877	127
2008	115	539	4	0	3166	150
2009	120	528	0	0	2814	171
2010	173	473	5	7	3042	172
total	935	3351	38	24	20758	1298

Table 4. Number of cited publications relative to the year and language of the cited publications, 2003-2010

4.2.2 Analysis of the citation of various sources of information

For the analysis of the citation of various sources of information, we separated the cited literature into articles, monographs, contributions from conferences, and other (grey literature, regulations, official journals, statistical publications and electronic publications). The analysis showed that during the analysed period, authors most frequently cited journal articles (65% at the ZV, 76% at EJPH), followed by monographs (24% at the ZV, 18% at EJPH), while the smallest portion of cited literature (11% at the ZV, 6% at EJPH) was from congresses and literature listed under 'other' (Table 5). Today, articles in scientific journals are one of the most important information sources in science. The advantage of articles over monographs is primarily their currency, since the publication of a specific monograph takes a lot longer than the publication of an article in a scientific journal.

year	ZV				EJPH			
	citation type				citation type			
	articles	monographs	congresses	other	articles	monographs	congresses	other
2003	274	143	6	15	1097	392	5	35
2004	227	163	18	44	1764	440	7	39
2005	287	107	19	43	2092	666	17	55
2006	368	138	19	51	2233	458	8	246
2007	285	112	12	36	2306	464	13	221
2008	482	105	11	60	2539	552	12	213
2009	479	84	22	63	2369	462	11	143
2010	401	167	20	63	2485	481	1	254
total	2803	1019	127	375	16885	3915	74	1206

Table 5. Number of cited publications relative to year and type of information source, 2003-2010

4.2.3 Citation age analysis

With the citation age analysis, we can usually ascertain how quickly an individual scientific discipline developed within a specified period of time. The use of literature and its citation varies among the scientific disciplines relative to the age of citations. We know, for example, that the fields of medicine and natural science use newer cited literature than the humanities (Mihajlov & Giljarevskij, 1975).

It is clear from Table 6 that most of the analysed articles, from both journals and by individual years, contained citations and references aged 0-10 years. At the journal ZV, in the period 2003-2010, on average a good third of the literature used in articles was in the 0-5 years age group (1,519 citations), with a similar portion present in the journal EJPH (7,642 citations). This was followed by a poor third of articles that had citations from the 6-10 years age group (1,341 citations), while the EJPH had a good third of citations from the 6-10 years age group (8,096 citations). Both journals, ZV and EJPH had 17% of articles with literature from the 11-15 years age group (766 citations at the journal ZV, 3,689 citations at EJPH). There were 9% of articles that had literature from the 16-20 years age group (419 citations); the same portion was seen with the journal EJPH with 1,854 citations. References older than 21 years were found in only 6% of the articles (279 citations) at the ZV, and 3% of articles (799 citations) at the journal EJPH.

In a review of the American Journal of Public Health for the period 2003-2005, authors also cited newer literature: half of the cited literature was 0-5 years old, and a good quarter of the cited literature was in the 6-10 years age group (Rethlefsen, 2005).

In their contribution, Musek et al. (2003) compared the results of the bibliometric analysis of the journal Radiology and Oncology for a ten-year period with a related international

journal *Neoplasm*. The results of the bibliometric analysis of Radiology and Oncology for the period 1992-2001 showed a constant number of articles per year, predominated by multi-author articles. In the journal Radiology and Oncology, citations in English were in first place, followed by citations in German and Slovenian, then other languages such as Croatian, French, Italian and Czech. Articles were the most cited, followed by monographs, congress contributions and grey literature. In 1992, a quarter of the citations in the journal Radiology and Oncology were from the 0-5 year age group, while in 2001 the portion increased to 42.3%. In the period 1992-2001, the portion of citations from the 6-10 years age group ranged between 24.8 and 30.6%. The portion of articles with citations from the 11-15 years age group decreased in the analysed period from 21.5% in 1992 to 13.3% in 2001; similarly, the portion of articles with citations from the 16-20 and over 20 years age group decreased in the period 1992-2001. The data shows a greater use of newer literature in recent years.

year	ZV					EJPH				
	citation age					citation age				
	0-5 years	6-10 years	11-15 years	16-20 years	>21 years	0-5 years	6-10 years	11-15 years	16-20 years	>21 years
2003	181	150	48	24	35	519	604	260	139	7
2004	197	117	63	27	61	563	906	458	316	7
2005	180	131	86	29	42	751	1135	514	414	16
2006	200	192	95	72	12	993	1099	457	244	152
2007	149	134	93	66	3	1079	1100	498	173	154
2008	203	213	130	59	54	1373	1128	518	164	133
2009	213	207	120	65	43	1160	992	466	204	163
2010	196	197	131	77	50	1204	1132	518	200	167
total	1519	1341	766	419	279	7642	8096	3689	1854	799

