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Review

Nexus between Water Security Framework and Public Health: A Comprehensive Scientific Review

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Abstract: Water scarcity, together with the projected impacts of water stress worldwide, has led to a rapid increase in research on measuring water security. However, water security has been conceptualized under different perspectives, including various aspects and dimensions. Since public health is also an integral part of water security, it is necessary to understand how health has been incorporated as a dimension in the existing water security frameworks. While supply–demand and governance narratives dominated several popular water security frameworks, studies that are specifically designed for public health purposes are generally lacking. This research aims to address this gap, firstly by assessing the multiple thematic dimensions of water security frameworks in scientific disclosure; and secondly by looking into the public health dimensions and evaluating their importance and integration in the existing water security frameworks. For this, a systematic review of the Scopus database was undertaken using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A detailed review analysis of 77 relevant papers was performed. The result shows that 11 distinct dimensions have been used to design the existing water security framework. Although public health aspects were mentioned in 51% of the papers, direct health impacts were considered only by 18%, and indirect health impacts or mediators were considered by 33% of the papers. Among direct health impacts, diarrhea is the most prevalent one considered for developing a water security framework. Among different indirect or mediating factors, poor accessibility and availability of water resources in terms of time and distance is a big determinant for causing mental illnesses, such as stress or anxiety, which are being considered when framing water security framework, particularly in developing nations. Water quantity is more of a common issue for both developed and developing countries, water quality and mismanagement of water supply-related infrastructure is the main concern for developing nations, which proved to be the biggest hurdle for achieving water security. It is also necessary to consider how people treat and consume the water available to them. The result of this study sheds light on existing gaps for different water security frameworks and provides policy-relevant guidelines for its betterment. Also, it stressed that a more wide and holistic approach must be considered when framing a water security framework to result in sustainable water management and human well-being.

Keywords: water security; water insecurity; water scarcity; water security framework; public health; primary health care; COVID-19

1. Introduction

Water security is a concept that has recently gained widespread global attention. With the increase in population, rapid urbanization, overexploitation of natural resources, encroachment on natural forests, declining soil fertility, lack of capacity to adapt to climate change, and inadequate capacity of institutions for water management, achieving water security has become one of the emerging global challenges [1–3]. Nearly 1.8 billion people worldwide are already living in countries experiencing high water stress or scarcity [4], and by 2025 more than 2.8 billion people in 48 countries may face water stress [5]. Furthermore, the number of people exposed to water stress could double by 2050, when compared to 2010 [5]. All stakeholders must act quickly to address these challenges of rapid population growth, natural resource degradation, and climate change for better adaptation and achieving water security in a timely manner [3].

Over the last few decades, the concept of security has moved beyond a narrow emphasis on military threats and conflicts to wider concepts of human security, wherein water serves as a central link between health, economic, political, personal, food, energy, and environmental aspects of human security [6]. While the term 'water security' has been conceptualized with a variety of meanings by different scholars, managers, planners, and stakeholders to fit in their specific contexts [7], the United Nations task force on water security has holistically defined water security as "*the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability*" [4].

Water security is a key factor affecting public health. According to the Sustainable Development Goal (SDG) 6 synthesis study [4], 2.1 billion people lack access to clean drinking water, 4.5 billion people lack access to safely managed sanitation, 0.9 billion people still practice open defecation, and in the least developed nations only 27% of the population has access to soap and water for hand sanitation. In particular, vulnerable groups (e.g., ethnic minorities, children, the urban poor) are those who typically suffer most. Inadequate accessibility to clean water is also often linked with gender inequality. Every day, women and girls are estimated to spend 200 million hours hauling water around the world. In rural Africa, the average woman walks 6 km a day to carry 40 pounds of water [8]. These factors can negatively affect women's opportunities for pursuing education and careers. When there is an absence, insufficient or poorly regulated water and sanitation services, individuals become vulnerable to different preventable health risks [9]. From an environmental point of view, water-related diseases can be waterborne diseases caused by ingestion of contaminated water (e.g., Diarrhea, typhoid); water-washed diseases caused by poor personal hygiene (ex. lice, skin rashes), water-based diseases caused by parasites living in the water (e.g., some helminths), and diseases transmitted by water-associated insect vectors that breed in water (e.g., dengue, malaria) [10].

The incidence of outbreaks depends on the level of scarcity, population density, economic growth, extreme weather events [11]. When people lack even a basic drinking water service, they depend on surface water and/or wastewater that is not safe. Already, at least two billion people around the world are using drinking water sources that are contaminated with feces [9]. Water-borne diseases also occur through leakage of contaminated run-off water, or within the distribution of pipe systems [12].

Despite advancements in science and technology and water security measures, waterborne diseases kill 2195 children every day which is more than AIDS, malaria, and measles combined. This accounts for 1 in 9 child deaths worldwide, making waterborne diseases the second leading cause of death among children under the age of five, even in the 21st century [13]. Diarrheal diseases, the most common type of waterborne diseases, are particularly serious for children and vulnerable people in low-income countries [9]. On top of that, occasional climate-related hazards such as floods and droughts can further increase the pathogen load making water unsafe to drink. Flood can damage water infrastructures, sanitation facilities, reduces water quality, and can mix up drinking water with industrial and agricultural waste, increasing the risk of waterborne diseases [14] while droughts lead to shortages of water and poor water quality [13,15,16].

The risk has been even greater due to the emergence of SARS, MERS, and now COVID-19 [17]. Furthermore, water scarcity, poor quality, and poor accessibility to clean water can lead to additional mental health conditions such as persistent psychological stress, social alienation, intra-community disputes, despair, hopelessness, depression, and anxiety especially in developing countries [18,19]. Finally, due to rapid global changes including climate change, land-use change, and population growth, the risks of waterborne diseases are expected to further increase [2].

