Asian Journal of Research in Nursing and Health

Volume 6, Issue 1, Page 361-379, 2023; Article no.AJRNH.105909

Integration Strategy to Control and Prevent Diarrheal Disease among Children in the Community: A Systematic Review

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/105909

Systematic Review Article

Received: 16/07/2023
Accepted: 21/09/2023
Published: 03/10/2023

ABSTRACT

Background: Diarrheal disease is a childhood disease serve as global health threat to the population of young children. Based on World Health Organization [1], it was listed as fourth highest recorded cases which as estimation of 1 out of 9 child deaths worldwide. It has a mortality rate of

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"525,000" every year (WHO, 2017. These mortality statistical data are associated with 88% of child deaths. One of the leading viruses that manifests diarrhea is the rotavirus which in return accounts for 40% of hospitalization of cases.

Purpose: The study aims to enlighten people about various preventive measures to manage diarrheal diseases. Diarrhea is a significant global health threat that particularly affects children. The goal of this study is therefore to summarize scientific evidence on the different prevention and control of diarrheal diseases.

Methods: This systematic review aims to examine the effectiveness of preventive measures and the process of control strategies for diarrheal disease through synthesizing epidemiological and clinical investigations that include cohort studies, cross-sectional studies, and qualitative research. This review seeks to provide a comprehensive understanding of various interventions, such as oral hydration and zinc therapy, handwashing facilities, sanitation, hand hygiene, wash, water filters, and other relevant methods.

Results: On the twenty (20) related literature in this review, a total of "50,765" samples, 19837 records, 15 studies, and 10 articles consisting of 2841 who considered oral rehydration solutions and zinc, 826 samples considered handwash, 46423 samples considered Sanitation, hygiene and Water, and the rest considered Water filters in Prevention and Control of Diarrheal Diseases. Reported methods or procedures included oral hydration and zinc therapy, handwashing facility (EHF), sanitation, hand hygiene, wash, water filters.

Conclusion: The systematic and integrative review conducted on diarrheal diseases has provided valuable insights into the risk factors and various prevention and control measures associated with this widespread health issue. The analysis has identified several aggravating factors that contribute to the increasing incidence of diarrheal diseases, including rainwater, age, type of drinking water, distance from water purification plants, and toilet facility type. These factors highlight the need for targeted interventions to address specific vulnerabilities and improve overall public health.

Keywords: Children; community; control; diarrheal disease; prevention; systematic review.

1. INTRODUCTION

Diarrheal disease is a childhood disease and a persisting global health threat to young children based on World Health Organization [1]. It has a mortality rate of "525,000" every year WHO [2], and 2,195 children every day are affected. These mortality shows statistical data which 88% of it is child deaths. One of the leading viruses that manifests diarrhea is the rotavirus which accounts for 40% of hospitalization of cases. This disease can also spread from the stool of one person that can be transfer to the mouth of another individual. It has also high possibility of contaminating water, food, and objects. Aside from this, diarrhea can also be brought upon by inadequate sanitation, unsafe and/or contaminated water, and insufficient hygiene [3]. However, many significant studies have just recently surfaced in various preventive measures and controlling the occurrence of diarrheal diseases. The paper entitled "Prevention and Control of Diarrheal Diseases" will give us comprehensive integrative reviews in the medical field to help people comprehend a study issue holistically. Several studies conducted in 2022 have highlighted the persistent global burden of diarrheal diseases, particularly among children under the age of five. Infection caused by various pathogens, including Rotavirus and Escherichia coli (E. coli), is a common etiology of diarrheal diseases, which can spread through improper hygiene practices and unsanitary environments. Malnutrition further exacerbates the risk of child deaths related to diarrhea. This analysis aims to identify and analyze preventive and control measures for diarrheal diseases to reduce their prevalence. The study reviewed literature from databases such as PubMed, Scopus, and Cochrane Library, focusing on observational studies conducted between 2019 and 2022. The quality of the selected studies was assessed using appropriate appraisal methods. One notable gap in the study on diarrheal diseases is the limited focus on the social and cultural factors that influence the occurrence and management of the disease. While the study examined preventive measures and control interventions, it did not delve deeply into the socio-cultural determinants that contribute to the persistence of diarrheal diseases in certain populations or regions.

A patient's risk for diarrheal comorbidities increases if they have poor sanitation, unavailability of clean water, and improper

hygiene. This is because contaminated water with human feces from sewage, or septic tanks have been linked to cause infection due to the presence of various pathogens. Rotavirus and *Escherichia coli*, or *E. coli*, are the two most common etiological pathogens that cause moderate to severe diarrhea. It can proliferate from one person to another person associated with improper hygiene and poor environment. Additionally, malnutrition can be one of the factors for diarrhea-related child death as it makes their bodies more vulnerable to the disease [2]. However, despite the inclusion, "Ensuring the availability and sustainable management of water and sanitation for all" in the Sustainable Development Goals (SDGs)—also known as Global Goals by the United Nations—8 out of 10 people still lacks access to basic water necessities [4]. Even with the existence of prior research with regards to the precautionary practices to alleviate the development of the disease, the mortality rate remains high in some countries. According to the latest statistical data, sanitation, unsafe water, and hygiene are attributes of the mortality rate. India has the highest WASH death rate accounting to 199, 845 cases [5]. The current review article's major goal is to offer an overview of the different prevention and control measures of diarrheal diseases.

