

**Bilim Haritalama Tekniği ile Tek Sağlık Çalışmalarının İncelenmesi****Examination of One Health Studies with Science Mapping Technique**<sup>1</sup>İsmail ŞİMŞİR, <sup>1</sup>Buse METE<sup>1</sup>Sakarya University of Applied Sciences, Faculty of Health Sciences, Department of Health Management, 54100, Sakarya/Türkiyeİsmail Şimşir: <https://orcid.org/0000-0001-7460-9634>Buse Mete: <https://orcid.org/0000-0001-5440-9723>**ÖZ**

**Amaç:** Bu çalışmada tek sağlık başlıklı akademik çalışmaların bibliyometrik analizinin sunulması amaçlanmaktadır.

**Materyal ve Metot:** Web of Science veri tabanı kullanılarak başlıkta "tek sağlık" araması yapılmıştır. Belirli filtrelemeler sonunda Tek Sağlık alanında 1012 çalışma incelenmiştir. İlgili çalışmalar SCIMAT bibliyometrik analiz programına aktarılmış ve 3 döneme ayrılarak analiz edilmiştir.

**Bulgular:** 1981-2010 döneminde veri sayısı 53, 2011-2015 döneminde 207, 2016-2021 döneminde 752'dir. Tek Sağlık'ta ilk dönemde ortaya çıkan temalar salgın hastalıklar, insanlar, yeni hastalıklar, tek sağlık, veterinerlik, hayvan sağlığı, kuş gribiydi. İkinci dönemde ortaya çıkan temalar arasında Nipah virüsü türleri, kuduz, insan sağlığı, brusella, ortaya çıkan enfeksiyonlar, salgın hastalıklar, epidemiyoloji, virüsler ve zoonozlar yer almaktadır. Son dönemde tek sağlık kapsamındaki çalışma temalarının oldukça geliştiği ve çeşitlendiği görülmektedir.

**Sonuç:** Gelecekteki tek sağlık konularında araştırmacılar, küresel olarak bulaşıcı hastalıklar için aşırı ve kontrolsüz antibiyotik kullanımı, antibiyotik direnci, uluslararası sürveyans sistemlerinin kurulması, aşı geliştirme, aşılama, salgın riskleri ve yönetimi temalarını dikkate almalıdır.

**Anahtar Kelimeler:** Bibliyometrik analiz, bilim haritalama, tek sağlık

**ABSTRACT**

**Objective:** In this study, we aimed to present the bibliometric analysis of academic studies titled one health.

**Materials and Methods:** A search for "one health" was performed in the title using the Web of Science database. At the end of certain filters, 1012 studies in the field of One Health were examined. Related studies were transferred to the SCIMAT bibliometric analysis program and analyzed in 3 periods.

**Results:** Number of data in 1981-2010 period is 53, 207 in 2011-2015 period and 752 in 2016-2021 period. Themes that emerged in One Health in first period were epidemics, people, new diseases, one health, veterinary medicine, animal health, bird flu. In second period, emerging themes include various types of Nipah virus, rabies, human health, brucellosis, emerging infections, epidemics, epidemiology, viruses and zoonoses. In last period, it is seen that study themes within scope of one health have developed and diversified considerably.

**Conclusion:** In future one health studies, researchers should consider themes of excessive and uncontrolled use of antibiotics for infectious diseases globally, antibiotic resistance, establishment of international surveillance systems, vaccine development, vaccination, epidemic risks and management.

**Keywords:** Bibliometric analysis, one health, science mapping

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## INTRODUCTION

Studies on public health problems arising in a globalized environment are based on the fact that social, economic and ecological systems are an inseparable whole, and boundaries of interaction between these systems are becoming unclear. This situation has resulted in the examination of public health, animal health and ecology health together. This holistic health approach is referred to as "One Health" in international literature and "Tek Sağlık" in national literature.<sup>1,2</sup> Today, definition of one health concept has been expanded to include topics such as food safety, poverty, gender equality, strengthening health systems, infectious diseases, chronic diseases, toxicology, ecology, agriculture, sustainability, protective medicine, economics, anthropology, and social sciences. It is expected that those working on environmental health, agriculture, social workers, ecology, and those working on human and animal health will cooperate.<sup>3,4</sup>

Public health models based on "One Health Approach" are widely recommended and implemented in international literature.<sup>1</sup> These studies provide a lot of evidence for ease of case detection in epidemics, their contribution to cost-effectiveness, their support for detecting the source of epidemic and support for laboratory research, and possibility of multidisciplinary work.<sup>5,6</sup> However, there are not enough tangible applications and data on "one health concept" in national literature. In a study conducted by Özgüler<sup>7</sup> it was determined that 63.5% of physicians affiliated to Ankara Chamber of Physicians had never heard of concept of one health before. This situation shows that there is a gap about awareness and applications of the one health approach in public health circles in Turkey.<sup>7</sup>

In this study, the aim is to make a bibliometric analysis of the publications in the field of one health and to reveal the periodical development and the themes related to the subject. In this context, the periodic development and relations of the themes in the field of one health will be analyzed.

