

## Trend analysis of domestic forest healing research



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### ABSTRACT

This paper analyzes trends in forest healing studies based on the published graduates' theses and domestic journals in Korea from January 1, 2006, to June 30, 2021. The results of the study will provide data for forest healing researchers. According to the research results, research related to forest healing in Korea has been steadily increasing since the early 2000s, and from 2020, most works are being actively performed. The gender ratio of researchers was 5.4% higher in females than males in the case of degree dissertations and 25.0% higher in males than females in the case of journals. In terms of publication type, the highest number of journals was 184 articles (61.3%), followed by master's thesis with 82 articles (27.3%) and doctoral dissertation with 34 articles (11.3%). In terms of research methods, most of the papers (77.3%) are quantitative studies. When the study subjects were classified into the general group, occupational group, disease group, and social target, the general group for the purpose of prevention were the most with 78 articles (61.9%). The topics of the papers related to forest healing were in the order of analysis of the effects of forest healing programs, development of forest healing programs, and forest healing facilities. At a time when more attention is being paid to forests, which are places of healing due to the COVID-19 pandemic, it becomes basic data for forest healing researchers through objective data analysis of domestic forest healing. When analyzing domestic and foreign trends in the future, if you analyze paradigm changes and trends in various media, such as news as well as YouTube videos, using big data-related technologies that have been used in recent research papers, broader insights can be provided.

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## 1. Introduction

COVID-19, being a global pandemic, brings much stress to the world. After the first confirmed case of COVID-19 in Korea in January 2020, the public sentiment stagnates and social vitality deteriorated due to prolonged social distancing (MHW, 2021). This phenomenon goes beyond mental health problems called "COVID-19 blue" such as depression or anxiety symptoms and is progressing to "COVID-19 red," which leads to anger and fear due to the accumulation of depression. According to the data released by the "COVID-19 National Mental Health Survey" in the first quarter of 2021 (MHW, 2021), the risk of depression in all age groups facing

different stressful situations increased about six times from 3.8% in 2018 before the outbreak of COVID-19 to 22.8% in 2020. As a result, thoughts about suicide also increased 3.5 times from 4.7% in 2018 to 16.3% in 2020.

In order to solve these problems, the country is improving depression by opening forest spaces to the vulnerable class and response personnel through the Korea Forest Service. In addition, to efficiently deliver the benefits of forest healing, since May 2020, various cooperative projects have been carried out through the forest healing support program. Although the operation was temporarily suspended due to the increase and extension of social distancing the number of participants in the forest treatment program recorded 1,045 at the end of October 2020 and is continuing to increase. In addition, the Korea Forest Service conducted a forest healing program to overcome depression from COVID-19 and reported that a statistically significant emotional stabilization effect was confirmed as a result of an emotional stability test on 415 participants. The main achievements of promoting forest healing support

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for COVID-19 are the discovery of the possibility of supporting disaster psychological recovery using forests and the improvement of COVID-19 depression. In addition, the Korea Forest Service was included in the 'Central Disaster Psychological Recovery Support Group' according to the Disaster Relief Act while establishing a system that enables systematic support for forest healing in the event of a disaster. In the event of a disaster, the provision of forest healing services will be facilitated for victims by the continuous management group and national disaster response personnel.

Although there are some differences of opinion among scholars studying the definition and concept of forest healing, the common point is that forests increase immunity and promote health. Forest healing was created as a compound word of the term forest and healing. The Korea Forest Service defines forest healing as an activity that enhances the human body's immunity. In this regard, 'healing forest' was defined as a forest created for forest healing, immunity, and health by using various elements of nature such as fragrance and scenery.

The claims of researchers on the effects of forest healing are as follows. Yoo and Jeong (2009) introduced that using the many physical and environmental factors of forests to make the human mind and body healthy and using forests for the treatment of incurable diseases is the key to forest healing. It is effective to ultimately prevent disease in advance and restore health by feeling comfortable physically and mentally in the forest away from urban life and by enhancing immunity through this. Park (2010) said that the effect of applying a forest environment to improve mental and physical health has been scientifically proven. Kang et al. (2011) physiologically proved the effect of forest bathing and claimed that it is expected to have a preventive medical effect by restoring lowered immunity through psychological stability. Also, topography, climate, light rays, negative ions, phytoncides, scents, sounds, and landscapes interact with human sensory, physiological, mental, and body tissues to promote human mental and physical health.