There are several frameworks or assessments developed to measure water security with various scales, aspects, and dimensions [7,20–22]. Considering the above-mentioned facts, health-related issues cannot be denied as a focal point or dimension to designing the water security framework. Thus, a comprehensive understanding of how health has been incorporated as a dimension in water security frameworks in different contexts around the world is needed. This research aims to address this need through a systematic analysis of existing water security frameworks, seeking to answer the following research questions:

1. How have the different dimensions of water security been reflected in scientific disclosures? What is the geographical and rural/urban focus of studies on water security and methods used for water security analysis?
2. What are the health impacts mentioned in the papers?
3. What is the importance of health-related issues in framing any water security framework?

2. Materials and Methods

A systematic literature review was conducted, using the Scopus database (http://www.scopus.com/, accessed on 5 December 2020) to collect existing literature related to water security frameworks. For this analysis, we followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to document our literature review process [23]. As the search query, we used the Boolean string: TITLE-ABS-KEY (water security) AND (TITLE-ABS-KEY (framework) OR TITLE-ABS-KEY (assessment) OR TITLE-ABS-KEY (health AND hazard)). Publication dates for the search were limited from the year 2000 to 2020, and all searches were limited to the English language texts. The full-texts of all articles retrieved from this search were downloaded and manually screened, and articles meeting any of the following inclusion criteria were used for further analysis: (1) articles discussing water security frameworks or assessments with or without an associated hazard; (2) articles reporting dimensions, components, or indicators of water security; or (3) articles including the term 'health'. Finally, papers matching our inclusion criteria were reviewed and the following information extracted: (a) Spatio-temporal information (i.e., the publication date and location of the studies); (b) the context in which the term water security was used (e.g., in relation to hazard-prone areas, lack of water infrastructure, water pollution, etc.); (c) the key components of the water security framework described in the study; (d) direct and indirect health impacts mentioned, and the importance given to health-related issues in framing a water security framework.

3. Results

The results of our literature search using the PRISMA guidelines are shown in Figure 1. A total of 933 papers were initially retrieved from Scopus using our defined search query. After a manual screening of these 933 articles, a total of 77 articles were found to be matching our defined inclusion criteria. All other journal articles not matching our inclusion criteria, as well as book chapters, conference papers, and other non-peer reviewed reports were excluded from further analysis.

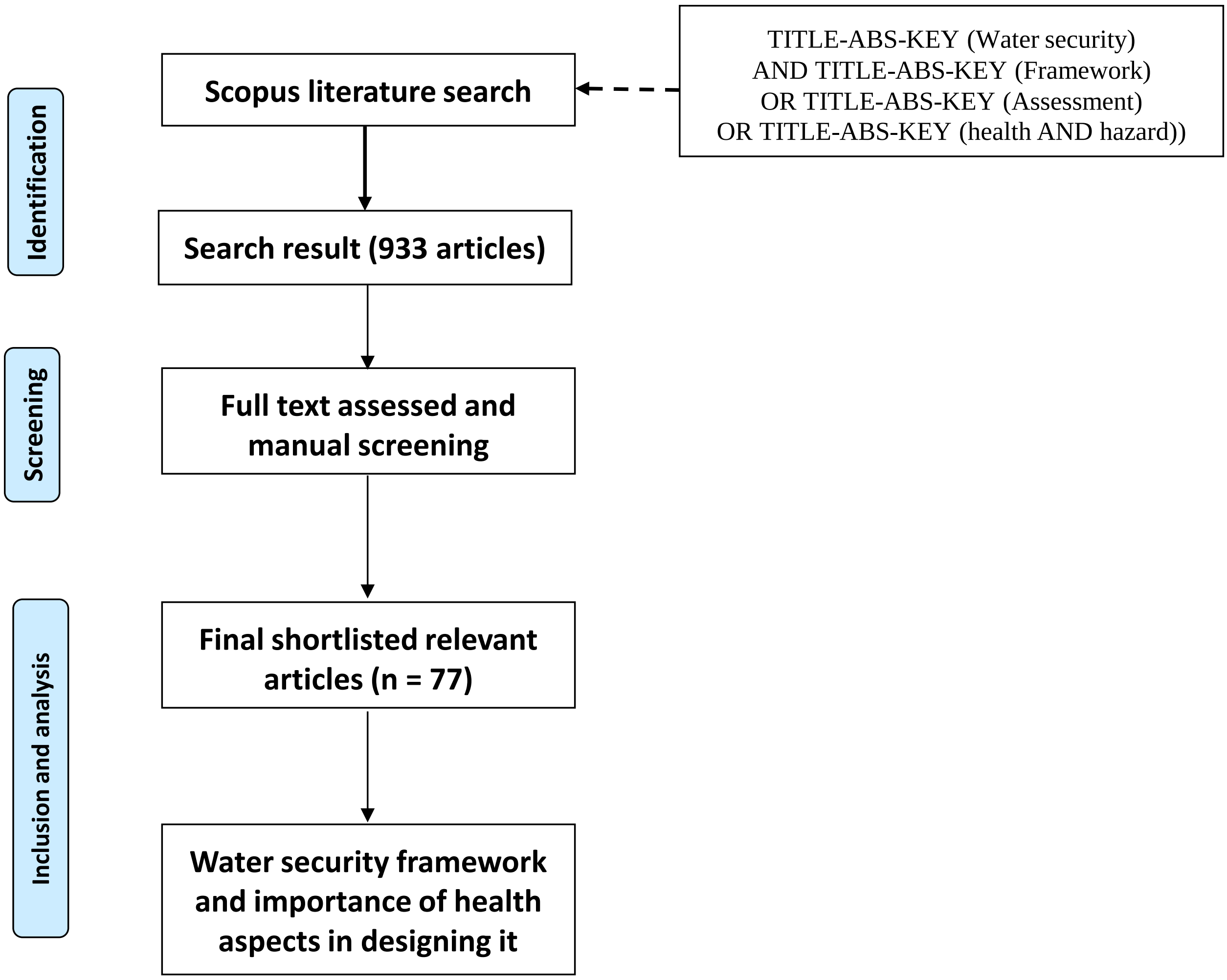

Figure 1. PRISMA flowchart of review results.