In line with stated purpose, the bibliometric analysis of studies on one health will be divided into three periods and will be carried out using the Scimat program.

## MATERIALS AND METHODS

**Ethical Status of the Study:** The approval of Sakarya University of Applied Sciences Ethics Committee was obtained for the conduct of this study. (Date: 22.04.2022, decision no: 22/12).

Aim of this study is to periodically examine trends of studies in literature on concept of "One Health", to reveal themes that arise within scope of "One Health" in certain periods and their relationship with

each other. It is thought that it will help researchers about developing issues and future research topics in field of One Health. In line with the purpose of the study, "one health" was searched in title using Web of Science database. In order to be able to use in the study, only the articles and reviews written in English and scanned in the SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI indexes between 1981-2021 were filtered. At the end of this search strategy, 1012 studies in field of One Health were examined. The studies included in research were analyzed by transferring them to SCIMAT bibliometric analysis program.

Bibliometric analysis method is gaining more and more value to measure scientific quality, productivity and evolution in a particular field. Bibliometric analysis provides concrete data about the movement of the related discipline in time and space by considering the whole or a certain section of the literature, and makes generalizations. It allows to objectify subjective observations. In addition, it reveals sources of influence of researchers. It helps to make inferences about possible future direction of a discipline. It can provide data to researchers in terms of determining research topics and career planning.<sup>8</sup> Cobo et al.<sup>9</sup> suggested the SciMAT software developed for bibliometric analysis in their study. Strategic theme maps, thematic network maps and longitudinal analysis visuals of the studies are presented in SciMAT software. Thanks to these, inferences can be made about the importance and development of the themes of the subject. In this study, SciMAT software was used to visualize strategic diagrams and theme areas.<sup>8</sup>

A conceptual science mapping analysis based on a network of common words is performed with the SciMAT software, which is based on an approach that focuses on four stages: (1) identification of research themes, (2) visualization of themes (research lines) and relationship as a thematic network, (3) thematic areas discovery and (4) performance analysis. For this purpose, the identified research themes are laid out in a strategic diagram. Research is a two-dimensional map in which themes are shown as a globe and whose volume is equivalent to the sum of the publications associated with the theme, divided into four different areas according to their relevance: (i) Upper-right quadrant: Q1-Engine themes (themes within this quarter are related to structuring and developing the research field ). (ii) Upper left quadrant: Q2- Advanced and isolated themes (themes in this area are important, but not important enough to be considered more of a highly specialized or environmental activity for the research field). (iii) Lower-left quadrant: Q3-Ascending or descending themes (research themes in this quarter are weak, but this

weakness can be understood as themes that emerge, need to be explored, or disappear). (iv) Lower right quadrant: Q4-Basic and cross themes (These themes are not advanced enough, but are important for learning in the field of study).<sup>10</sup>

Motor themes include clusters of most advanced and important studies of field under study. The main themes, on the other hand, are subjects that are not developed enough, although they make a significant contribution to research field. Emerging or disappearing themes are those that are not developed and have no value at the moment, that may be valuable if attention intensifies, or that, on the contrary, will disappear completely. Developed and isolated themes, on the other hand, are seen as very deep and specific topics in field.<sup>11</sup>

## RESULTS

1012 studies obtained as a result of search strategy were analyzed by dividing into 3 periods. Examining in 3 periods gives healthier results in evaluating development of themes. Accordingly, number of data in 1981-2010 period is 53, 207 in 2011-2015 period and 752 in 2016-2021 period.

According to Figure 1, “one health, human, emerging diseases” are the motor themes of 1981-2010 period. Developed and isolated themes are “young people, white-tailed deer and epidemics”. “Global health and bird flu” are emerging/disappearing themes, while “veterinary medicine, veterinarians and animal health” constitute the main themes.