Diarrhea is a disease that has underlying severe illness like the manifestation of the gastrointestinal disease such as infection, inflammatory bowel diseases (IBDs), and severe dehydration UCSF Health, n.d. [6]; [2]. Nonetheless, this type of disease is believed to be prevented and treated if everyone has access to cost-effective interventions in relation to health and sanitation [5]. Studies have shown that there is an adequate knowledge about the appropriate preventive measure concerning pediatric diarrheal disease; however, it was concluded that knowledge is not enough to overcome this morbidity primarily because of the unavailability of clean water Khaliq et.al. [7]; Wani et.al [8]. Despite the fact that there is a gradual increase of safely managing drinking water services around the world from 70% to 74% in the year 2015 and 2022, two billion individuals do not have the same privileges. Inclined with the Sustainable Development Goals (SDGs), to be able to reach the expected universal coverage, the recent progress must increase fourfold.

This paper review may contribute to specific progress about health, the paper entitled "Prevention and Control of Diarrheal Diseases" will give us comprehensive Integrative reviews in the medical field to help people comprehend a study issue holistically. This study aims to enlighten people about various preventive measures to manage diarrheal diseases. Diarrhea is a significant global health threat that particularly affects children [36]. The goal of this study is therefore to summarize scientific evidence on the different prevention and control of diarrheal diseases.

2. METHODS

This integrated scientific review study aims to examine the effectiveness of preventive measures and control strategies for diarrheal diseases. By synthesizing epidemiological and clinical investigations, including cohort studies, cross-sectional studies, and qualitative research, this review seeks to provide a comprehensive understanding of various interventions, such as oral hydration and zinc therapy, handwashing facilities, sanitation, hand hygiene, wash, water filters, and other relevant methods. The review will encompass studies conducted within the last 3 years and will not impose any language restrictions. A wide range of databases, including PubMed, Scholar, Embase, Cochrane Library, PubMed Central (PMC), MEDLINE, Scopus, BIOSIS Citation Index, and Elsevier, will be searched to ensure the inclusion of relevant literature.

To maintain the focus of the review, studies unrelated to the prevention and control of diarrheal diseases will be excluded. Additionally, the study population will be limited to household residents, including both adults and children, with particular attention given to studies targeting mothers and children under the age of five. Participants who are not household residents or unavailable during the study period, as well as those who have passed away within the specified time frame, will be excluded from the analysis. The review will integrate findings from various study designs, including cohort studies, cross-sectional studies, and qualitative research, to provide a comprehensive analysis. Special emphasis will be placed on studies that specifically focus on mother and child populations, allowing for an exploration of different age groups and sex. Furthermore, the review will consider the influence of location, such as urban-slum areas and agricultural land, on the implementation and effectiveness of preventive measures and treatments. The impact

of interventions, including oral hydration and zinc therapy, handwashing facilities, sanitation, hand hygiene, wash, water filters, and other relevant methods, will be analyzed in relation to the prevention and control of diarrheal diseases.

Conducting a scientific review is a meticulous process that involves systematically analyzing existing literature to provide a comprehensive understanding of a specific research question or objective. It compasses a series of step-by-step actions, like highlighting the importance of defining the research question, conducting a comprehensive literature search, critically evaluating the selected studies, synthesizing the findings, and disseminating the review to contribute to the scientific community. The first step in conducting a scientific review is to define a clear research question or objective. This helps in guiding the entire review process and ensures that the literature search and analysis are focused on a specific topic or area of interest. Establishing inclusion and exclusion criteria is crucial to ensure that the selected studies are relevant and of high quality. Criteria such as study design, population, intervention/exposure, outcomes, and time frame should be defined to align the studies with the research question.

A comprehensive literature search is conducted using academic databases, such as PubMed, Scopus, and Web of Science, as well as relevant sources in the field. Effective search strategies, including appropriate keywords and Boolean operators, are employed to retrieve relevant studies. The identified studies are screened based on their titles and abstracts to determine their eligibility for inclusion. The predefined inclusion and exclusion criteria are applied to select studies that meet the research question's requirements. Full-text articles of the selected studies are obtained for further evaluation. Access is gained through databases, library resources, or direct contact with authors if necessary. Having access to the full texts enables a more comprehensive assessment of the studies. The quality and reliability of the selected studies are critically evaluated. Factors such as study design, sample size, methodology, data analysis, and potential biases are assessed using established tools or checklists, such as the Cochrane Collaboration's Risk of Bias Tool. Relevant data from the selected studies are extracted using a standardized data extraction form. This includes information such as study characteristics, population, interventions, outcomes, and key findings. Extracting data in a structured manner helps in organizing the information for analysis. The extracted data are analyzed to identify patterns, trends, and relationships across the studies. Findings from individual studies are synthesized by summarizing results, identifying common themes, and discussing any discrepancies or contradictions that arise.

The synthesized findings are interpreted, and conclusions are drawn based on the evidence presented in the reviewed studies. The strengths and limitations of the evidence are identified, and implications for practice, policy, or further research are discussed. A comprehensive review paper is prepared, summarizing the research question, methodology, findings, and conclusions. The review follows the appropriate structure and formatting guidelines for scientific reviews in the relevant field, ensuring clarity and coherence. Feedback is sought from colleagues or subject-matter experts on the review paper. Incorporating their suggestions and addressing any concerns helps improve the clarity, accuracy, and overall quality of the review. Peer review ensures the robustness of the review process. The finalized review paper is submitted to a relevant scientific journal for publication. Alternatively, the findings can be shared through conferences, seminars, or online platforms to contribute to the scientific community. Dissemination of the review increases its visibility and impact.

Through this integrated scientific review, a comprehensive understanding of the effectiveness of preventive measures and control strategies for diarrheal diseases will be achieved. By considering studies from diverse sources and databases, this review aims to provide an up-to-date analysis of recent advancements in the field. The findings will contribute to the existing knowledge base and inform future interventions and policies aimed at reducing the burden of diarrheal diseases worldwide.