3.1. Spatio-Temporal Identity of the Available Literature on Water Security

As shown in Figure 2, all papers matching our inclusion criteria were published between the years 2008 and 2021. The number of articles published per year showed an increasing trend starting from 2015, with almost 79 percent (61 out of 77) of papers on water security being published since 2015. This suggests increasing global attention toward the issue of water security in recent years, possibly as a result of the SDGs (which were agreed upon in 2015), as one of these global goals (i.e., SDG 6: "Clean water and sanitation for all") is directly linked to water security. Indeed, the SDGs have pushed countries around the world to think more holistically about achieving sustainable water development through attaining water security.

With regards to the geographic focus of the articles, 81 percent (n = 62) focused on water security in a particular continent, while the remaining 31 percent (n = 24) did not mention any specific region. The spatial distribution of the study locations is plotted on a world map (Figure 3). It is found that the majority of the studies related to water security frameworks and health were focused on the Asian continent (n = 29), followed by North America (n = 12). Conversely, relatively few studies focused on Africa, Australia, Europe, and South America. In terms of the countries that were the focus of most studies, China was the most common (n = 10), followed by Canada (n = 6). Only one study (1 of 77) covered Europe. However, this study found 24 papers, which did not have any geographical area of focus, because they were either conceptual papers describing water security frameworks or literature review papers such as Bichai et al. [24], UN water [4]. The plotted map does not include studies done in multiple regions: North America and South

America [25]; Artic region with seven countries [26]; seven urban case studies selected from Asia, Europe, North America, and South America [27]; and 27 sites in 21 low-and middle-income countries across Africa, Asia, the Middle East, and the Americas [28].

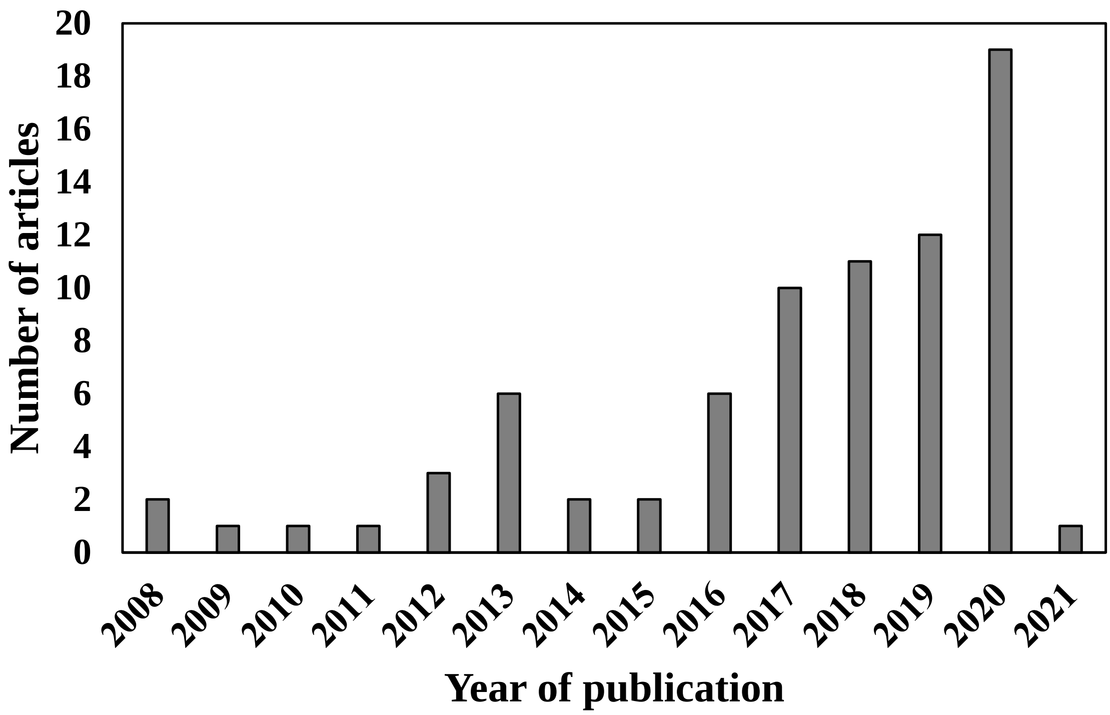

Figure 2. Systematic review by publication date.