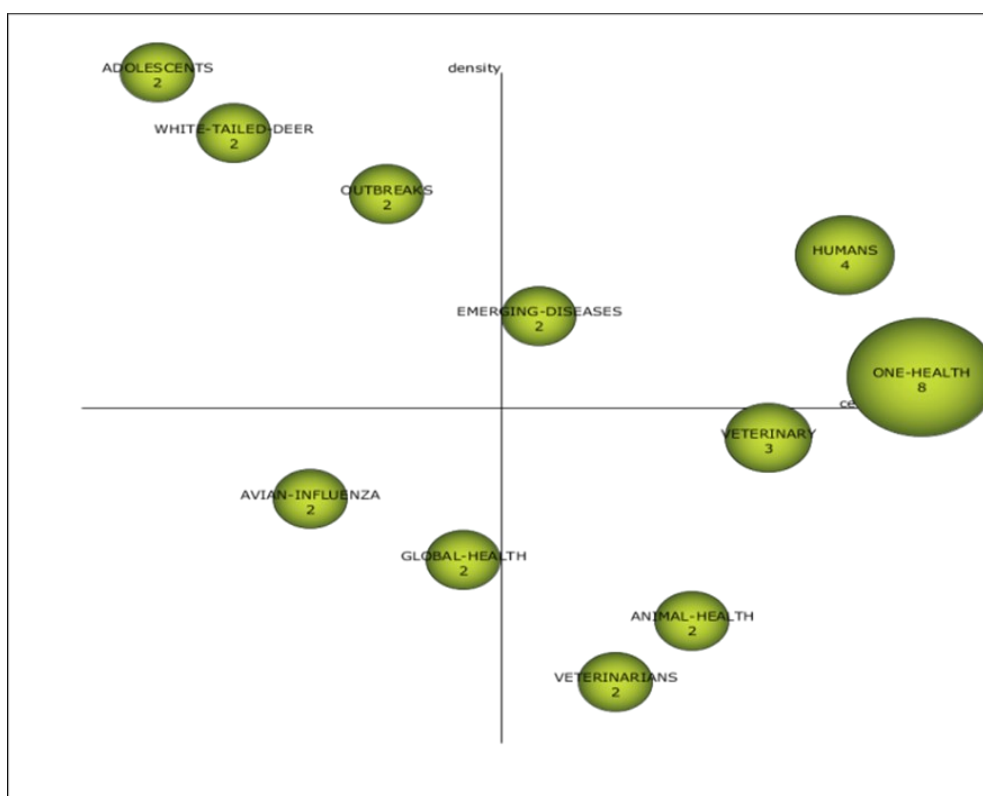


Figure 1. Strategic theme map for years 1981-2010.

When theme map for period 2011-2015 is examined, motor themes are “molecular epidemiology, mycobacterium bovis (bacterium that causes tuberculosis from cattle to humans), emergence, brucellosis (bacteria/viruses found in milk and animal foods), advanced and isolated themes” nipah (virus transmitted from bat to humans), veterinary services, Rabies, challenges, Zoonotic-Infections, humans, Ecology, interventions, Impacts, Vaccines, Human health, Emerging Diseases”, emerging or disappea-

ring themes are “animals, epidemics, viruses, surveillance”. The main themes are “Emerging-Infectious-Diseases, Avian influenza, Infectious diseases, One Health, wildlife, Infections, vaccine, Diseases, policies, risks, Risk factors, zoonoses”(Figure 2).

When strategic theme map of last period in Figure 3 is examined, it is understood from theme density that interest in field has increased considerably. It is seen that authors worked on 114 themes during this

period. Among these themes, "antibiotic resistance, Sars-Cov-2 virus, food safety, animals, social sciences, bats, dogs, risk assessment" stand out as motor

themes with high h-index. Developed and isolated themes “liver flukes (intestinal worm), Cutaneous-Leishmaniasis (a type of parasite), Bacteriophages (a