2.1 Design

There are a lot of different approaches and ways in alleviating the symptoms of diarrheal diseases. Given widespread preventive measures, this systematic review only included the scientific evidence and most suggested approaches in combating this type of disease. This systematic review took into account preventive measures that are not yet widely adapted such as oral

hydration therapy or oral rehydration solution, zinc therapy, and water filters. This paper used Whittemore & Knafl (2005) process, where it developed a methodological framework for the integration of review process, defining the issue, formulating question for the issue, conducting a focused literature search, and utilizing different methods or qualitative data processing strategies to assess bias and error. The study main objective is to offer several and diverse ways in terms of prevention and control of diarrheal diseases. By providing these measures, it can contribute to decreasing numerous cases of active occurrence, and mortality and morbidity rate of this disease.

2.2 Search Strategy

This review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) standard (Page, 2020). The Supplementary Materials contain the PRISMA checklist. Through the following: Google Scholar, MDPI, ScienceDirect, PubMed/MEDLINE, IWA Publishing, Oxford Academic, the Journal of Global Health Reports, Elsevier, African-British Journals, and Springer databases, an electronic search of literature was conducted. The following terms were used in the search:"Diarrheal diseases" AND "Prevention of Diarrheal Diseases OR Control for Diarrheal Diseases" AND "Measures in preventing OR controlling Diarrheal Diseases". The evaluation covered all articles from the beginning to April 2020.

The total number of studies used in the integrative review was discussed (Fig. 1). Thirty-seven research were chosen in the related studies search where eight were excluded because it did not coincide with the aim of this review. Twenty-nine (29) records are screened and 26 records are included, following the inclusion criterion. Twenty-six studies undergone thorough review to be eligible. Then, two studies were excluded that ends with 23 studies included for the results. Five (5) were community-based cross- sectional studies, one longitudinal study, two qualitative studies, two quantitative studies, two cohort studies, one comparative study, three systematic reviews, four random-controlled trials (RCTs), one clinical epidemiology, and two pilot studies. Subsequently, as can be seen in above figure two studies were excluded due to comprehensive screening and the remaining twenty (20) studies are included in final records and reports to be included in the review.

2.3 Inclusion and Exclusion Criteria

The writer included studies that compared households who are particular in using methods such as oral hydration and zinc therapy, handwashing facility (EHF), sanitation, hand hygiene, wash, and water filters to households who are not familiar or using any of these particular methods. Inclusion criteria for the literature are as follows: (1) the use of any of these stated common methods in the prevention and control of Diarrhea diseases; (2) studies comparing and analyzing households who used and do not used any of these methods; (3) the study population was children under five, mother with children and some members of senior who can still participate in the study and was randomly chosen from the total target population, with an exclusion of unavailability of the sample involved (death, change residents, etc). Case reports/case series research and review articles were not included. The population is patients who have the said setbacks, to know the outcome for the aim and objective to answer.

2.4 Data Evaluation/ Quality Appraisal

Independent reviewers were assigned to screened and reviewed the literature included in this review. Any disagreements that include the lack of consistency in the process of evaluation were settled through consultation between parties involved until consensus was reached. Fitting title for the review as well as was assessed during screening. Mendeley Reference Manager was used to remove any duplicate studies. The following information was gathered from the reference literature: study locations (state and/or country), the type of study design, number of participants studied, and number of households who are using any of the stated methods and those who did not, oral hydration and zinc therapy, handwashing facility (EHF), sanitation, hand hygiene, wash, water filters, etc, participant's age, location. For RCTs and observational studies, the risk of bias was going to be assessed using the Cochrane Risk of Bias (RoB) 2 Tool (Higgins, 2011) and the Newcastle-Ottawa Scale (NOS) (Wells, 2021).

All outcome variables were summarized and then pooled in a meta-analysis through Review Manager version 5.4.1 software (Cochrane Collaboration). Mantel-Haenszel method was used to analyze dichotomous data, which was presented as the odds ratio (OR). The continuous data on the other hand which came

