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A Bibliometric Examination of Sanitation Issues and Challenges in Nepal: Identifying Research Trends and Knowledge Gaps

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Abstract

Background and Objective: This study delves into the bibliometric examination of sanitation issues and challenges in Nepal, aiming to identify research trends and knowledge gaps in the WASH sector. Nepal has set ambitious targets under SDG 6 to ensure water and sanitation access for all but faces significant hurdles due to its mountainous terrain and climate vulnerability.

Methodology: Data for this study was sourced from Dimensions.ai, focusing on publications related to sanitation issues in Nepal from 2013 to 2024. A bibliometric analysis was conducted to analyze publication trends, citation ratios, top sources, and countries contributing to research on sanitation in Nepal.

Key Findings: The analysis revealed fluctuating research output over the years, with Health Sciences leading in publication frequency. Notable organizations such as the Institute of Engineering and the London School of Hygiene & Tropical Medicine emerged as key contributors to research output and influence. Citation numbers have shown a general increase, indicating growing academic engagement and impact in addressing sanitation challenges in Nepal.

Conclusion: The findings underscore the diverse yet evolving landscape of research on sanitation issues in Nepal. While progress has been made, there is a pressing need for heightened awareness and targeted interventions, particularly at the local level, to tackle the multifaceted challenges in sanitation. Enhanced collaboration among countries and organizations, coupled with improved dissemination of research findings, can bolster effective adaptation strategies and public health initiatives in Nepal.

Keywords: Bibliometric analysis, Nepal, Research trends, Sanitation, WASH

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Introduction

Nepal has set the target of SDG in different areas including WASH sectors. SDG 6 is *'Ensure availability and sustainable management of water and sanitation for all'*. The proposed targets for SDG 6 include basic water supply coverage to 99 percent of households' piped water supply and improved sanitation to 90 percent of households. Other targets are to free 99 percent of the communities from open defecation, to reach 95 percent of the households with improved sanitation facilities that are not shared, and to ensure 98 percent of the population uses latrines (National Planning Commission, 2017).

Nepal's mountainous terrain and reliance on natural resources make it highly vulnerable to climate change, leading to temperature changes, glacier retreats, and erratic rainfall, which cause floods and landslides. These impacts reduce agricultural productivity, increase food insecurity, and damage infrastructure. Rising temperatures and altered precipitation patterns exacerbate water scarcity and contamination, affecting clean water and sanitation. Limited awareness among local stakeholders hampers effective adaptation measures for Water, Sanitation, and Hygiene (WASH), necessitating urgent interventions to protect public health (Government of Nepal, 2021; Sharma, et al., 2021). In rural Nepal, governing sustainable water supply, sanitation, and hygiene (WASH) services is a significant problem that calls for ongoing efforts to enhance coordination, the provision of high-quality treatments, and community involvement. Concerning the functioning of WASH services in rural Nepal, governance issues in the water, sanitation, and hygiene (WASH) sectors are of global importance (Khatri & Bhandari, 2019).

WASH is crucial for human beings as it helps prevent diseases, maintain physical and mental health, reduce body odor, promote social well-being, and contribute to environmental sustainability. One previous study of Nepal shows that out of 768 students surveyed, half were from schools with improved Water, Sanitation, and Hygiene (WASH) facilities, while the other half were from schools with unimproved facilities. Significantly, 64% of respondents from schools with unimproved WASH facilities and 41% from schools with improved facilities reported sickness (P <.001). The likelihood of sickness was higher among respondents aged 15 to 19 (59%) and those aged 10 to 14 (51%) (P <.05). Females (57%) experienced sickness more frequently than males (47%) (P <.05). Moreover, students from Dalit backgrounds (67%) and Brahmin/Chhetri-Terai (62%) were more prone to sickness in schools with unimproved WASH facilities compared to other castes (55%), Janajati (43%), and Brahmin/Chhetri-Hill (39%) (P <.001). The study revealed a significant impact of school WASH services on students' health status (cOR = 0.388, CI; 290-0.519, P <.001), even after adjusting for other socio-covariates (aOR = 0.442, CI; 0.302-0.646, P <.001). Furthermore, female respondents were more likely to fall sick (aOR = 0.678, CI; 0.502-0.915, P <.01) compared to their male counterparts when controlling for other variables in the model (Sharma & Adhikari, 2022).