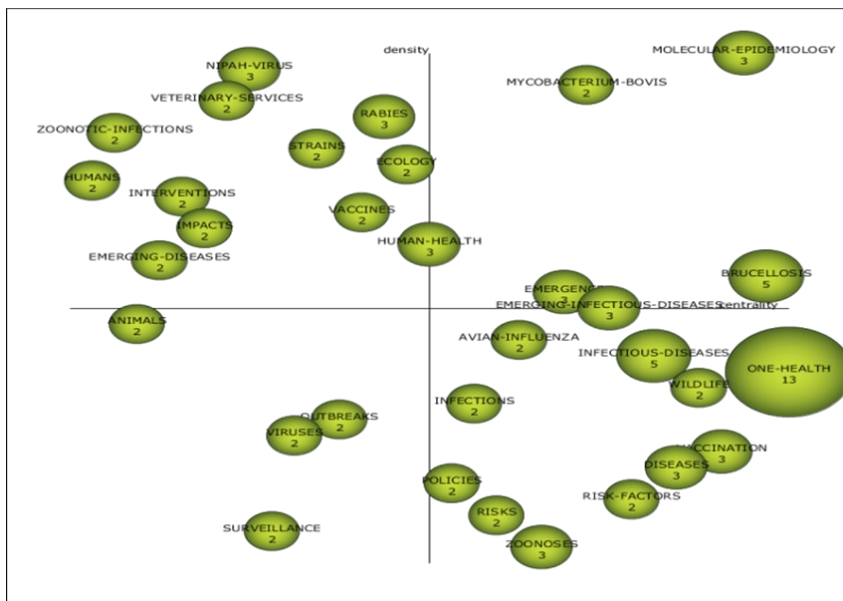


Figure 2. Strategic theme map for years 2011-2015.

virus that destroys bacteria), Toxoplasma-Gondii (a type of parasite), obesity, antibiotic resistance genes, H1N1 virus, emerging diseases, diagnoses, birds, drinking water, health systems, sustainability” are

some of the themes that have higher h-index than others. “Education, China, behaviors, management, host (parasites that cause disease), attitudes, pathogens, Africa, challenges, ecosystems, cooperation,

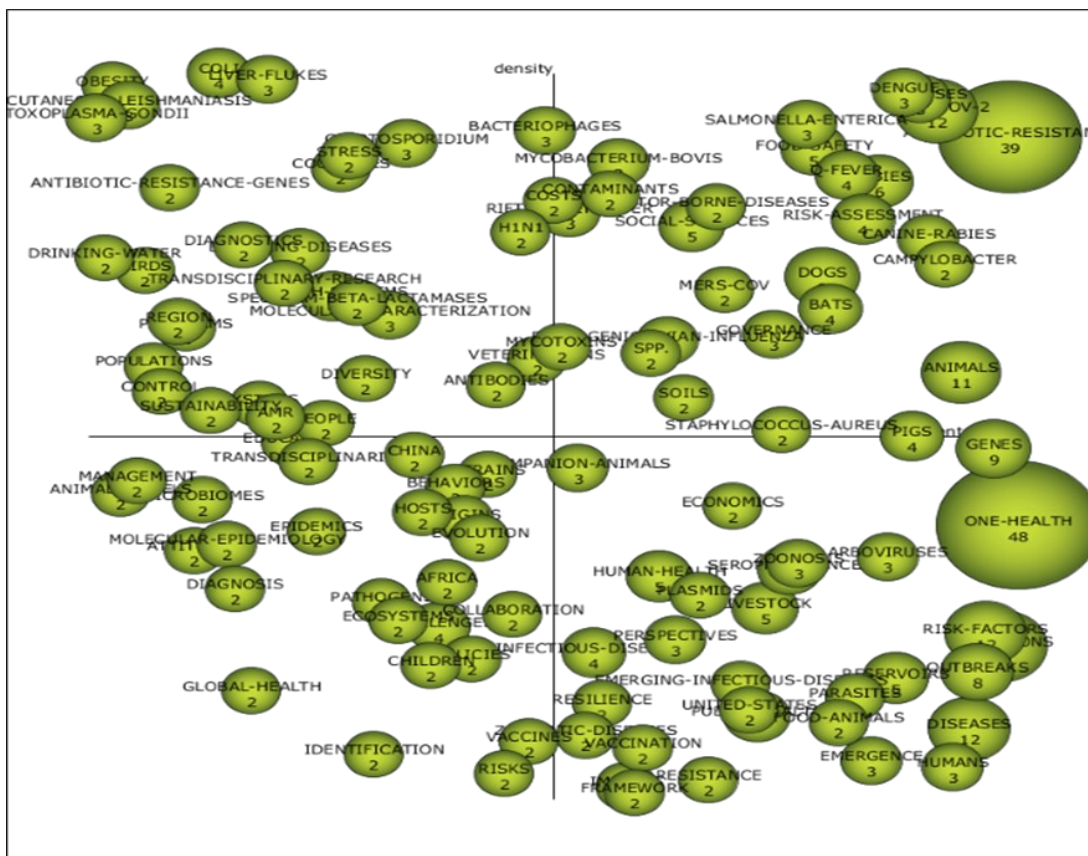


Figure 3. Strategic theme map for years 2016-2021.

policies, children, global health, risks” are emerging or disappearing themes. “Pigs, genes, economies, One health, pets, diagnosis, livestock, risk factors, infections, infectious diseases, epidemics, reservoirs, diseases, effects, conceptual framework” are fundamental and transformational themes.