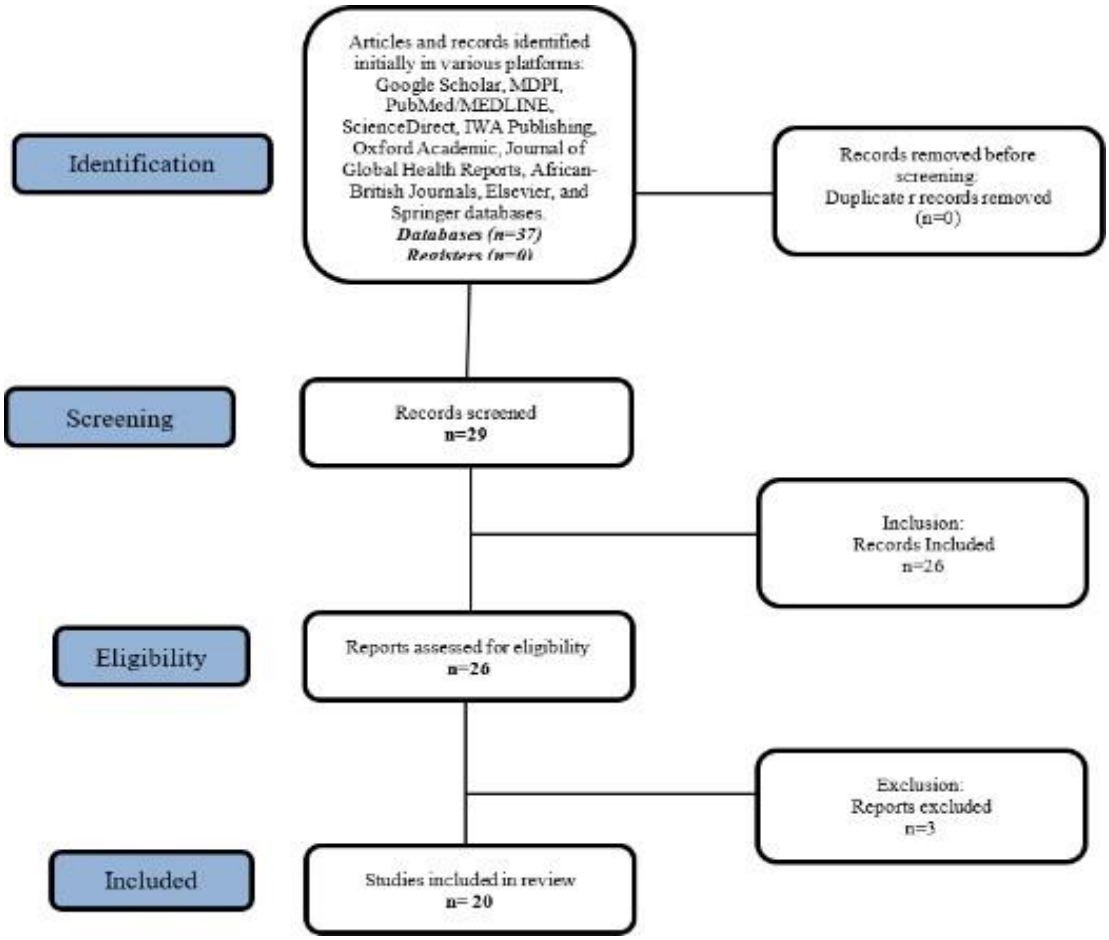

Fig. 1. The PRISMA flow diagram of the literature search

from the mean difference was used to present continuous data and was analyzed using the Inverse Variance method. The I2 test was used to assess heterogeneity, and data were considered heterogeneous if I2 was greater than 75%, in which case a "random-effect" model was used.

There is a maximum of 37 studies included in this review where eight studies were excluded because it did not coincide with the main objective of this review. Twenty-nine (29) records are screened and 26 records are included, following the inclusion criterion. Twenty-six studies undergone a thorough review to be eligible. As a result, six studies were excluded which ended with 20 studies. Five (5) of these were community-based cross-sectional studies, one longitudinal study, two qualitative studies, two quantitative studies, two cohort studies, one comparative study, three systematic reviews, four random- controlled trials (RCTs), one clinical epidemiology, and two pilot studies. Subsequently, as can be seen in above figure two studies were excluded due to comprehensive screening and the remaining twenty (20) studies are included in final records and reports to be included in the review.

3. RESULTS

On the twenty (20) related literature in this review, a total of "50,765" samples, 19837 records, 15 studies, and 10 articles consisting of 2841 who considered oral rehydration solutions and zinc, 826 samples considered handwash, 46423 samples considered Sanitation, hygiene and Water, and the rest considered Water filters in Prevention and Control of Diarrheal Diseases. Reported methods or procedures included oral hydration and zinc therapy, handwashing facility (EHF), sanitation, hand hygiene, wash, water filters, etc. All studies have range of three to five years for follow up. Study characteristics were summarized (Table 1). Average age of the study population were children under five years and middle aged with few senior participants.

Table 1. The previous studies

Study	Design	Location	Sample Size	Method/s and/or Procedure/s Considered	Population	Theme
Agegnehuet al. [9].	Community-based cross-sectional study	Enemay District, Northwest Ethiopia	398 = caregivers	Handwashing	All caregiversof under-fivechildren in the Enemay district	Adjusted for age andlocation; Age: under-fivechildren Location: enemyDistrict
Putri et al.[10]	Systematic review	Bangladesh	10 = articles	Zinc Supplement	All articles and literature synthesized through methodused in thestudies and the effectiveness ofzinc therapy.	Adjusted for publishedin the same common langauge, or had been assessed according tosame objective of this review.
Firima et al. [11]	Cross-sectional study	Port Harcourt, Nigeria	200 = drug vendor shops registeredwith the government	Oral rehydration solutions andzinc	Patent and proprietary medicine vendors at asafe area in PortHarcourt.	Adjusted for Odds Ratio, the availabilityof it and ZINC.
Yanti et al. [12]	Qualitative study with ananalysis of Analytical Hierarchy Process (AHP)	Pagar Alam City-Indonesia	37% = people who have sustainable accessto quality drinking water(decent). 63% = peoplewho have difficulty obtaining cleanwater. Where 57.7% = House floor is notmade of landonly.	Sanitation	Inhabitant ofPagar AlamCity - Indonesia	Associated and basedon society, environment, and infrastructure.