According to the results of the previous study, the Water, Sanitation, and Hygiene (WASH) status in Nepal is a challenge due to the country's rapid growth and sensitivity to climate change

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(Shrestha et al., 2023). The quality of water remains poor, with 71% of all water sources and 91% of those used by the poorest having poor functional status (UNICEF Nepal, 2023). Diarrhea and other waterborne diseases are common in Nepal due to the contamination of drinking water and poor quality of hygiene and sanitation (Aryal et al., 2012). One study conducted among the travelers of Nepal shows that the majority of the travelers (78.7%) preferred mineral water, which they think is safe to drink (Bhatta et al., 2023). Nepal is committed to achieving the Sustainable Development Goals (SDGs) by 2030, including access to safe water and basic sanitation as a fundamental right.

Objective of this study

This study investigates the bibliometric examination of sanitation issues and challenges in Nepal, aiming to identify research trends and knowledge gaps in the WASH sector. It is a review article based on the scholarly article published in Dimension.ai from 2013 to 2024.

Methodology

Data source: the data used in this article for bibliometric analysis were collected from 'Dimensions'. The published issues and challenges of sanitation in Nepal-related articles and proceedings were collected by using some filtration conditions.

Data filtration process: the study used the following filtration process:

Data source	Dimensions.ai
Keywords	Issues and Challenges of Sanitation in Nepal
Keywords Search in	Title and abstract
Publication Year	2013 to 2024
Total articles	14
Data collection date	December 30, 2024

Research Design: the study is based on the bibliometric analysis of scientific papers published on issues and challenges of sanitation in Nepal from Dimensions.ai. Bibliometric analysis is a widely used and rigorous method for exploring and analyzing large volumes of scientific data. It allows us to understand the evolutionary nuances of a specific field and identify emerging areas within that field (Donthu et al., 2021). This analysis aids in identifying national and international networks, mapping research trends, and evaluating the contributions of individuals, organizations, and countries (Saputro et al., 2023). It has statistically analyzed the publication trend, citation ratio, top sources, and top countries so it is based on the quantitative design.

Data analysis: It has used the bar chart, and tables to show the quantitative analysis of data. The trends and patterns of published articles are presented in graphs and tables.

Findings

The study has reviewed the scholarly published article on 'Issues and challenges of sanitation in Nepal' in Dimension.ai from 2013 to 2024. The study has analyzed the data of published articles on different thematic areas. The findings are presented as below sub-headings:

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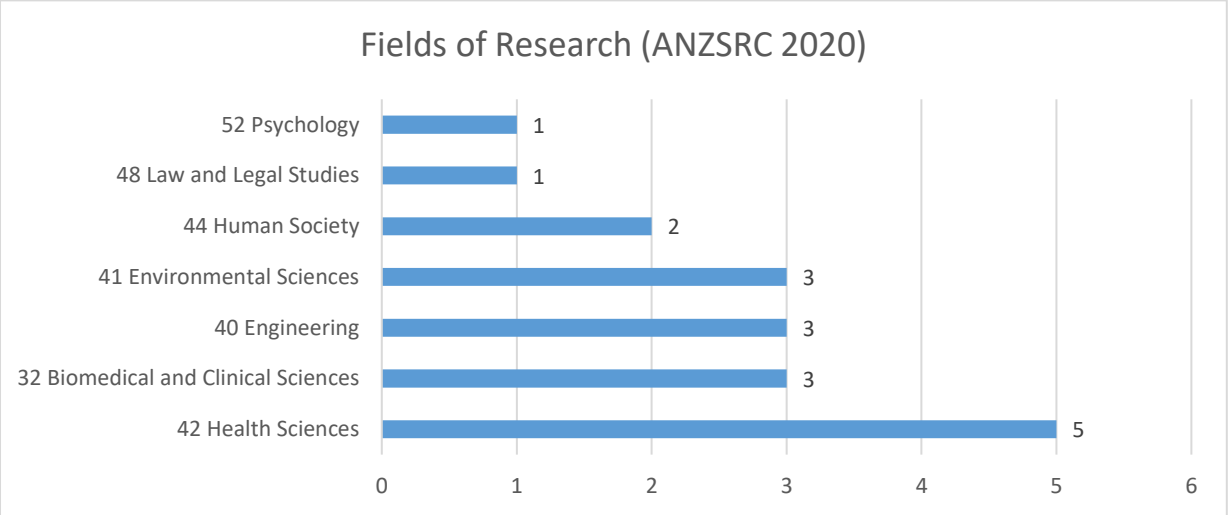
Fields of Research (ANZSRC 2020)