Researchers have also been actively making efforts to restore health and improve the quality of life in forests. The first study on forest healing in Korea in 1996 was a study on the effect of experience participating in forestry programs on the level of depression (Shin and Oh, 1996). Since then, a study by Cho et al. (2009) demonstrated the effectiveness of forest healing and Song et al. (2009) used psychological indicators such as depression index, stress index, and self-esteem measurement were used. Various studies have been attempted in Korea to prove the effect of forest healing, such as Park (2011), who measured autonomic nervous system activity using a scientific method. At the same time, a paper that analyzed the research trends related to forest healing (Sun and Lee, 2010) called 'Systematic Review on Papers Related to Forest Healing' was published for the first time in Korea. As of March 2010, only three papers were analyzed

targeting only the RCTS study, which is a clinical trial related to forest healing. In a study on forest healing programs such as Hong et al. (2010), 41 papers were searched with three keywords and only a brief report on the status was reported. Sung et al. (2015) analyzed the domestic trend of forest healing research again.

It has been almost 20 years since the relevant laws on forest healing were enacted in Korea in 2005 and the movement on forest healing started. Various interest in forest healing, which improves health in forests as an alternative to various environmental pollutions such as the COVID-19 pandemic and fine dust, is growing more than ever. So far, a meta-analysis of the effectiveness of forest healing programs (Cho et al., 2015) and a forest healing issue network analysis using big data (Park and Yeon, 2020) have been published, but overall trend research on forest healing in Korea is lacking. This study aims to provide a trend analysis of domestic forest healing research by looking at the thesis data that have been studied on the topic of forest healing so far and categorizing the general status and various research topics and research subjects. In particular, at a time when more attention is being paid to forests, which are places of healing due to the COVID-19 pandemic, it becomes basic data for forest healing researchers through objective data analysis of domestic forest healing.

## 2. Study method

### 2.1. Study subject

The subject of this study was to search for papers to be analyzed using the online search database of Journal Research Information Service (RISS), Korea Education and Research Information Service (KISS), Nuri Media (DBpia), and Scholar from January 1, 2006, to June 30, 2021. The keywords were 'forest healing,' and the title of the thesis was searched with the keywords 'forest.' As a result of the search, 119 domestic master's and doctoral dissertations and 213 domestic journals were searched, bringing a total of 332 articles collected. Among them, papers not directly related to forest healing, papers in which forest healing was entered as a keyword but not on forest healing, duplicate papers, and papers whose original text was not viewed and read were excluded from the study. As a result of the data search, a total of 300 papers for forest healing research were selected, including a total of 116 domestic master's and doctoral theses and 184 Journal papers. This study is a quantitative study.

### 2.2. Study design

The study started on May 1, 2021, until July 15, 2021. The data collection was collected from research on forest healing published in Korea from January 1, 2006, to June 30, 2021. The data analysis period was from June 1, 2021, to July 10, 2021. This

study was conducted by three people including two experts and one researcher. The experts include a professor teaching research and one with a doctoral dissertation. The first meeting was held on May 1, 2021, and the scope of the study was determined at the first meeting. The second meeting was held on July 1, 2021. At the second meeting, the representative author of the papers, the subject of this study, was selected as the corresponding author. The overall review of the study was done by two experts.

### 2.3. Data analysis

The collected data were analyzed for domestic research trends, and master's and doctoral dissertations and papers from domestic journals were classified and coded by researchers (gender), publication type, papers by year, research method, degree-granting institution, and research topic. Real numbers and percentages were calculated from the analyzed results. In this study, descriptive statistics of the research contents of the thesis selected according to the selection criteria were processed with Excel functions such as alignment, filter, and data validation for accurate verification of data coding.

## 3. Results

### 3.1. Gender trends analysis

The general gender ratio of researchers who study forest healing was investigated. In the case of multiple authors, the gender of the corresponding author was used as the standard. In the case of degree thesis, there are a total of 116 articles, and there are two women who wrote their master's thesis and doctoral dissertation on forest healing. This was counted as 114 articles, excluding the duplicate statistics. Table 1 and Fig. 1 show degree study classification analysis by gender.

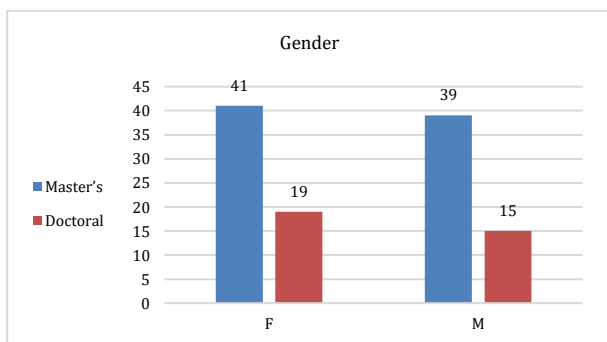


Fig. 1: Degree study classification analysis by gender

There was a total of 80 master's theses, with 41 females and 39 males, showing a rather high proportion of females. Among the 34 doctoral theses, 19 were female authors and 15 were male authors showing a rather high proportion of females. Among the 114 papers, 60(52.7%) were female authors and 54(47.3%) were male authors, indicating that female

researchers were 5.4% higher overall. Table 2 and Fig. 2 show journal classification analysis by gender.