Lubis et al. [13].	Quantitative study with aCross Sectional Study design	Berastagi District, KaroRegency	100 = mothers with toddlers aged6-24 months	Sanitation and personalhygiene	Mother with breastfeeding infants fromSinabung post -eruption settlement, Berastagi District, Karo Regency	Adjusted forbreast feeding, age, anddiarrhea. Age: toddlers aged 6- 24 months
Shah et al. [14].	Randomized Controlled Trial	Tehsil HeadQuarters Hospital, Besham District Shangla, Khyber Pakhtunkhwa	90 = children Which 45 = experimentalgroup 45 = controlled	Zinc supplement	Children from Tehsil HeadQuarters Hospital	Adjusted for age anddiarrhea.
Hossain etal. [15].	Qualitative study	Bangladesh	20 = householdswas drawn from each EAs (Clusters)	Effective handwashing facility (EHF)	Households from geographical divisions of Bangladesh	Associated and basedon age, sex, educationlevel and ethnicity of household head, geographical divisions,area of residence,wealth index, improved sanitationstatus, improved waterstatus, media exposure,own house, and toiletfacility.
Tintle et al. [16]	Prospective Comparative Quantitative Study	Dominican Republic	675 = households	Water Filters	Sixteen villagesin Dominican Republic	Adjusted for sponsorship, date,geographic location/watershed, school anticipation,and government publichealth statistics.
Kumari etal. [17].	A cross-sectional study	Seloo blockof Wardhadistrict	140 = sample	Hygiene practices	All the adopted villages of Seloo block ofWardha district	Adjusted for age anddiarrhea ; Age: under-five age children
Solomon etal. [18].	Cluster randomized controlled trial	Eastern Ethiopia	408 = households (children) from 8 clusters	Handwashing	Children belowfive in ruraleastern Ethiopia.	Adjusted for age, chronic illness and location;

			Which 204 =households (children) from 4 clusters for handwashing group 204 = households (children/) forcontrol group			Age: 5 years' old Location: RuralEastern Ethiopia
George etal. [19].	A Cluster-randomized Controlled Trial	Dhaka, Bangladesh	2626 = participants in 769 households	Water, Sanitation and Hygiene	769 householdsin Dhaka, Bangladesh	Adjusted for weight and time duration of the study.
Iwashita et al. [20].	Prospective Cohort Study	Northern Vietman	1508 = residents 13 = researchteam	Drinking Water andSanitation	2133 households in Hien Khanh commune, with a total population of7966 people	Adjusted for age andduration of the study period.
Wani et al. [8]	A community based repeated cross- sectional study	Santacruz East, 'Waghariwada', Mumbaicity, India	50 = urban slumbased households 5= 10% non-respondent	Water, Sanitation and Hygiene	Six slumpockets basedin the Wakola area, SantacruzEast, 'Waghariwada' having "1,663" households	Associated and basedon practices included boiling of water, dailycleaning of storagecontainers, water transfer, handwash, defecation location,and disposal of children's feces.
Khaliq et al.[7].	A community-based cross-sectional study	Gadap Town, Karachi, Pakistan	40 = participants	Sanitation, and hygiene practices	mothers of children under 2years, who wereresidents of Gadap Town, Karachi, Pakistan	Adjusted for age andsex. Demographics; Based on age and sex.
Komba et al. [21].	Comparative study	Tanzania	Slow sand filter,bone char,membrane filter, ceramic filter anbio sand filter	Water filters	Water filters in Tanzania market.	Associated based onavailable water filtersin Tanzania.

Opeyemi [22]	A retrospective cohort study	Oyo state	2551 = Cases of diarrhea diseaseamong under fivechildren in selected PHCCentres in OyoState, 2017-2021.	Therapeutic methods: Oral Rehydration Salt and Zinc Supplements.	Children underfive years of agein the selected primary healthcenters in Oyo State who had diarrhea from 2017 to 2021 and have beentreated with either ORS orZinc supplements.	Adjusted for age,location and diarrhea.
Wolf et al. [23].	Systematic Review	LMICs (Lower- and Middle- income Countries)	19 837 = records; of which 124 =studies providing 83 water= (62 616children); 20 sanitations =(40 799 children); 41 hygiene = (98 416 children)	Drinking water, Sanitation, and handwashingwith soap	Surveys and Data across multiple institutions, including WHOand the Institutefor Health Metrics and Evaluation	Adjusted for publishedin common language,or had been in relation to the this review'sobjective
Solomon etal. [24]	cluster randomized controlled trial	Dire Dawa, Eastern Ethiopia	405 = households	Water treatment with chlorine	Children underthe age of five years in ruralareas of Dire Dawa, eastern Ethiopia	Adjusted for age; Age: under age of five
Bauza et al. [25].	Systematic Review	LMIC (Lower- and Middle- income Countries)	15 studies =73,511 participants	Sanitation	Any country or population listed in LMICs.	Adjusted for age: Age: children underfive years old
Brahmanamdam et al. [26].	Longitudinal Study	New Delhi, India	41 554=househol ds for first wavesurvey 34 131=household were interviwed	Sanitation	Household from Urbanareas of New Delhi India in longitudinal study	Associated and basedon place of residence, type of house), occupation, education, household, economic status social group and regional categories

The studies mentioned have important implications for nursing practice in the prevention and management of diarrheal diseases.

Zinc Supplement: The studies by Putri et al. [10]; Shah et al. [14] highlight the effectiveness of zinc supplementation in the treatment of diarrhea. Nurses can play a role in advocating for the use of zinc supplements and educating caregivers about their benefits and appropriate dosage. They can also ensure the availability of zinc supplements in healthcare settings and provide guidance on their properadministration.

Oral Rehydration Solutions (ORS) and Zinc: The study by Firima et al. [11] emphasizes the role of drug vendors in providing oral rehydration solutions and zinc as first-line treatments for diarrhea. Breastfeeding for the infant promote hydration of children [34]. Nurses can collaborate with these vendors to improve their knowledge and understanding of these treatments. They can also educate caregivers about the importance of using ORS and zinc in the home-based management of diarrhea [37].

Handwashing: The studies by Agegnehu et al. [9]; Solomon et al. [18]; Hossain et al. [15] highlight the effectiveness of handwashing in preventing diarrhea. Nurses can educate caregivers, children, and communities about proper handwashing techniques and reinforce the importance of regular handwashing [29]. They can also advocate for improved handwashing facilities in households and communities, particularly in areas with a high prevalence of diarrhea [35].