Figure 1

Fields of Research (ANZSRC 2020)



Source: Dimension.ai, 2024

Figure 1 categorizes research fields related to the publication on sanitation issues and challenges in Nepal, as indexed by Dimensions.ai, based on the Australian and New Zealand Standard Research Classification (ANZSRC 2020). It shows that Health Sciences leads with 5 publications, followed by Biomedical and Clinical Sciences, Engineering, and Environmental Sciences, each with 3 publications. Human Society has 2 publications, while Law and Legal Studies and Psychology each have 1 publication.

Publications (total)

Table 1

Publications (total)

Year of publication	Publications (total)
2013	1
2014	0
2015	0
2016	2
2017	2
2018	0
2019	1
2020	2
2021	2
2022	1
2023	3
2024	0

Source: Dimension.ai, 2024

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The table displays the distribution of publications on sanitation issues and challenges in Nepal by year, showing the total number of publications from 2013 to 2024. It indicates a fluctuating pattern in research output, with the highest number of publications (3) in 2023. Notable years with no publications include 2014, 2015, 2018, and 2024. Other years with research contributions are 2013, 2016, 2017, 2019, 2020, 2021, and 2022, with 1 to 2 publications each.

Citations (total)

Table 2

Citations (total)

Year	Citations (total)
2013	5
2014	6
2015	2
2016	4
2017	6
2018	14
2019	18
2020	16
2021	29
2022	24
2023	28
2024	20

Source: Dimension.ai, 2024

The table presents the total number of citations for publications on sanitation issues and challenges in Nepal from 2013 to 2024. Citations show a generally increasing trend, starting with 5 citations in 2013 and peaking at 29 in 2021. Notable increases are seen in recent years, with 28 citations in 2023 and 20 in 2024. Other significant citation counts include 14 in 2018, 18 in 2019, 16 in 2020, and 24 in 2022. Earlier years have relatively fewer citations, with 6 citations in 2014 and 2017, 4 in 2016, and 2 in 2015.

Country-wise Bibliographic coupling

Bibliographic coupling with country based on the number of published documents and their citations on issues and challenges of sanitation in Nepal. The documents are collected from Dimension.ai.

Table 3

Country-wise Bibliographic coupling

ID	Country	Documents	Citations	Total link strength
1	[see note]	1	21	0
2	Australia	1	3	155
3	Bangladesh	1	3	3