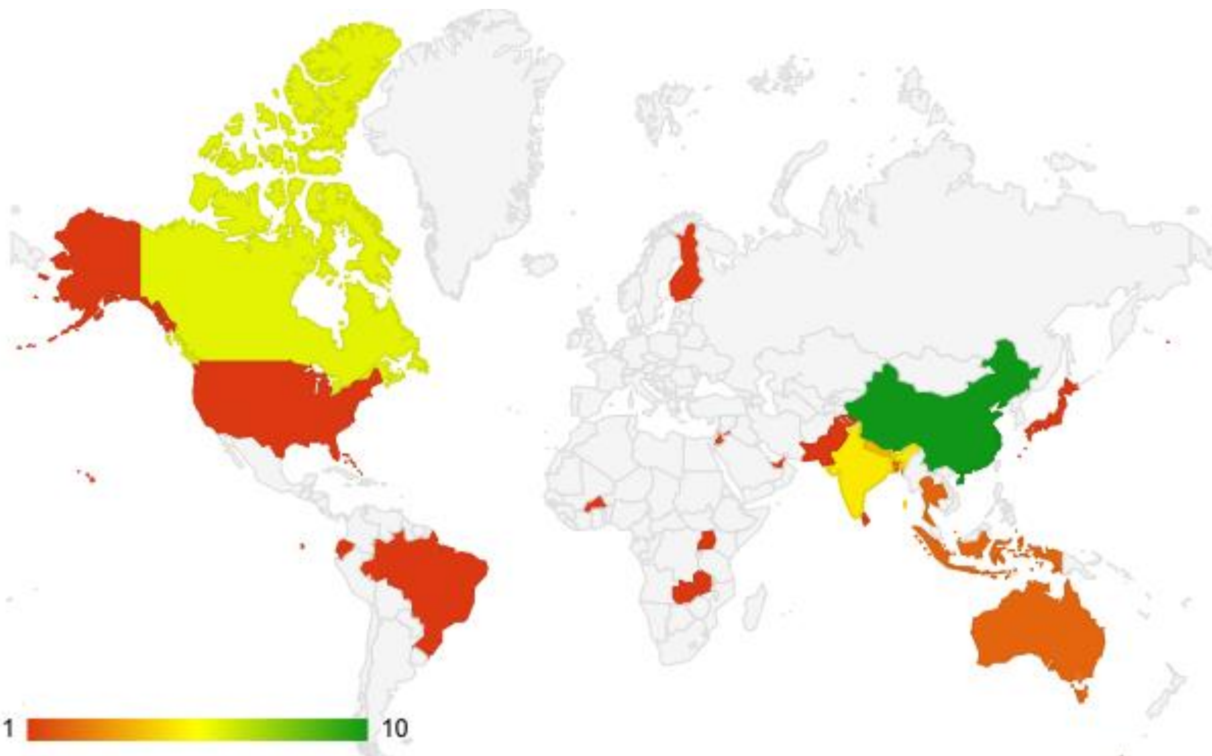

Figure 3. Systematic review by study locations (countries).

3.2. Urban vs. Rural Focus

Here, all the reviewed papers are further categorized based on their focus on rural or urban areas. 49 percent (n = 38) of the studies had a focus on rural areas, urban areas, or both rural and urban areas. The majority focused on urban areas (n = 22), followed by rural (n = 13), and finally papers focusing on both urban and rural areas (n = 3) (Figure 4). Papers dealing with rural areas mainly emphasized accessibility, availability, pollution, lack of awareness, poor governance, etc., as key hurdles for achieving water security. On the other hand, the papers focusing on urban areas mainly emphasized water infrastructure-related issues such as non-revenue loss and leakage from supply pipes, pollution, poor governance, flooding, climate change, etc., as key drivers for water insecurity. Finally, papers falling under the mixed category, deal with the coastal areas or river basins including both rural and urban sites. On the other hand, 51% of the papers did not have any focus area, they were either literature review papers or conceptual papers.

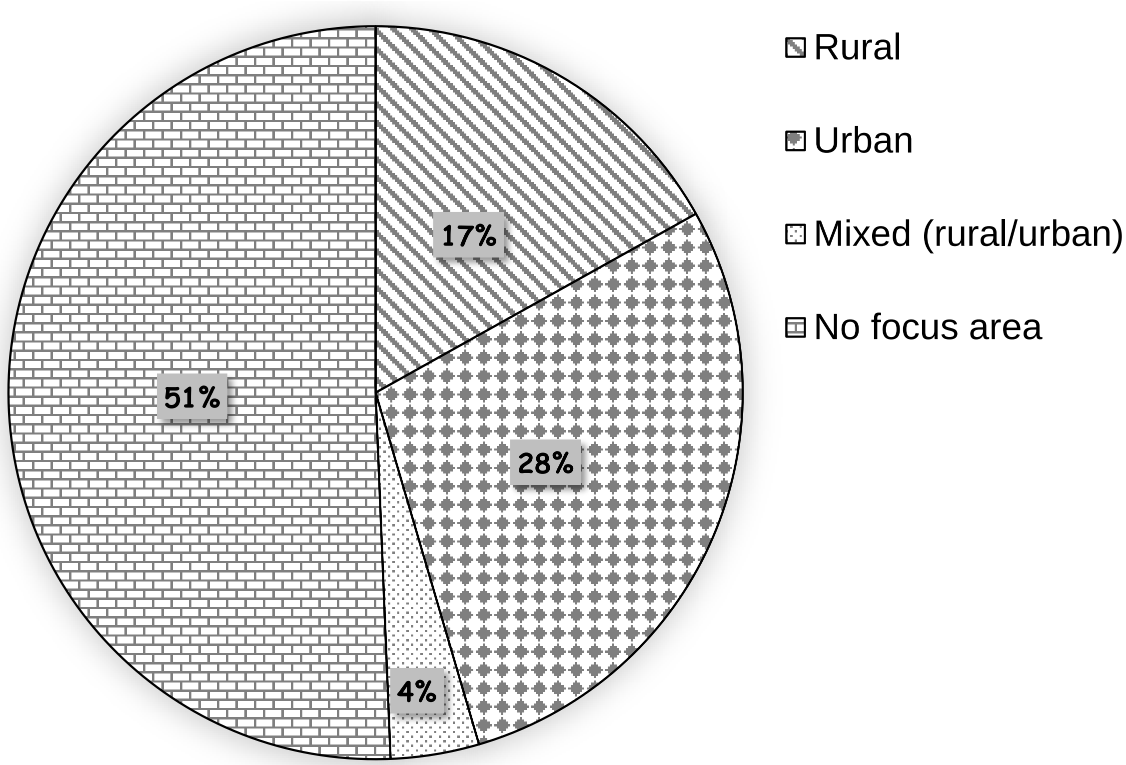

Figure 4. Systematic review by the focus of the study.