Sanitation and Hygiene: The studies by Iwashita et al. [20]; Wani et al. [8]; Khaliq et al. [7]; Brahmamdam et al. [26] emphasize the importance of sanitation and good hygiene practices in reducing the incidence of diarrhea. Nurses can educate communities about the need for improved sanitation facilities, proper disposal of feces, and hygiene practices such as clean water usage, safe food handling, and personal hygiene [27]. They can also advocate for policies and interventions that promote access to clean water and sanitation facilities.

Water Filters: The studies by Komba et al. [21]; Tintle et al. [16] highlight the effectiveness of water filters in reducing diarrhea cases. Nurses can educate communities about the benefits of using water filters and provide guidance on their proper selection, installation, and maintenance. They can also collaborate with local authorities and organizations to promote the use of water filters in areas with limited access to clean water sources.

3.1 Comparable

Handwashing practices in the Philippines exhibit regional and community variations. While the significance of handwashing is acknowledged, adherence to proper techniques and frequency differs. Urban areas and more developed regions generally have better access to clean water and soap, fostering improved handwashing practices. However, rural and remote areas face challenges due to limited access to these essential resources, posing obstacles to practicing adequate hand hygiene.

Similarly, sanitation practices in the Philippines display variations based on region and socioeconomic conditions. Despite endeavors to enhance sanitation infrastructure and access to improved facilities, challenges persist, particularly in rural areas and informal settlements. Open defecation continues in certain communities, primarily in remote areas with inadequate toilet accessibility. The absence of proper sanitation facilities contributes to the spread of diarrheal diseases.

The Philippine government has implemented initiatives to promote handwashing and improve sanitation practices. The Department of Health (DOH) has launched campaigns and programs aimed at raising awareness about the significance of hand hygiene and providing guidelines for proper handwashing techniques. The DOH also encourages the use of soap, water, and alcohol-based hand sanitizers in healthcare settings. Additionally, the government has initiated the "Zero Open Defecation Program" to address open defecation issues and enhance sanitation facilities in rural areas.

Notwithstanding these efforts, challenges persist in fostering widespread adoption of proper handwashing and sanitation practices throughout the country [28]. Limited access to clean water, soap, and sanitation facilities impedes the implementation of recommended practices, particularly in underserved areas. Cultural beliefs, attitudes, and education levels also influence individual behaviors concerning handwashing and sanitation.

However, opportunities for improvement exist. Collaborative endeavors among government

agencies, healthcare professionals, community leaders, and non-governmental organizations can help overcome these challenges. Community-based education and awareness campaigns play a crucial role in promoting behavior change and encouraging the adoption of proper handwashing and sanitation practices. Concurrently, efforts to improve access to clean water sources, sanitation facilities, and hygiene products can contribute to better practices.

Overall, these studies underscore the importance of preventive measures and interventions in reducing the burden of diarrhea. Nurses can play a crucial role in promoting these measures through education, advocacy, collaboration with stakeholders, and implementation of evidence-based practices. By integrating the findings from these studies into nursing practice, healthcare professionals can contribute to the prevention and management of diarrheal diseases and improve the health outcomes of individuals and communities [31].

4. DISCUSSION

The presented paper highlights the association between diarrhea and underlying gastrointestinal diseases, such as inflammatory bowel diseases (IBDs), infections, and severe dehydration. This connection is significant considering the increasing number of active cases and the consequent rise in child mortality rates. To combat this issue, preventive approaches focusing on washing, sanitation, and hygiene have beenimplemented.

The objective of the study was to provide insights into various preventive and control measures related to diarrhea diseases. The meta-analysis conducted in this study emphasizes the importance of effective handwashing facilities (EHFs), hygiene practices, sanitation programs, water filters, and oral rehydration solution and zinc therapy in managing diarrheal diseases. Additionally, the study identifies gaps in knowledge, practice, and risk factors associated with diarrheal episodes.

One specific study conducted in Bangladesh examines the relationship between socio-demographic factors and the availability of effective handwashing facilities (EHFs). The findings suggest that matriarchal families have less access to EHFs compared to patriarchal families, as female heads may face challenges in enforcing handwashing practices among children. Furthermore, wealthier families tend to have better access to EHFs, improved sanitation, and protected water sources. The study also reveals that sharing toilets poses additional risks in maintaining proper sanitation, which can contribute to the spread of diarrheal diseases.

Similarly, a study conducted in India indicates that approximately 46.2% of households continue to practice open defecation, which significantly contributes to the incidence of diarrheal diseases. Factors such as rainwater, age, drinking water sources, distance from water purification plants, and toilet facilities also play a role in the occurrence of diarrheal episodes.

The systematic review encompasses several preventive and control measures for diarrheal diseases. The implementation of modern sanitation facilities has been found to significantly reduce the development of such diseases. Improved sanitation facilities have been associated with a decrease in diarrheal morbidity from 4% to 2% compared to those without access to proper toilet facilities.

Moreover, a high level of awareness among individuals, specifically mothers, effect of breastfeeding, method of vaccine helps to contribute in promoting quality health [32]. In addition, benefits of water treatment and proper handling and storage practices has been observed. Positive hygiene practices, including handwashing with soap and water after toilet use, have been practiced by 94.5% of individuals. These cost-effective interventions contribute to the prevention and control of diarrheal diseases.

Water filters are another effective method for purifying water and removing contaminants. Various types of filters, such as bio sand filters (BSF), slow sand filters (SSF), ceramic filters (CRF), bone char filters (BCF), and membrane purifiers (MP), have been shown to eliminate significant amounts of Escherichia coli (E. coli) and other contaminants from water sources.