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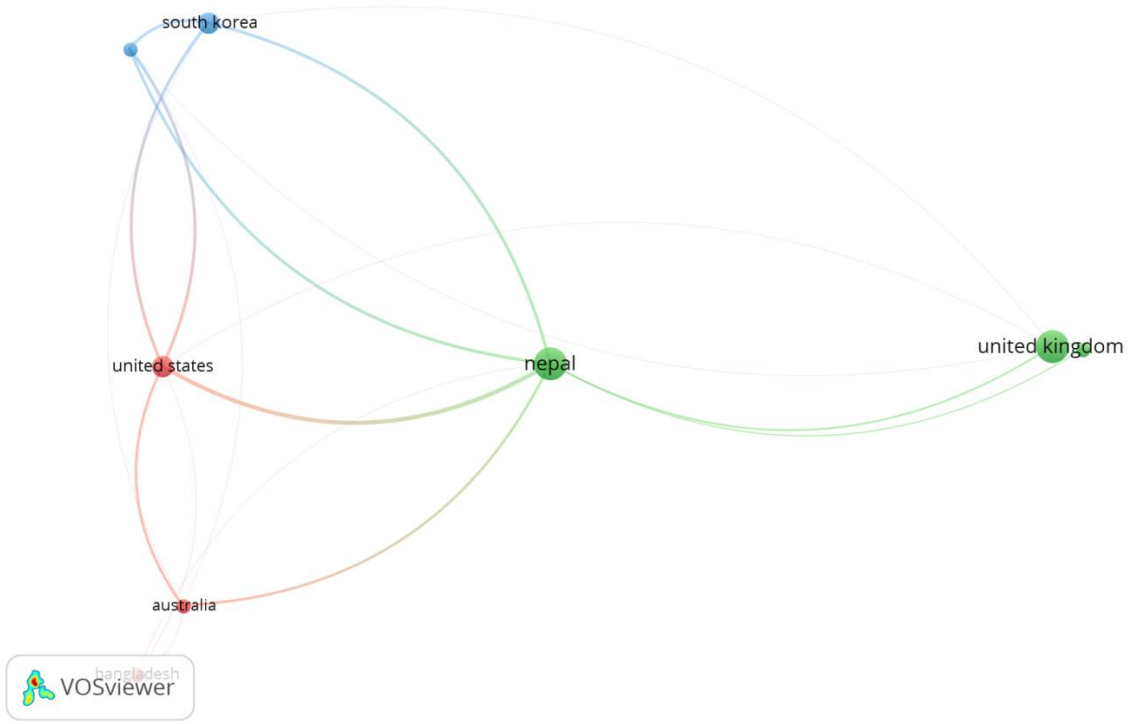
4	India	1	3	34
5	Nepal	5	70	503
6	South Korea	2	50	295
7	Switzerland	1	12	295
8	United Kingdom	5	88	59
9	United States	2	15	448

Source: Dimension.ai, 2024

Figure 2

Country-wise Bibliographic coupling



Source: Dimension.ai, 2024

Table 3 and Figure 2 present bibliographic coupling data for various countries based on the number of published documents and their citations regarding sanitation issues and challenges in Nepal. The data is sourced from Dimension.ai. Nepal leads with 5 documents and 70 citations, showing total link strength of 503. The United Kingdom also has 5 documents but more citations at 88, with link strength of 59. South Korea has 2 documents with 50 citations and link strength of 295. The United States has 2 documents and 15 citations, with link strength of 448. Other countries include Switzerland with 1 document, 12 citations, and link strength of 295; India with 1 document, 3 citations, and link strength of 34; Bangladesh with 1 document, 3 citations, and link strength of 3; and Australia with 1 document, 3 citations, and link strength

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of 155. Additionally, there is an entry with a note for an unspecified country, which has 1 document, 21 citations, and no link strength.

Organizations-wise bibliographic coupling

The data presented in Table 4 shows the bibliographic coupling with organizations based on the number of published documents and their citations on issues and challenges of sanitation in Nepal. The documents are collected from Dimension.ai.