3.3. Analytical Approach

To understand the types of analytical approaches used in relation to water security frameworks, we grouped the reviewed studies based on their methodology used for analysis. From this, we found that all the analytical approaches could be classified into four major categories: big data analysis, literature review, qualitative analysis, and quantitative analysis (Figure 5). Around 16% of studies (6 of 77) used big data analysis, e.g., analyzing data from the national census or the global water data portal; 18% of the papers used qualitative analysis to analyze data from household surveys and key informants' interviews. Studies using a literature review as the principle analysis method accounted for 26% of all papers that contained the study of national and international reports, articles, local governmental reports, and case studies. Finally, 40% (the largest percentage) of the papers used quantitative analysis such as numerical simulations, statistical analysis of water quality data, machine-learning (e.g., neural network) analysis, remote sensing, and GISbased analysis. The reason for quantitative analysis being the most dominant one is possibly due to the advancement of different tools and technologies for analyzing water quality and quantity. Also, many countries have become committed to achieving SDGs, and for this they are enhancing the monitoring activities of their precious water resources. However, for many developing countries, in absence of any past data, it is mandatory to do the baseline studies to get a clear picture about the current status and hence helpful take any timely measures.

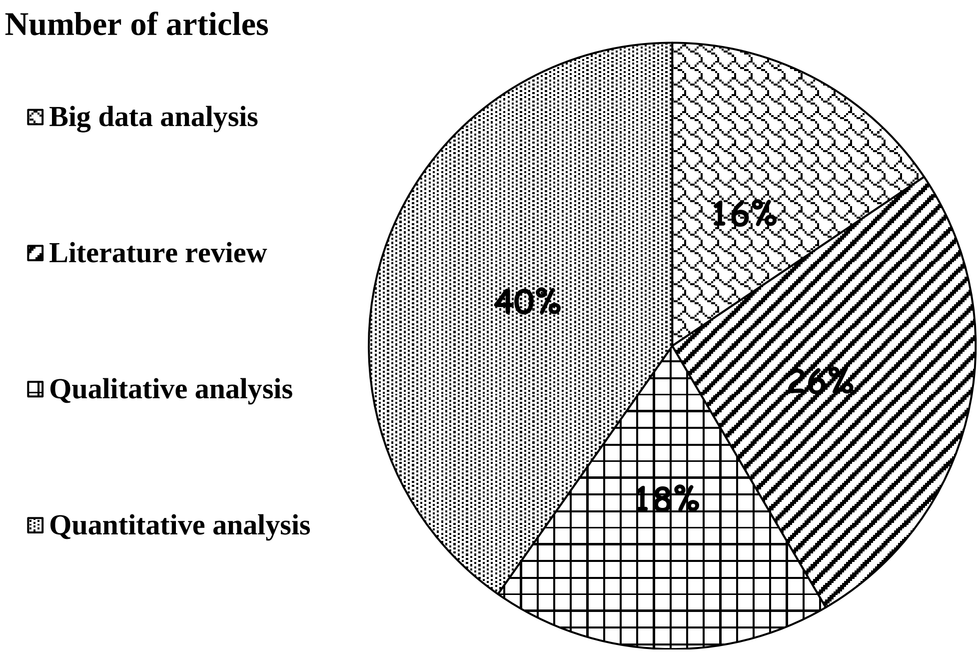

Figure 5. Systematic review by study methods/approach.

3.4. Water Security Dimensions

All of the reviewed papers used multiple indicators or variables to measure water security under a different framework. All the variables and indicators were categorized under 11 dimensions in this study, and the result is shown in Figure 6. According to the number of appearances, the order of different dimensions considered in these papers are, namely public health > water quality > availability > policy and governance > ecosystem > socio-economic > water quantity = accessibility > risk/hazards > infrastructure and technology > sanitation and hygiene. Also, a summary of the list of reviewed papers and their association with different water security dimensions is presented in Table S1. Although health appeared as the most common dimension in these reviewed papers (51 percent of studies, $n = 39$), number of papers measuring direct health impacts such as incidence rates of water borne diseases, were still quite low (n = 14), which highlights the lack of priority being given to health-related issues when framing water security frameworks. Moreover, only a few papers discussed indirect health effects such as anxiety and stress, where water scarcity plays a mediating effect [18,29,30]. Most of the papers discussed direct health effects, which included issues such as the presence of different contaminants and pathogens which cause adverse health effects. The next dimension is water quality followed by availability with 47% and 34% of the share among the papers reviewed in this study [25,31,32]. Here, for the water quality component, most of the papers discussed different contaminants with grave health concerns and different approaches to monitor and manage them to achieve water security. A majority of these papers also discussed health aspects, hence they both share a large number of common papers in this graph. When talking about availability, this is more about water scarcity due to geographical or climatic conditions such as arid regions and highlighting the different possible options for water resource management. The next dominant factor is policy and governance with 26% of papers covering it. It is evident especially from developing countries that poor policy and governance leads to water insecurity whether it is related to wastewater management in a city [2], or that poor policy related to water security based on time and distance to fetch water, often lead to stress and anxiety [33]. The fifth dimension is the ecosystem which appeared in 25% of the reviewed papers. The main idea to bring ecosystem in the discussion here is that an ecosystem-based approach must be adopted to manage not only water security but human well-being in any particular region [34]. The sixth dimension found in this study is socio-economic with an appearance in 22% of the reviewed papers. Here, the socio-economic dimension reflects on water inadequacy for people living in densely populated areas or informal settlements due to poor water systems or a poor capacity to access the available water [35–37]. The next few dimensions from seventh to the tenth rank, such as accessibility, water quantity, risk/hazard, infrastructure, and technology carries approximately similar occurrences in the reviewed papers [38–41]. These dimensions mainly discuss the effect of rapid global changes viz. climate change led to extreme weather conditions such as flooding or drought, on different water-related infrastructure, water accessibility, and water quantity. The last dimension i.e., sanitation and hygiene appeared in about 10% of the reviewed papers. The paper discussing sanitation and hygiene under a water security framework highlights the relation between poor water availability and sanitation and ultimately its impact on health whether its health of people or the ecosystem [42]. The main reason behind these low occurrences despite being a critical element of water security is that sanitation and hygiene are separately being discussed under the topic of Water, Sanitation, and Health (WASH). However, our goal here is to relate these dimensions under the umbrella of the water security framework.