Table 1: Degree study classification analysis table by gender

	Master's	Doctoral	N	%
F	41	19	60	52.7
M	39	15	54	47.3
S	80	34	114	100.0

Table 2: Journal classification analysis table by gender

	Journal	%
F	42	37.5
M	70	62.5
S	112	100.0

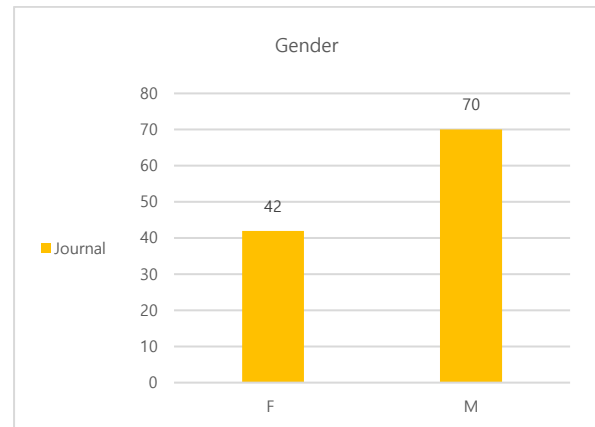


Fig. 2: Journal classification analysis by gender

For journals, 112 articles counted the subject by gender, excluding 72 articles with 29 identical corresponding authors who published two or more of the 184 articles. There were a total of 112 papers in the journal, of which 42(37.5%) were female authors and 70 (62.5%) were male authors, indicating that male researchers were 25.0% higher overall.

### 3.2. Papers by publication type

The researcher's papers are divided into master's thesis, doctoral dissertation, and journal by publication type. Table 3 and Fig. 3 show papers by publication type.

Table 3: Papers by publication type

Publication Type	Number of Papers	%*
Master's	82	27.3
Doctoral	34	11.3
Journal	184	61.3
S	300	100.0

\* Percentages have an error of 0.1% due to rounding off

Looking at the distribution of publication types of research papers, master's theses were 82 (27.3%), doctoral dissertations were 34 (11.3%), and journals were 184 (61.3%).

### 3.3. Analysis of papers by year

A total of 300 papers from January 1, 2006, to June 30, 2021, were presented in separate journals and master and doctoral theses on forest healing. By

year, the first period (2000-2009) is the 'introduction period' of forest healing, the second period (2010-2019) is the 'formation period,' and the third period (2020-2029) is the 'development period.'

Table 4 shows papers by year and Fig. 4 show number of papers per year.

As a result of analyzing the frequency of publications by year among 300 research papers, looking at the subtotal of master's theses and doctoral dissertation and journals, the first period included 9 articles (3.0%), the second period 34(78.0%), and the third period 57(19.0%). Until 2007, there were insufficient studies related to forest healing that directly mentioned healing such as forest healing. However, there was a study on the forest planning criteria for healing in 2008 (Lim, 2008), the effect of a forest healing program on the depression and self-esteem of single mothers in 2009 (Song et al, 2009), and the healing experience of alcohol dependents through forest experience (Cho et al, 2008).