Table 4

Organizations-wise bibliographic coupling

ID	Organization	Documents	Citations	Total link strength
1	[See Note]	1	21	0
2	Auburn University	1	3	230
3	Engineers Without Borders USA, 1031 33rd Street, Suite 210, Denver, Co 80205, USA	1	4	0
4	Independent Consultant	2	3	66
5	Independent Consultant, Kathmandu, Nepal	1	32	124
6	Institute of Engineering	2	15	526
7	Kangwon National University	1	38	0
8	Khulna University	1	3	4
9	Korea University	1	12	298
10	Liverpool John Moores University	1	50	63
11	London School of Hygiene & Tropical Medicine	3	35	170
12	London School of Hygiene and Tropical Medicine Department of Population Health	2	3	66
13	Manmohan Memorial Institute of Health Sciences	1	50	63
14	Phase Nepal, Nepal	1	50	63
15	Pokhara University	2	6	264
16	Sikkim Manipal University	1	3	34
17	Swiss Federal Institute Of Aquatic Science And Technology	1	12	298
18	Tribhuvan University	1	2	14
19	University of East London	1	3	34
20	University of Illinois Urbana-Champaign	1	12	298
21	University of Sheffield	1	50	63
22	University of Southern Queensland	1	3	230
23	Wash Specialist, Plan International Nepal, Lalitpur, Nepal	1	2	14
24	WaterAid	3	35	170

Source: Dimension.ai, 2024

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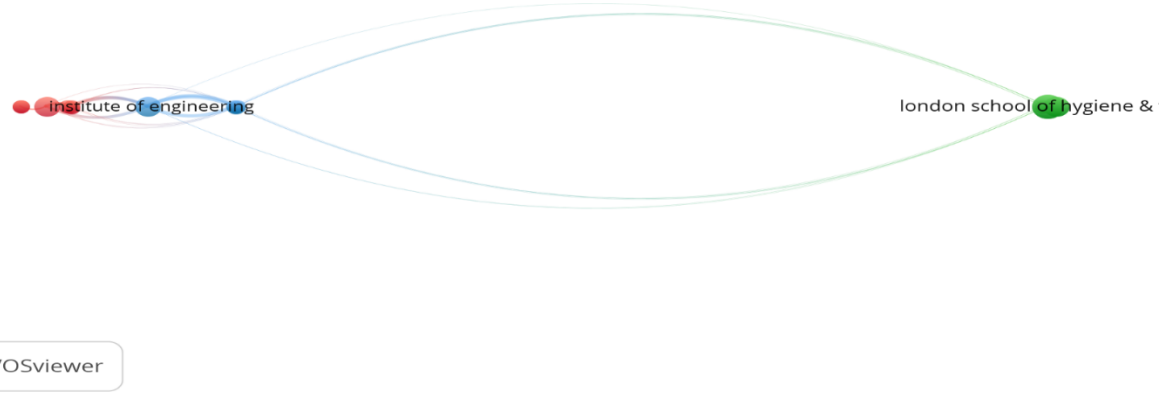
Figure 3
Organizations-wise Bibliographic coupling



Source: Dimension.ai, 2024

Table 4 and Figure 3 present bibliographic coupling data for various organizations based on the number of published documents and their citations regarding sanitation issues and challenges in Nepal, sourced from Dimension.ai. The Institute of Engineering leads with 2 documents, 15 citations, and total link strength of 526. Organizations with notable contributions include the London School of Hygiene & Tropical Medicine, and Water Aid, each with 3 documents, 35 citations, and a link strength of 170. Universities such as Liverpool John Moores University, Manmohan Memorial Institute of Health Sciences, Phase Nepal, University of Sheffield, and Kangwon National University each have 1 document and 50 citations, with link strengths varying from 0 to 63. Independent consultants and organizations like Pokhara University and Plan International Nepal also contribute significantly. Several other universities and organizations, such as Auburn University, Korea University, and the Swiss Federal Institute of Aquatic Science and Technology, have fewer documents but maintain a moderate to high link strength, highlighting their impactful contributions to the research on sanitation in Nepal. Additionally, there is an entry with a note for an unspecified organization, which has 1 document, 21 citations, and no link strength.

Bibliographic Coupling with Documents

Table 5 presents the data of bibliographic coupling with documents of authors based on their citations and total link strength on issues and challenges of sanitation in Nepal. The documents are collected from Dimension.ai.