It is useful to examine longitudinal analysis above in order to see relationship between themes that emerged during the periods. It can be said that research themes in first period did not include large number of studies. Especially among these themes, bird flu, one health and animal health influenced and guiding later studies. Despite this, other themes, such as human-transmitted diseases from white-tailed deer, remained only at time they belonged. In second period, it is seen that new themes with a limited num-

ber of studies emerged and some of them were fed from themes of the previous period. As thickness of lines connecting themes of periods increases, strength of relationship between themes also increases. Emerging themes include various types of Nipah virus (a type of virus transmitted from animals to humans), rabies, human health, brucellosis (a type of virus originating from milk and dairy products, raw meat), emerging infections, epidemics, epidemiology, viruses and zoonoses (animal origin viruses). It can be said that there are themes. In particular, it can be stated that one health theme is a theme that develops by being fed from related studies in previous period. Recently, it is seen that study themes within scope of one health have developed and diversified considerably. It is seen that there are more

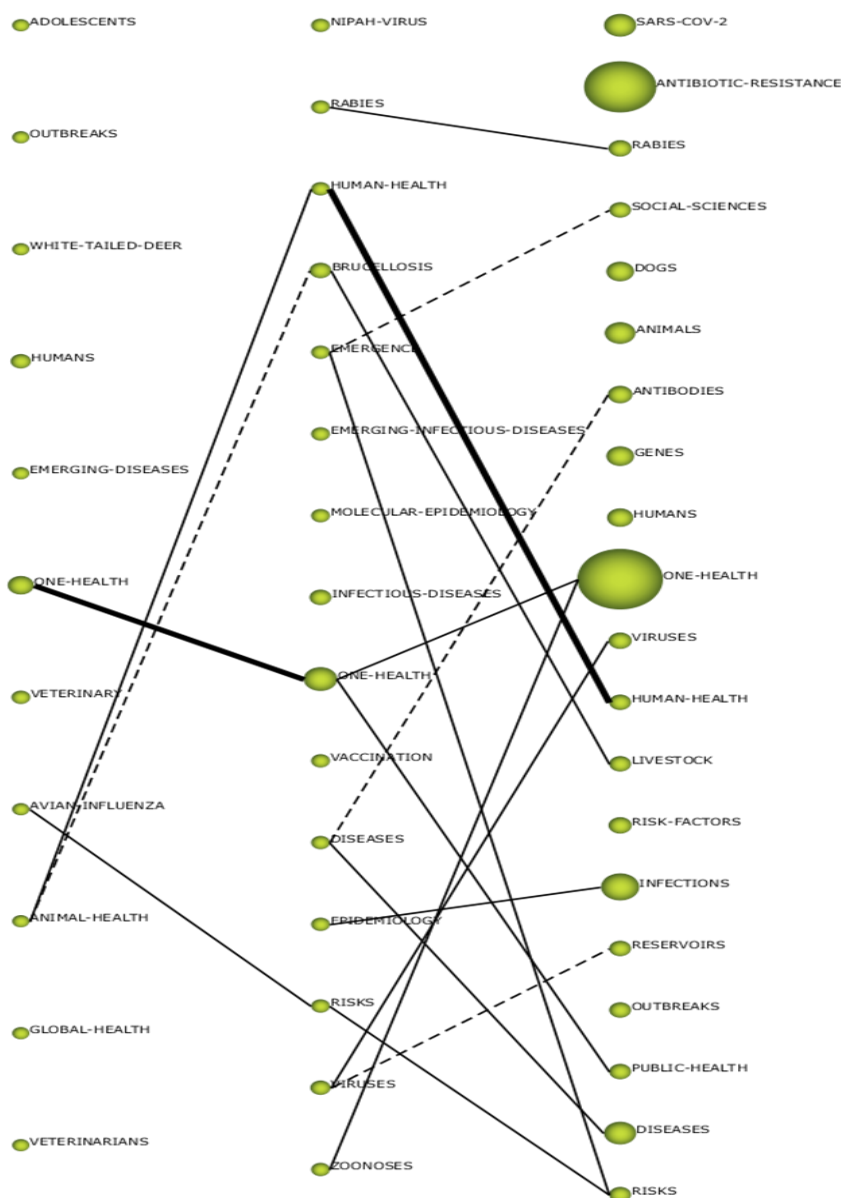


Figure 4. Evolution of Themes by Period.

researches on themes that emerged especially in recent period and that a theme is fed by more than one theme from the previous period. In this context, it is thought that subject of antibiotic resistance in current studies will intensify more in one health in next period (Figure 4).