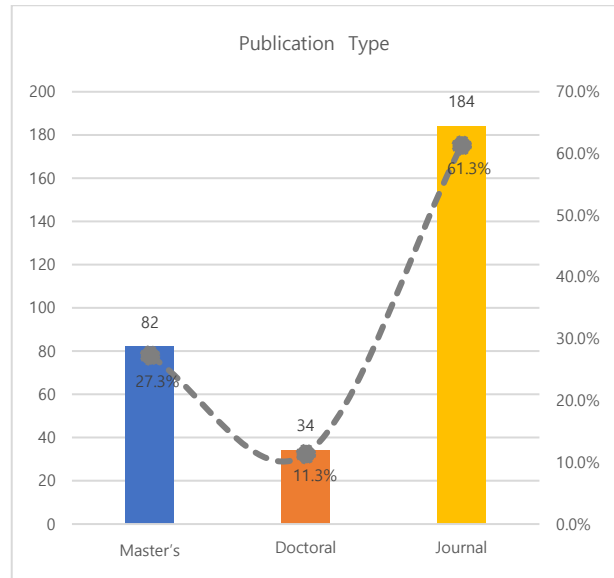


Fig. 3: Papers by publication type

Table 4: Papers by year

Year	Master's	Doctoral	Journal	S	N	%*
1st Period (2000~2009)						
06'	-	-	1	1		
07'	-	-	1	1		
08'	1	-	2	3	9	3.0
09'	1	-	3	4		
10'	-	2	4	6		
11'	2	-	13	15		
12'	3	3	9	15		
13'	11	4	12	27		
2nd Period (2010~2019)						
14'	7	1	17	25	234	78.0
15'	10	3	20	33		
16'	6	2	27	35		
17'	5	5	12	22		
18'	10	2	17	29		
19'	9	5	13	27		
3rd Period (2020~2029)						
20'	10	5	22	37	57	19.0
21'	7	2	11	20		
S	82	34	184	300	300	100.0

\* Percentages have an error of 0.1% due to rounding off

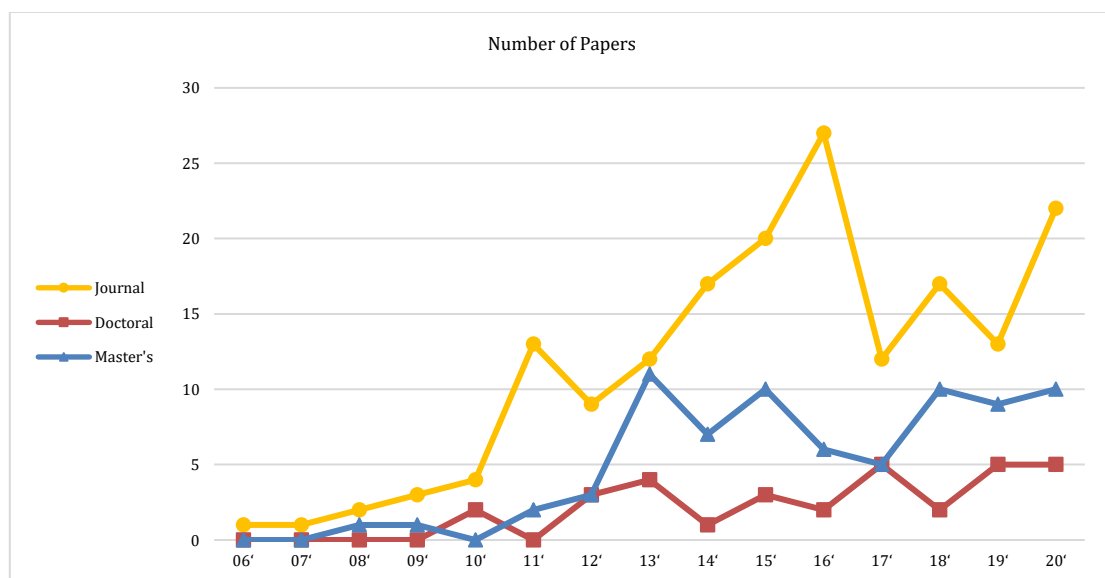


Fig. 4: Number of papers per year

This coincided with the first forest healing research project conducted by the Korea Forest

Service in 2007, and the first Healing Forest opened and operated in Saneum. The year 2013 was the time

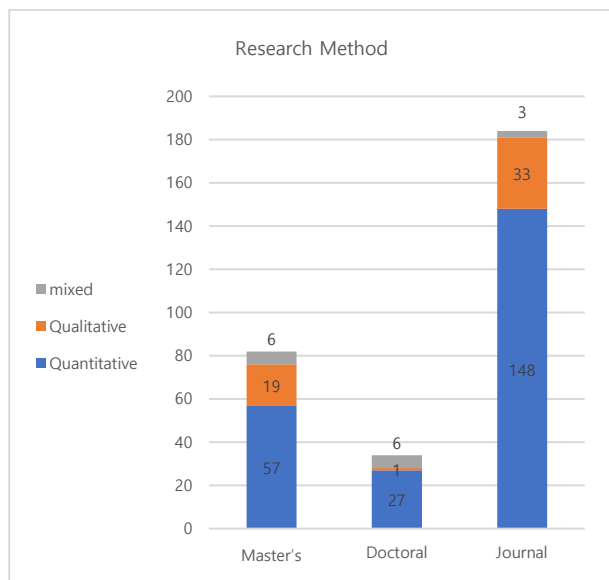
when forest healing entered the development stage in Korea, and research began in earnest. Since then, it can be seen that the research articles have been steadily increasing. In 2020, 37 research articles were published, and 20 articles by the end of June 2021 are expected to continue to increase in the future.