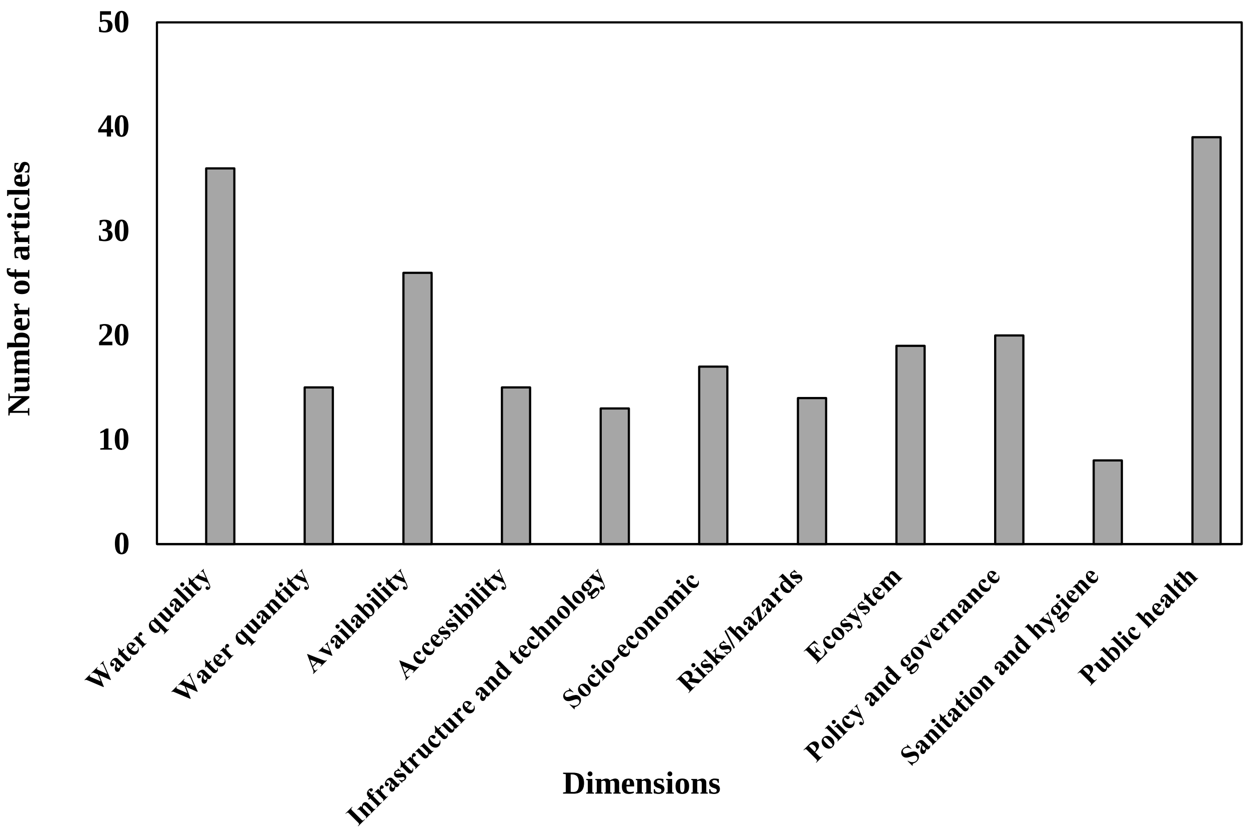

Figure 6. Summary of different water security dimensions.

Among different frameworks reviewed in this study, the water security framework reported by [31], which is also called the DECS framework (Drinking water, Ecosystem, Climate change, and water-related hazards, and Socioeconomic aspects) adopted from the United Nations task force on water security, covered almost all dimensions, followed by Urban Water Security (UWS) framework by Romero-Lankao and Gantz and Urban Water Security Index (UWSI) [43]. On the other hand, frameworks that have widely covered the public health perspectives were the biocultural model of household water insecurity [28]; DECS UWS Framework [31]; UWSI [43]; HWIAS [44].

3.5. Public Health

This category represents both direct and indirect health impacts. According to the World Health Organization [45], health is defined as the state of complete physical, mental and social well-being and not merely the absence of diseases or infirmity. In this review, direct health impacts were considered to be the state free from water-borne diseases or the health impacts caused by the intake of water. Indirect health impacts were considered to be the mediating factors such as the accessibility to adequate quantities of acceptable quality water for physical and mental well-being. As mentioned, a total of 39 papers dealt with public health (both direct and indirect) issues. The result of direct health impacts is shown in Figure 7.