Additionally, oral rehydration therapy (ORT) or the use of oral rehydration solution/salt (ORS) and zinc supplements have been proven to decrease the prevalence of acute watery diarrhea. The mortality rate associated with this type of diarrhea has been reduced from 70-90% to approximately 11.5% with the implementation of these therapeutic approaches.

Despite the valuable insights provided by the overall review, certain limitations should be acknowledged. The study acknowledges the lack of sufficient statistical data, which prevents a comprehensive analysis of other risk factors and underlying conditions that can exacerbate diarrheal diseases. Additionally, further research is necessary to fully explore the advantages and benefits of water filters, including their efficiency and impact on reducing diarrheal diseases. Moreover, the study suggests that future research should consider the efficacy of vaccinations and conduct a more thorough analysis of water filters to enhance the understanding of preventive measures for diarrheal diseases.

In conclusion, this systematic review highlights the importance of preventive and control measures in managing diarrheal diseases. By emphasizing the significance of effective handwashing facilities, hygiene practices, sanitation programs, water filters, and oral rehydration therapy, the study provides valuable insights for healthcare professionals, policymakers, and researchers. However, further research is needed to address the identified limitations and enhance our understanding of risk factors, interventions, and preventive strategies in combating diarrheal diseases.

4.1 Implication for Practice

Severe Diarrhea is one of the recorded reasons for death targeting specifically ages below five. Household practices are the common root or cause of the Diarrhea as well as preventive measures in order to avoid this disease [30]. Treatments and methods such as oral hydration and zinc therapy, handwashing facility (EHF), sanitation, hand hygiene, wash, water filters, etc. provided proofs which help to lessen and minimize cases involving Diarrheal diseases [33]. Despite that fact, almost few are self-aware or have knowledge about the effectiveness and usefulness of these methods. Households who are practicing these methods are mostly doing it as it is the traditional practices in their locality. Study about the local market selling medicines shows that few are aware that oral hydration and zinc is the most common treatment for Diarrhea since the locals are only doing it for business. This review will cover these topics as major preventive measures and control of Diarrhea Diseases to address the challenges related to handwashing and sanitation practices, a comprehensive program can be proposed. This program should target the specific needs of the population, considering factors such as access to clean water, availability of sanitation facilities, cultural beliefs, and educational levels. The following components can be included in the program:

1. Improved Water Sources: The program should focus on improving access to clean water sources, particularly in rural and remote areas. This can be achieved through the installation of water supply systems, such as wells, rainwater harvesting systems, or piped water networks. Collaboration with local authorities, community organizations, and non-governmental organizations (NGOs) can help facilitate the implementation and maintenance of these water sources.

2. Sanitation Facilities: The program should prioritize the construction and maintenance of sanitation facilities, including toilets and handwashing stations, in areas lacking proper infrastructure. Community-led total sanitation approaches can be employed to raise awareness about the importance of sanitation and encourage the construction and use of toilets. The program should also ensure the availability of soap, hand sanitizers, and other hygiene products in these facilities.

3. Education and Awareness: Community-based education and awareness campaigns play a vital role in promoting behavior change. The program should involve training sessions and workshops conducted by healthcare professionals and community health workers. These sessions should educate the target population about the importance of handwashing, proper handwashing techniques, and the benefits of using sanitation facilities. Culturally sensitive and context-specific information should be provided to address specific beliefs and practices.

4. Policy Development and Implementation: The program should advocate for the development and implementation of policies and regulations that support improved handwashing and sanitation practices. This can involve working closely with government agencies, policymakers, and community leaders to ensure that adequate resources are allocated for water

and sanitation infrastructure. The program should also emphasize the enforcement of existing regulations related to sanitation and hygiene practices.

5. Monitoring and Evaluation: Regular monitoring and evaluation of the program's effectiveness are essential to ensure its success. Data collection on handwashing and sanitation practices, as well as the incidence of diarrheal diseases, should be conducted to assess the impact of the program. This information can guide future interventions and modifications to improve outcomes.

To implement the program, collaboration and partnerships among various stakeholders are crucial. This includes government agencies, NGOs, community organizations, healthcare professionals, and local leaders. Funding can be sought from government sources, international organizations, and private donors to support the program's implementation and sustainability.

By implementing a comprehensive program that addresses water sources, sanitation facilities, education, policies, and monitoring, significant improvements in handwashing and sanitation practices can be achieved. This can lead to a reduction in diarrheal diseases and improved overall health and well-being in the target population. Diarrhea diseases are avoidable and controlled with the right practices or methods and treatments. Based on the observational results and analytical comparison of data, oral hydration and zinc therapy, handwashing facility (EHF), sanitation, hand hygiene, wash, water filters, are proved effective in this review. Furthermore, these practices and methods included in this review can be easily implementedand applied.

5. CONCLUSION

The systematic and integrative review conducted on diarrheal diseases has provided valuable insights into the risk factors and various prevention and control measures associated with this widespread health issue. The analysis has identified several aggravating factors that contribute to the increasing incidence of diarrheal diseases, including rainwater, age, type of drinking water, distance from water purification plants, and toilet facility type. These factors highlight the need for targeted interventions to address specific vulnerabilities and improve overall public health.

The review has also underscored the importance of cost-effective interventions in the prevention and control of diarrheal diseases. Effective handwashing facilities (EHFs), along with wash, sanitation, and hygiene (WASH) programs, have emerged as crucial measures in reducing the transmission of diarrheal pathogens. Access to improved sanitation facilities has been found to significantly decrease diarrheal morbidity, emphasizing the significance of adequate infrastructure in disease prevention.