### 3.4. Analysis by research method

According to the research method, this study was classified into a quantitative study (including experimental study and research study), qualitative study, and mixed study, and the frequency was recorded. Table 5 and Fig. 5 show paper classification analysis by research method.

**Table 5:** Paper classification analysis table by research method

	Master's	Doctoral	Journal	N	%
Quantitative	57	27	148	232	77.3
Qualitative	19	1	33	53	17.7
Mixed	6	6	3	15	5.0
Total	82	34	184	300	100



**Fig. 5:** Paper classification analysis by research method

When looking at the total number of research methods, quantitative studies were overwhelmingly large with 232 (77.3%) research, 53 (17.7%) qualitative studies, and 15 (5.0%) mixed studies. Most of the research related to forest healing has been focused on quantitative research that relies on statistical techniques calculated quantitatively so far. On the other hand, qualitative research included analysis of psychological phenomena of people who have experienced healing in the forest (Oh et al., 2016), and recently, mixed studies combining quantitative and qualitative research are also appearing.

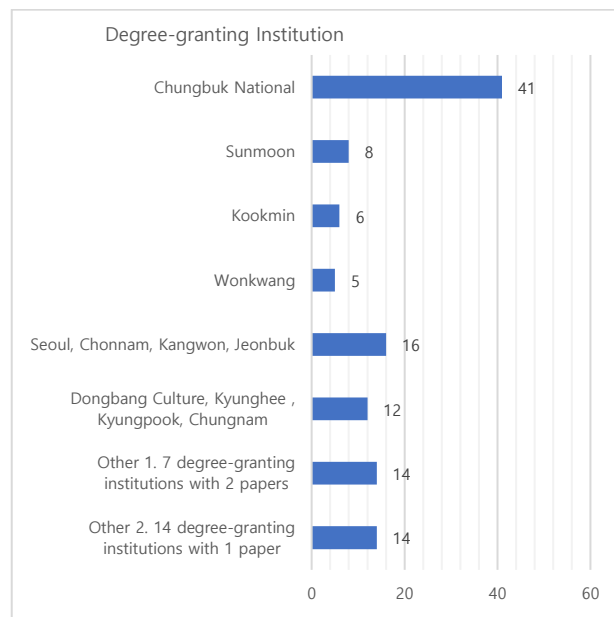
### 3.5. Analysis by the degree-granting institution

During the research period, a total of 116 theses on forest healing were awarded master and doctoral

degrees. Table 6 and Fig. 6 show the number of the thesis by the degree-granting institution.

**Table 6:** Number of the thesis by the degree-granting institution

Degree-granting University	N	%
Chungbuk National	41	35.3
Sunmoon	8	6.9
Kookmin	6	5.2
Wonkwang	5	4.3
Seoul, Chonnam, Kangwon, Jeonbuk	16	13.8
(per 4)		
Dongbang Culture, Kyunghee, Kyungpook, Chungnam	12	10.3
(per 3)		
Other 1. 7 degree-granting institutions with 2 papers	14	12.1
(per 2)		
Other 2. 14 degree-granting institutions with 1 paper	14	12.1
(per 1)		
S	116	100



**Fig. 6:** Number of the thesis by the degree-granting institution

As for degree-awarding institutions, Chungbuk National University had the highest number with 41 cases (35.3%), followed by Sunmoon University with 8 cases (6.9%), Kookmin University with 6 cases (5.2%), and Wonkwang University with 5 cases (4.3%). There were 4 cases from Seoul National University, 4 cases from Chonnam National University, 4 cases from Kangwon National University, 4 cases from Chonbuk National University, 3 cases from Dongbang Graduate School of Culture, 3 cases from Kyunghee University, 3 cases from Kyungpook National University, and 3 cases from Chungnam National University had.

### 3.6. Institutional analysis of journals

A total of 184 journal papers were published in 54 journals. The analysis of the journal papers is as follows (Table 7 and Fig. 7).

A total of four journals published more than 10 papers, with 57 articles (31.0%) from the Journal of the Korean Society for Forest Recreation, followed by 22 articles (12.0%) from the Journal of the

Korean Society for Environment and Ecolog, and 15 articles (12.0%) from the Journal of the Society for Human Plant Environment, while Journal of the Korean Society for Forest Science (Journal of the Korean Society for Forestry) published 14 volumes (7.6%).