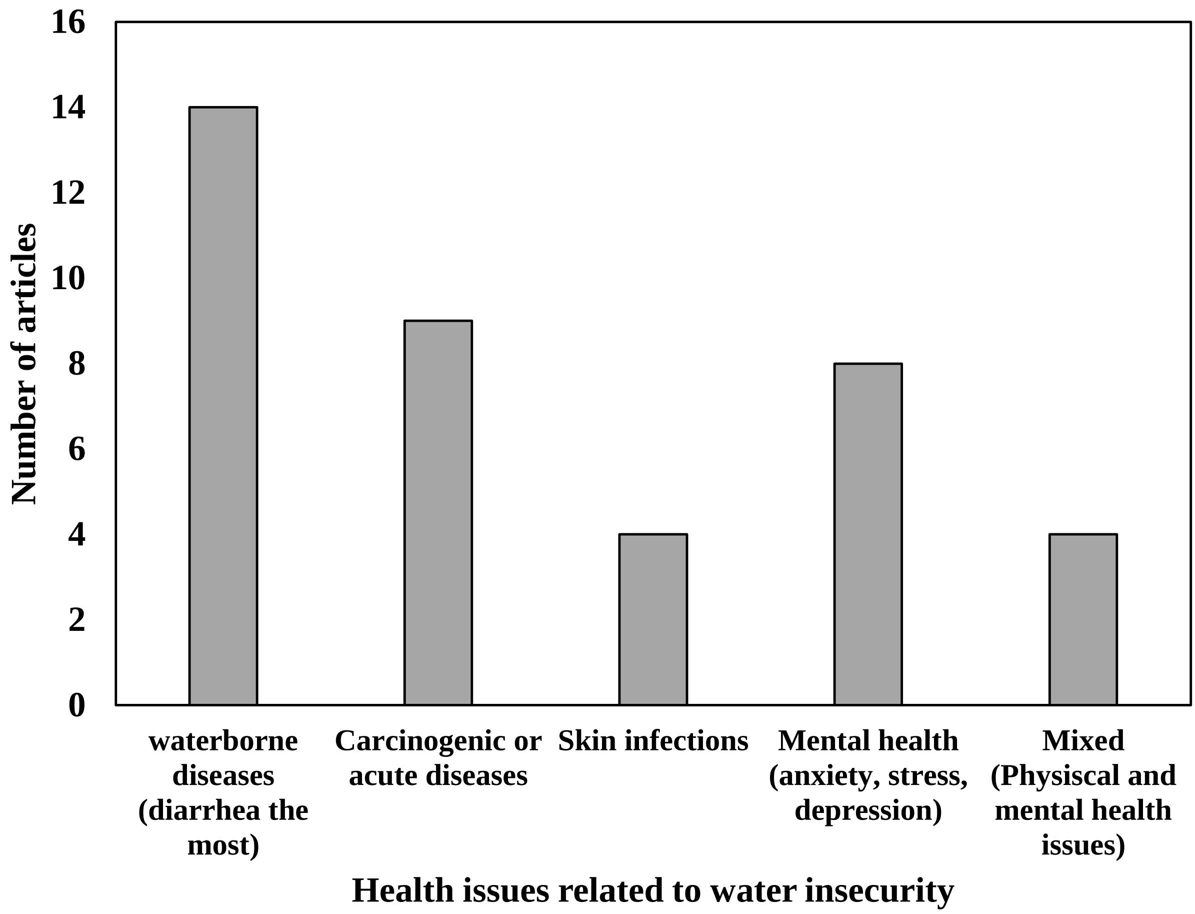

Figure 7. Summary of direct health issues related to water insecurity found in reviewed papers.

Among direct health impacts, physical and mental health were considered. In physical health, water-borne diseases (diarrhea) were most common, considered by 14 papers. However, only 5 among the reviewed frameworks mentioned the inclusion of the incidence rate of diseases as a crucial variable to measure water security [31,46–50]. This was followed by carcinogenic diseases caused by the presence of different pollutants such as heavy metals, including Cd, Pb, etc. [51] and finally skin diseases because of the presence of Arsenic [52]. On the other hand, mental health impacts such as anxiety and water stress appeared in 12 papers, i.e., 16% of the total reviewed papers. Experienced anxieties from water issues are strongly linked to household water needs not being met, time investments required for fetching water, suspected waterborne sickness, and household size [18,29].

Indirect health impacts or the mediating factors were considered by 25 papers. Aboelnga et al. [31] presented the DECS framework which has one of the dimensions as "drinking water and human wellbeing", which includes the sub-indicators such as water availability; diversity of water and energy source; consumption; reliability, water quality, accessibility, adequacy, equity, water bodies' and dependency ratio [47]. Similarly, the water-energy-food nexus framework by Marttunen et al. [20] has one of the dimensions as "human health and well-being" that includes the indicators such as quality and quantity of drinking water, sanitation, and hygiene, recreational opportunities. Similarly, water quality parameters such as heavy metals and microorganisms possess health threats. High Mg intake can cause hypermagnesemia; high Ca intake can cause cholesterol, muscle cramps, and kidney stones; high hard water intake can cause eczema, intestinal problems, and loss of fertility; high fluoride intake can cause fluorosis and osteosarcoma; and high nitrate intake can cause methemoglobinemia [39,53–55] and diseases related to the presence of microorganisms such as E. coli and fecal coliform can cause serious waterborne infectious diseases [44,46,56].

Table 1 shows how we use the term 'human health' while measuring water security as a whole. On one hand, water security measurement is limited to the provision of safe, adequate water supply and sanitation facilities, and on the other hand, the waterborne morbidity and mortality rates are also taken into consideration to achieve water security. The incident rate of waterborne diseases (particularly diarrhea), which is measured in cases per 100,000 population per year, is commonly considered to be one of the indicators of water security [26,31,46–48]. Carcinogenic diseases are measured by checking the prevalence of diseases such as skin malignancy [57]; carcinogenic risks are predicted through hydrochemical evaluation [51]; and mental health issues are often measured through self-reported items and behavioral manifestations [29,44]. Measuring the public's health is an important step in focusing attention and resources on improving health, and slowing the nation's declining quality of life, which is threatening the country's future [58].

Table 1. Public health measurement in water security.