Table 6. Number of cited publications relative to the year and age of cited sources, 2003-2010

5. Conclusion

Apart from the financial support provided by the agency, the evaluation of Slovenian scientific journals is of vital importance. Professional bodies (scientific councils for individual areas) evaluate Slovenian scientific journals, and based on their quality place them on a list of journals not included in international bibliographic databases, while they are taken into account for the categorisation of scientific publications. Based on the Rules of Indicators and Criteria for Measuring Scientific and Technical Efficiency Slovenian scientific journals and the publications in them are considered by scientific performance. Such evaluating and scoring in the researchers' bibliographies allows for the preservation of issues and the influx of higher quality scientific articles in Slovenian scientific journals that are published in Slovenian. Despite a journal not being internationally acclaimed, due to the

scoring provided by the rules, the researchers should endeavour to publish in Slovenian, to inform colleagues of their research results in Slovenian, and not only strive for international exposure and recognition.

Results of a quantitative analysis of the journals *ZV* and *EJPH* for the period 2003-2010, showed that throughout the period analysed, more sources were cited per article in the *EJPH* (31.05) than in the *ZV* (26.36). The portion of articles with more than one author is increasing in both journals. Both journals obtained similar results: material published in English was predominantly cited; articles were cited the most, followed by monographs. The results force us to consider that the research and technical field of health care is undoubtedly a medical field that has strong characteristics of social science as it deals with medicine, health care and health as a social phenomenon. The methods used in health care are close or even identical to those in social science, which is reflected in the manner of research and publication. Research in the field of health care has to be assessed and evaluated differently than research in other fields of medicine, e.g. in clinical medicine. Because this concerns Slovenian-language publications in the sole Slovenian journal (and the very existence of the journal for this field on Slovenian territory), they are evaluated differently and have different weight.

Comparison of the results of bibliometric analysis of the Slovenian Journal of Public Health - Zdravstveno varstvo (*ZV*) and the European Journal of Public Health (*EJPH*) for the period 2003-2010, has led us to the conclusion that the *ZV* is not behind *EJPH*. Therefore, Slovenian scientists could also publish the results of their research projects as scientific papers in local scientific journals. The difference in publication is that publishing in *EJPH* brings greater exposure and a greater number of received citations, which every author wants, yet scientists should have an interest in maintaining local scientific journals and informing the local professional public of their findings, and not just in scrambling for citations.

According to analyses, we can conclude that the impact of local journals in an international context is only possible if they are concurrently published in English. Therefore, greater international exposure can be assured for the authors' contributions, which increases the authors' interest in publishing in local journals. In the future, an initiative is expected of the Slovenian Research Agency, as a financier to numerous studies carried out by Slovenian scientists, to publish research in the form of articles, such as e.g. Open Access (OA). Examples in this area are the two largest financiers of research in the field of medicine: the American National Institute of Health and the British Wellcome Trust, which require from scientists that a version of their research is available in OA. This approach reliably contributes to promoting public access to publications and the faster flow of information and knowledge to other scientists in electronic form. Finally, it also affects the transparency of fund usage for the researches.

In Slovenia, the initiative for open access to data was presented very late, in 2009. To this day (October 2011), there still has not been any significant shift in the right direction. Since the storage of publications and data from publicly funded research in open access repositories is not required by funding bodies or by research institutes, only a very small portion of publications from Slovenian researchers is openly accessible via the World Wide Web. Consequently, Slovenia and its researchers do not share in the proven benefits of open access to publications and data: the country in terms of better utilisation of public resources,

rapid development of science and greater scientific visibility, while researchers in terms of greater visibility and impact of publications. Slovenia is among the countries with poor knowledge of open access and insufficiently developed (actually non-existent) network of internationally compatible institutional repositories. Various institutions in Slovenia issue over 30 open journals, recorded in the Directory Open Access Journals. Activities continue and in October 2011, in the spirit of better integration and openness, a seminar was organised, where an implementation plan for a portal for scientific and literary journals was presented. Currently it is too early to record the results of this activity, hopefully the fears that it will never develop further than the implementation plan are unfounded, and this activity will be realised. Yet there is interest and initiative from state institutions for regulation in this area, which could mean a step in the right direction towards greater openness of publications, and consequently, the greater visibility and recognition of Slovenian scientists both at home and abroad.

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