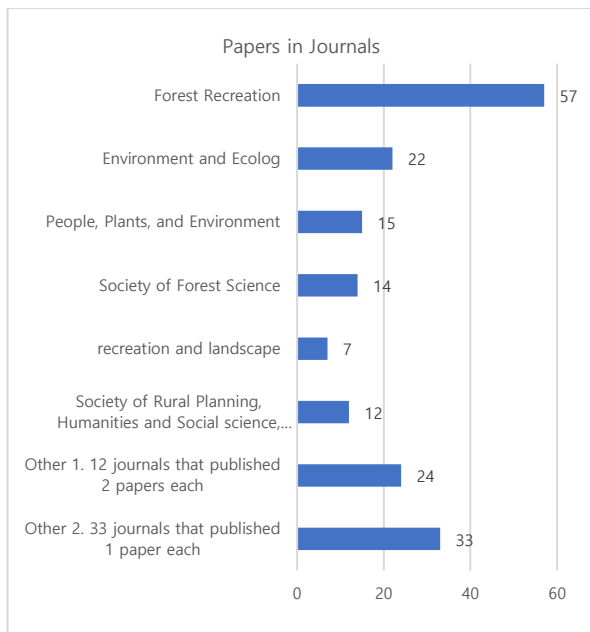


Fig. 7: Number of papers in journals

There were 7 cases of recreation and landscape research (3.8%), 3 cases of rural planning, 3 cases of Humanities and Social Sciences, 3 cases of Journal of the Korea Entertainment Industry Association, and 3 cases of Journal of Naturopathy. This seems to be related to the fact that the Korean Journal of Forest Recreation was founded in 1997 and continuously published papers.

### 3.7. Analysis by research topic

The results of the analysis according to the research topic are as follows (Table 8 and Fig. 8).

Table 7: Number of papers in journals

Journal Name	N	%
Forest Recreation	57	31.0
Environment and Ecology	22	12.0
People, Plants, and Environment	15	8.2
Korean Society of Forest Science	14	7.6
Recreation and Landscape	7	3.8
Society of Rural Planning, Humanities and Social science, Entertainment Industry Association, Naturopathy	12	6.5
Other 1. 12 Journals that published 2 papers each	24	13.0
Other 2. 33 Journals that published 1 paper each	33	17.9
S	184	100.0

Table 8: Classification by research topic

Research Topic	The details	Master's and Doctoral	Journal	N	%
Forest Healing Program	- Effect of Forest Healing Program - Development of forest healing program - Preference for forest healing programs	61	95	155	51.7
Forest healing facilities and operation	- Demand analysis, plan, others. - Healing space creation plan - Healing facility effect and preference for use	17	28	46	15.3
Forest healing factors Forest environment	- Healing facility operation - Forest healing factor effect - Forest healing factor function and preference	12	26	38	12.7
Forest healing users	- Effects and relevance according to the forest environment - Motivation for visit and satisfaction with use - Demand survey, usage behavior, others.	9	13	22	7.3
Forest Healing Instructor	- Curriculum development plan - Job analysis and job satisfaction	3	5	8	2.7
Recreation, welfare, tourism	- Medical tourism, healing tourism, healing food	1	5	6	2.0
Trend analysis and policy	- Forest healing news and trend analysis - Nurturing policy and activation plan	13	12	25	8.3
S		116	184	300	100

As a result of the analysis according to the research topic, it was classified into seven categories. Among the subjects studied so far, forest healing programs accounted for the largest number of 155(51.7%) cases. It was followed by 46 (15.3%) on forest healing facilities and operations, 38(23.7%)

on forest healing factors and forest environment, 25 (8.3%) on trend analysis and policies, 22(7.3%) on forest healing users, 8(2.7%) on forest healing instructors, and 6(2.0%) on recreation, welfare, and tourism.