Furthermore, the efficiency of water filters in purifying water from contaminants has been demonstrated. Different types of filters, such as bio sand filters (BSF), slow sand filters (SSF), ceramic filters (CRF), bone char filters (BCF), and membrane purifiers (MP), have proven effective in removing Escherichia coli (E. coli) and other pathogens, thereby reducing the risk of diarrheal diseases [28].

Additionally, the study has highlighted the effectiveness of oral rehydration solution (ORS) and zinc supplement therapy in managing acute watery diarrhea. These interventions have significantly contributed to the reduction in mortality rates associated with this type of diarrhea, emphasizing the importance of timely and appropriate treatment.

The statistical data presented in the review provide robust evidence supporting the effectiveness of these preventive and control measures in managing diarrheal diseases. However, it is crucial to acknowledge the limitations identified in the review, such as the lack of sufficient statistical data and the need for further research on specific aspects, including the efficacy of vaccinations and a more comprehensive analysis of water filters.

In conclusion, this systematic and integrative review serves as a valuable resource for healthcare professionals, policymakers, and researchers in understanding the risk factors and implementing evidence- based preventive and control measures for diarrheal diseases. By addressing the identified gaps and limitations, future research can further enhance our knowledge and contribute to the development of comprehensive strategies to combat this global health challenge.

6. LIMITATION AND RECOMMENDATIONS

The limitations of this study was that the majority of reviews have looked at agricultural settings and urban-slum areas where Diarrhea is caused by improper hygiene and water contamination. Commonly places such as provinces and rural areas which are remote are unreachable and have low accessibility in clean water resources. This leads to unsanitized practices and improper hygiene. Same with urban-slum areas where poverty and dumpsites are evident. But cases from cities and modernized locales are also valuable in Diarrhea diseases. Street food vendors are very prominent in cities since locals and some tourists are missing traditional foods. In which cases such as food poisoning and unhygienic street food is the cause of the diarrhea outbreak. It is also a risk in prevention and control of Diarrheal Diseases.

The increase in public awareness and heightened government measures to control infections doesn't decrease the foodborne pathogens transmission at is continue to in different parts of the world. In recent studies in United States, acute diarrhea occurs annually with over 76 million cases because of ingestion of contaminated food. Although some can be resolved without therapy or self-treatment, 6000 deaths are recorded in annual basis. It happens through consumption of a preformed toxin, ingestion followed by formation of toxin, and direct invasion of intestinal epithelial cells by the infecting organism. Contaminated foods or food poisoning causes are germs or other harmful things in the food or beverage.

Public health policies that assist the population in promoting proper sanitation, and hygiene, as well as the promotion of proper handwashing are one of the important tools and primary prevention and control for diarrheal diseases; it necessitates the participation of the government, public, and private sectors. Aligned with SDG No. 6 of United Nations which is the "Ensuring the availability and sustainable management of water and sanitation for all", these kinds of organizations must also increase their progress by extending their resources to full potential. Given the importance of this for health promotion and disease prevention, it is important to health-related organizations to create further programs to minimize the knowledge-practice gaps.

Based on the findings of the study, it is evident that increasing the knowledge of mothers and their partners regarding the prevention and control of diarrheal diseases is crucial in reducing the incidence and impact of this health issue. Here are some recommendations to enhance knowledge, attitudes, and practices among mothers and their partners:

1. Health Education Programs: Develop and implement comprehensive health education programs targeted specifically at mothers and their partners. These programs should focus on raising awareness about the causes, transmission, and prevention of diarrheal diseases. Provide information on effective handwashing techniques, proper sanitation practices, and the importance of using clean drinking water.
2. Community Workshops and Seminars: Organize community workshops and seminars to disseminate information and engage mothers and their partners in interactive sessions. These sessions can include demonstrations on handwashing techniques, discussions on proper sanitation practices, and information on the benefits of water filters and oral rehydration therapy.
3. Collaboration with Healthcare Providers: Collaborate with healthcare providers, such as doctors, nurses, and community health workers, to deliver key messages and education materials to mothers and their partners during antenatal and postnatal visits. Healthcare providers can also play a vital role in addressing any misconceptions or concerns regarding diarrheal diseases.
4. Use of Visual Aids and Technology: Utilize visual aids, such as posters, brochures, and videos, to effectively communicate key messages about diarrheal disease prevention. Embrace technology by developing mobile applications or online platforms that provide accessible and user-friendly information on prevention and control measures.
5. Engage Community Leaders: Involve community leaders and influential figures in promoting and advocating for diarrheal disease prevention. Community leaders can help create a supportive environment for behavior change by emphasizing the importance of good hygiene practices and sanitationfacilities.

6. Peer-to-Peer Education: Establish peer support groups or networks where experienced mothers can share their knowledge and experiences with new mothers and their partners. This peer-to-peer approach can be an effective way to disseminate information and encourage positive health behaviors.

7. Continuous Monitoring and Evaluation: Regularly monitor and evaluate the effectiveness of educational interventions and programs. Collect feedback from mothers and their partners to assess their understanding and identify any areas that require further improvement or clarification.

8. Targeted Messaging and Tailored Approaches: Recognize the diversity within communities and customize educational materials and approaches to suit different cultural, socioeconomic, and linguistic backgrounds. Tailor the messaging to address specific concerns and barriers that mothers and their partners may face in adopting preventive practices.

By implementing these recommendations, it is possible to enhance the knowledge, attitudes, and practices of mothers and their partners regarding the prevention and control of diarrheal diseases. Empowering individuals with accurate information and practical skills can lead to positive behavioral changes and ultimately contribute to reducing the burden of diarrheal diseases in communities.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/105909