Table 5
Bibliographic Coupling with documents

ID	Document	Citations	Total link strength
1	Hall (2017)	50	0
2	Montgomery (2016)	4	0
3	Wilbur (2021)	32	11
4	Khatri (2019)	2	0
5	Shrestha (2023)	12	2

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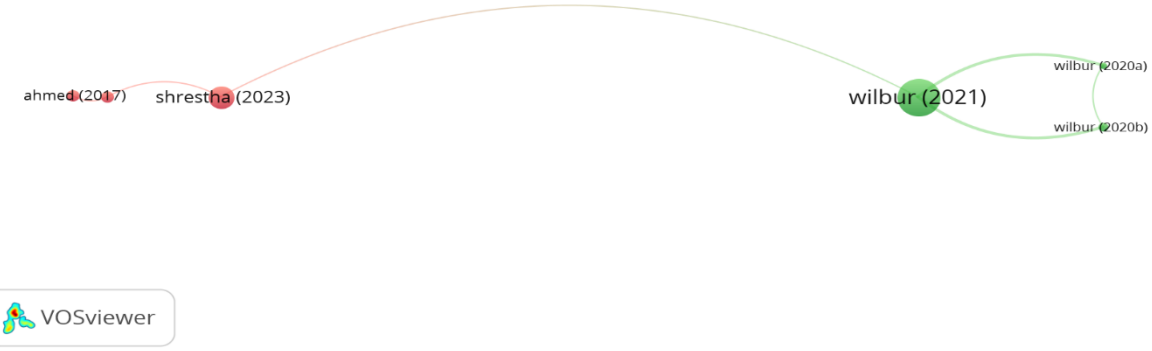
6	Gurung (2013)	38	0
7	Ahmed (2017)	3	1
8	Khanal (2023)	3	2
9	Wilbur (2020a)	1	6
10	Wilbur (2020b)	2	6
11	Shah (2022)	3	0
12	Anonymous (2021)	0	0
13	A Ericsen (2016)	21	0
14	Rehan Haider (2023)	0	0

Source: Dimension.ai, 2024

Figure 4

Bibliographic Coupling with documents



Source: Dimension.ai, 2024

Table 5 and Figure 4 provide bibliographic coupling data for various documents by authors based on their citations and total link strength related to sanitation issues and challenges in Nepal, collected from Dimension.ai. Hall (2017) and Gurung (2013) have the highest citation counts with 50 and 38, respectively, but no link strength. Wilbur's works, including Wilbur (2021) with 32 citations and link strength of 11 and two 2020 documents with lower citations but link strengths of 6 each, indicate notable contributions. Other documents with moderate citations include Shrestha (2023) with 12 citations and link strength of 2, and A Ericsen (2016) with 21 citations but no link strength. Authors such as Montgomery (2016), Ahmed (2017), and Khanal (2023) have minimal citations and low link strengths, while Anonymous (2021) and Rehan Haider (2023) have no citations or link strengths. Overall, the table highlights varying degrees of impact and interconnectedness among the research documents on sanitation in Nepal.

Conclusion

The findings indicate that research on sanitation issues in Nepal has been diverse but fluctuating over the years, with Health Sciences leading in publication frequency. Despite variations in annual publication counts, citation numbers have generally increased, reflecting growing academic engagement and impact. Bibliographic coupling data highlight significant

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contributions from Nepal, the United Kingdom, and South Korea, with notable organizations such as the Institute of Engineering and the London School of Hygiene & Tropical Medicine leading in research output and influence. However, there is a need for greater awareness and targeted interventions, particularly at local levels, to address the multifaceted challenges posed by sanitation issues in Nepal. Increased collaboration among countries and organizations, along with enhanced dissemination of research findings, can foster more effective adaptation strategies and public health initiatives in the region.

Conflict of Interest: There is no conflict of interest.

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