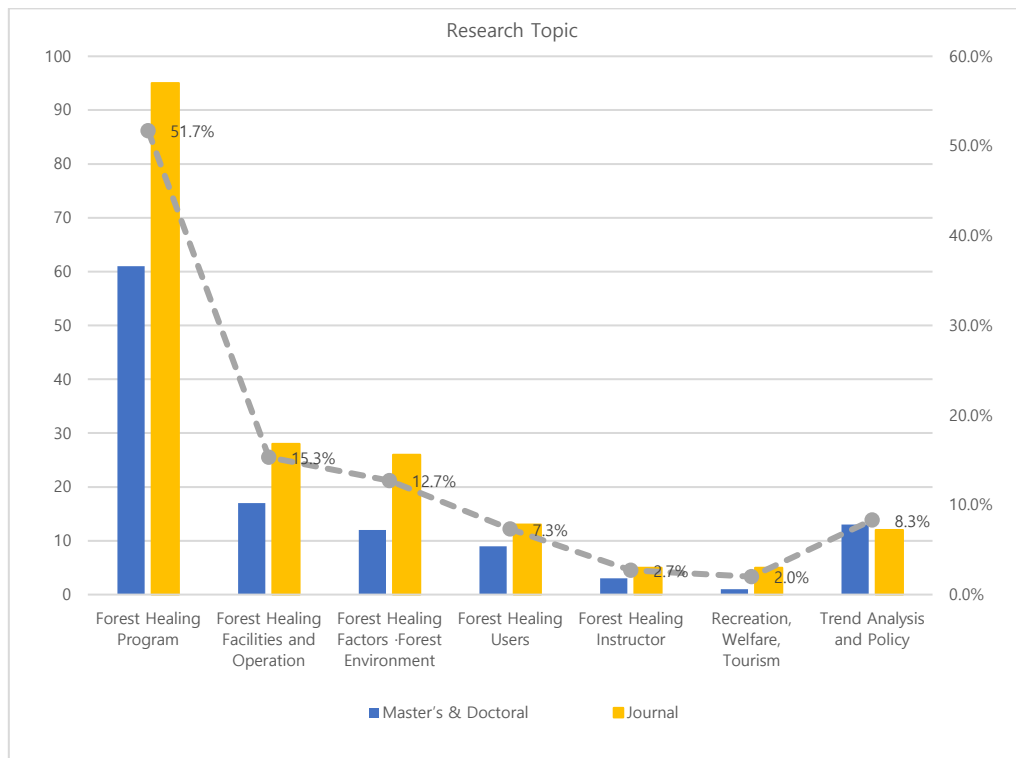


Fig. 8: Classification by research topic

3.8. Analysis by research subject

The subjects of this research were 126 papers clearly identified to measure the psychological, emotional, and physical effects of which the research

topic was related to the 'Forest Healing Program.' Table 9 and Fig. 9 show classification by research subject.

Table 9: Classification by research subject

Target	Master's and Doctoral(N)	Journal(N)	S
General Population	senior (5) Adults and general users(16) University students(4) Youth(6) Infant(3)	senior (4) Adults and general audience (29) Menopausal Women(3) University Students(1) Youth(4) Infant(3) General Occupational Group(3) Emotional Worker(1)	78 (61.9%)
	34 (69.4%)	44 (57.1%)	
Group of Occupations	Public Officials in Charge of Social Welfare (1) Fire Officer(1) Call Center Counselor, Public Official(1)	Teacher(2) Public officials in charge of social welfare and mental health workers (1) Firefighter(1) Medical Person(2) Atopic dermatitis(3) Alcoholism and dependence(4) Chronic disease(2) Cancer patient(1) depressive disorder dependent(1) infertile women (1) Elderly Living Alone (2) Single Mother (1) Victims of sexual violence against women (1)	12 (9.5%)
	3 (6.1%)	9 (11.7%)	
Group of Disease	Hypertension Diabetes patients (1) Cancer patients (1) Schizophrenia (2)	Internet Addiction Risk Group Youth (2) School Violence Victims (2) Probation Youth (1) Multicultural and marginalized (1) Residents affected by forest fires (1)	16 (12.7%)
	4 (8.2%)	12 (15.6%)	
Social Object	Elderly living alone/nursing facility (2) Single mother(1) Children from poor families (1) Children from communal households (2) Youth victims of school violence (2)		20 (15.9%)
	8 (16.3%)	11 (15.6%)	
S	49	76	126

The analyzed papers consisted of 49 master's and doctoral dissertations and 76 journals, a total of 126. Among them, 78 (61.9%) were for 'general people,' 12 (9.5%) for 'occupational group,' 16 (12.7%) for 'disease group,' and 20 (15.9%) for 'social object.' The majority of these theses were on 'the general public' with 61.9%. Next, 'social object,' 'disease group,' and 'occupational group' appeared in that order. In 'People,' adults and general users accounted for the majority with 41 episodes, but

there are also 10 teens and 9 elderly people. In 'Occupational Group,' research papers targeting various occupational groups such as firefighters, medical personnel, emotional workers, and call center counselors exposed to intense stress and depression appeared. In the 'disease group,' there were 3 cases of atopic dermatitis, 4 cases of alcoholism, and 3 cases of chronic diseases and hypertension and diabetes.