## DISCUSSION AND CONCLUSION

Themes common to all periods examined within scope of the study are seen as "one health, epidemics, infections, humans, zoonoses". This situation shows that there are main subjects included in only definition and scope of health made by Errecaborde et al.<sup>12</sup> Walter and Scott, Venkatesan and Gandhale, also emphasize that first studies to prove that diseases caused by zootonic organisms affect both animals and humans from a medical-veterinary perspective were in the 1980s.<sup>13,14</sup> It has also been stated that early studies strongly influenced subjects of the later period. New themes that emerged in second and third periods show that one health field is very current and increasingly important field of study.<sup>15,16</sup> In second period, it is seen that different themes such as human health, vaccines, molecular epidemiology, and risk factors emerged from first period and these themes were fed from the previous period themes. In this context, it is stated in literature that during the first period of industrial revolution, natural environmental balances deteriorated rapidly, and epidemic diseases increased.<sup>17</sup> In same period, thanks to developments in field of medicine, vaccine development and molecular biology studies have increased to prevent zootonic infectious diseases.<sup>18</sup> In third period, it is seen that research subjects in field of one health have increased due to many reasons such as increase in epidemics throughout world, globalization, and evaluation of immunization rates at level of development of countries as performance criteria.<sup>19</sup> In this context, Sars-Cov-2, antibiotic resistance, social sciences, genes, animal species are new themes examined in 3rd Period. These themes are open to development of new studies in literature.

Finally, when strategy theme maps are examined, it is seen that one health theme is motor theme in first period and main theme in second and third periods. This shows that one health theme developed by working intensively in first period and guided new themes in other periods, and took place among the main themes in last two periods. In addition, main themes in the second period, such as infections, risks, risk factors were motor themes in last period, animal species, molecular epidemiology, and bacteria such as bacteria were also motor themes in second period, while they were among disappearing-emerging themes in second period. In addition, themes such as vaccines, rabies, and interventions in the Q2 slice in second period have developed more recently and

took place in motor themes.

In this context, issues that are in the level of themes that have emerged especially in last period are considered as themes that should be dealt with and developed in the future. In this context, policies, collaborations, multidisciplinary studies, global health, ecosystem approach, management of human behavior, costs, etc. themes are issues that need to be studied to develop in one health. Results of many studies in literature support this decision.<sup>20,21</sup> While studying these topics, researchers can create a solid literature infrastructure and research method from motor themes and basic themes. In this direction, themes of excessive and uncontrolled use of antibiotics for global infectious diseases, antibiotic resistance, establishment of international surveillance systems, vaccine development, vaccination, epidemic risks and management should be taken into account. Studies in these areas should be examined.<sup>22,23</sup>

For future studies, researchers can also use data from databases such as Scopus, PubMed, Scholar. As bibliometric analysis software, they can choose different programs such as Citespace, Vosviewer, Bibliometrics. It is considered that results of this research can create awareness for all researchers and stakeholders interested in a one health field and can be used as an important data source.

In conclusion, as a result of findings obtained, it has been determined that studies on one health are quite common in the international literature and that they are not studied enough in Turkey. It is thought that especially public health experts in Turkey will make important contributions to national literature with single health studies. It has been concluded that researches on single health are widespread, especially in medical fields such as microbiology and infectious diseases. Despite this, studies examining the relationship of one health approaches with costs, health expenditures, resource allocation and health policies are insufficient. It is seen that there is a need to investigate one health studies according to these parameters in the future. Finally, based on the current global pandemics, it is thought that one health practices and approaches in the future need to be developed and detailed and it is a current research area.

**Ethics Committee Approval:** The approval of Sakaarya University of Applied Sciences Ethics Committee was obtained for the conduct of this study. (Date: 22.04.2022, decision no: 22/12).

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Author Contributions:** Concept – BM, İŞ; Supervision – BM, İŞ; Materials – BM, İŞ; Data Collection and/or Processing – BM, İŞ; Analysis and/ or Interpretation – BM, İŞ; Writing – BM.

**Peer-review:** Externally peer-reviewed.

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