Direct Health Measurements	Indirect Health Measurements
- Waterborne diseases (diarrhea) - Carcinogenic risks/diseases - Mental health issues (anxiety, depression) - Skin infections	- Drinking water and well-being (water quality, availability, accessibility, water adequacy, sanitation, hygiene, etc.) - Human health and well-being (quality, sanitation, hygiene, recreational opportunities) - Water quality parameters (Heavy metals, micro-organisms)

Having clean water provision may not define good human health and having contaminated water may not always mean bad health of a population. To support this statement, the public health dimension (water-borne diseases) had a poor score (1) despite the excellent accessibility to drinking water [31]. It was correlated with poor access to hygiene, and with the intermittent water supply where there is the possibility of microbial regrowth due to static conditions. In contrast, despite the evidence of microbial contamination in the city's drinking water, incidences of waterborne diseases were found to be the lowest [46], attributed to the good hygiene practices by residents and public awareness regarding disinfection of water before drinking.

4. Discussion

Water is a basic need and is fundamental to life and health. Drinking water supply and sanitation are among the essential components of primary health care [59,60]. All people must have access to at least a satisfactory level of water in terms of adequacy, safety, and accessibility because just improving access to clean drinking water reduces a major burden on human health [12]. Depending upon climate, a person's physiology, social culture, and norms, the Sphere Standards suggest at least 15 L of water per day per person for basic survival [61]. It further elaborates that the maximum distance between any household and the nearest water point is 500 m; queueing time at a water source is no more than 15 min, and filling a 20-L container takes no more than three minutes [61]. Yet, every day, women and girls are estimated to spend 200 million hours hauling water around the world [8].

During the Covid19 pandemic, where handwashing is crucial to reduce infection, a Household water Insecurity Scale (HWIS) study showed that many households in low- and middle-income countries were not able to wash hands due to lack of basic handwashing facilities [17,62]. This reveals that significant investments in water infrastructure, water governance, promotion of knowledge, and behavioral changes are crucial [62,63].

Apart from the existing conditions, there are occasional conditions such as disasters, natural or man-made that affect safe water availability; accessibility; reliability; and adequacy, consequently worsening physical and mental health. A study by Rosinger et al. [64] after a historic flood found a higher dehydration prevalence among children in households with high water insecurity. Dehydration, on the other hand, has mental health impacts such as anxiety and depression [65]; mood effects [66]; tension and fatigue [67]; tension, depression, and confusion [30]; and short sleep duration [64]. A case from Haiti backs up theories that suggest household water insecurity plays a central, influential role as a potential driver of common mental illness in households through direct and indirect pathways such as food insecurity and sanitation [68].

Water-borne outbreaks could be minimized if the water is treated before drinking. A study by Carlton et al. [69] had an interesting finding that good sanitation, hygiene, and social cohesion did not modify the relationship between heavy rainfall events and diarrhea, instead of drinking water treatment by households was the factor to reduce the diarrheal events. Thus, they emphasized adopting water treatment behavior as a climatic adaptation to reduce climate vulnerability. Furthermore, even if there is a good WASH intervention, if other factors such as climatic variability, ecosystem, and other factors are not considered, there are very few chances to prevent frequent occurrences of water-borne diseases [69]. This evidence clearly shows that just having good access to drinking water or with good WASH services does not always mean good health. Therefore, measuring the direct physical and mental health impacts caused by the intake of water distributed would give justice to dimensions of water security for having a sustainable healthy livelihood.

This study addresses a gap in how we perceive health while measuring water security. Health, in medical discipline especially by doctors and nurses, is defined as the absence of diseases or infirmity, while health in water disciplines can be ecological health and the mediating factors for health. On one hand, health depends on hygienic behavior, and on the other hand, it depends on environmental conditions. Under environmental pressures such as climate change and other factors, the risks of waterborne diseases tend to increase, so much effort is being intervened to supply adequate safe water, which then is known as water security, while health professionals look after the morbidity and mortality rates, and conclude that water security is not achieved despite advancements in science and technology and water security measures. The biohazard 'Covid19' is another example that reflects the urgent call for water security. Studies also concluded that the household culture, norms, and how people treat water before consumption affects the value measured. This gap should be bridged by emphasizing more local and household surveys with the inclusion of health indicators such as households with water-borne diseases, hygiene, and sanitation both in routine and disaster periods for sustainable human security. Also, a specific health-specific water security framework is imperative for dealing with issues arising from public health.

5. Conclusions

This study reports the water security frameworks and the place for health in them. Asia is the main hotspot for water security issues owing to rapid population growth, urbanization, and extreme weather conditions due to climate change. Mental health issues such as stress caused by poor accessibility and availability (in terms of time and distance) is a big determinant when framing water security frameworks, particularly in developing nations. Water-borne diseases due to poor water quality and sanitation play a major role in determining the water security framework for countries with poor governance on water and sanitation. Among different health issues, diarrhea is the most prevalent one considered for developing a water security framework because of poor water quality, especially the presence of biological pollutants. Although water security is a concept with several aspects and dimensions, public health is often not integrated into water security frameworks. More local and household surveys should be emphasized, with the inclusion of health indicators such as the percentage of households with water-borne diseases, hygiene, and sanitation both in routine and disaster periods for sustainable human security. As an important implication, this study provides knowledge and information of public health indicators in the available water security frameworks. This information is important for scientific communities, managers, policy planners, and stakeholders not only to conceptualize water security in a variety of meanings but also to measure water-related health issues for a population and its relation to other socio-environmental, provisional, and technical issues commonly prevailing in the human society. For the future, this study emphasizes developing comprehensive ways to refine the public health indicators at a ground level, to measure the significant burden that water insecurity places on human health. Similarly, a holistic approach with regular monitoring and future prediction of water resources and designing management measures on a timely basis are very much needed. Nexus approaches are needed, considering aspects of water-food-health-energy [20] or socio-hydrology [18] to achieve this very complex issue of water security and human well-being.

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/w13101365/s1, Table S1: List of reviewed papers (from the Scopus search) associated with different water security dimensions.

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