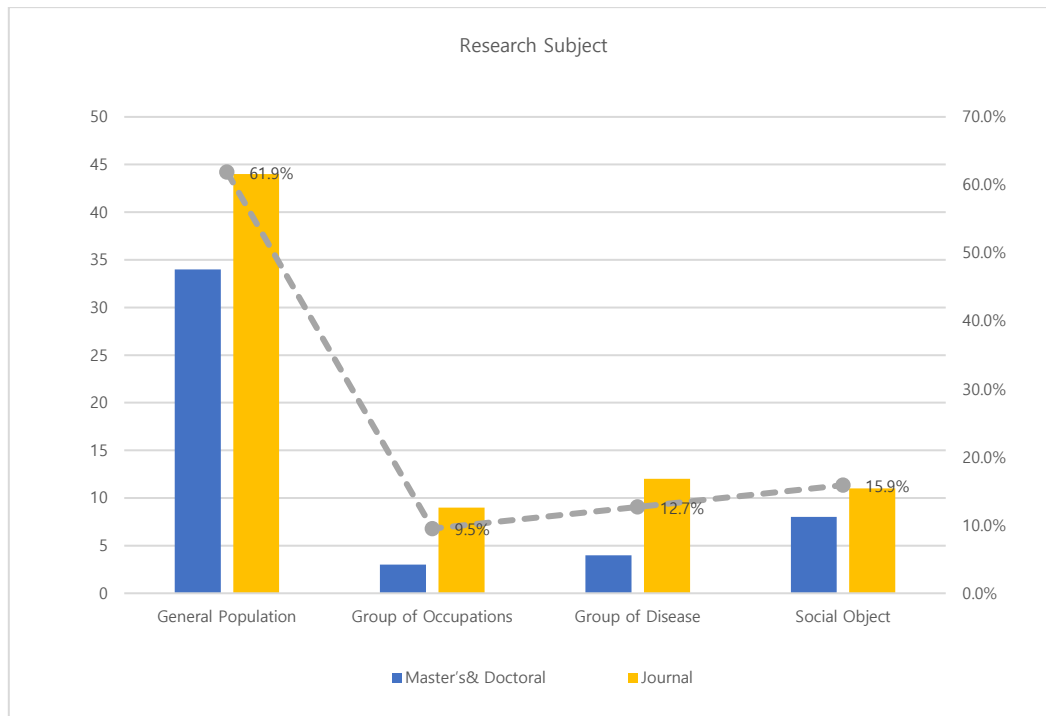


Fig. 9: Classification by research subject

"Social targets" include 4 seniors in nursing homes, including seniors living alone, 4 adolescents victimized by school violence, 2 adolescents in the Internet addiction risk group, and 1 probationary youth.

#### 4. Discussions

According to the research results, research related to forest healing in Korea has been steadily increasing since the early 2000s, and from 2020, most works are being actively performed. The gender ratio of researchers was 5.4% higher in females than males in the case of degree dissertations and 25.0% higher in males than females in the case of journals. In terms of publication type, the highest number of journals was 184 articles (61.3%), followed by master's thesis with 82 articles (27.3%) and doctoral dissertation with 34 articles (11.3%). In terms of research methods, most of the papers (77.3%) are quantitative studies. When the study subjects were classified into the general group, occupational group, disease group, and social target, the general group for the purpose of prevention were the most with 78 articles (61.9%). The topics of the papers related to forest healing were in the order of analysis of the

effects of forest healing programs, development of forest healing programs, and forest healing facilities. At a time when more attention is being paid to forests, which are places of healing due to the COVID-19 pandemic, active research on forest healing in Korea is being conducted.

#### 5. Conclusion

Since the early 2000s, forest healing has been developing at a rapid pace due to social demands and national policy aspects. As the movement for forest healing began, in the early days, forest healing programs were developed and implemented, and forest healing was developed through effectiveness measurement. In 2020, the COVID-19 pandemic started. In this regard, the forest provides another vaccine, contributing not only to the emotional and psychological stability of the people but also to resolving the 'COVID-19 blue.' Forest healing focused its efforts on scientifically verifying the effects of forest healing through various research subjects. Therefore, it seems that the forest healing program takes up the most weight. The benefits of forests like this are endless. Therefore, if programs using forests collaborate with other healing systems to create more synergistic effects, better results will be



obtained. It is expected that interest and demand for forest healing will continue to increase in the future.

In conclusion, it was found that forest healing has many uses as a preventive measure to protect health. In order to protect the health of the people in the future, a lot of efforts from forestry officials and researchers are needed. We would like to add a few suggestions. First, when analyzing domestic and foreign trends in the future, if you analyze paradigm changes and trends in various media, such as news and YouTube videos, using big data-related technologies that have been used in recent research papers, broader insights can be provided. Second, it is necessary to reorganize the forest healing program to increase its therapeutic value and to take on new challenges. Third, research that can synergize with various healing issues such as agricultural healing and marine healing, which is a recent healing issue, should be done.

### Compliance with ethical standards

### Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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