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Systematic Review

Maternal Handwashing with Soap Practices and Associated Risk Factors in Nepal: A Systematic Review

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Abstract: Handwashing with soap is a fundamental practice for preventing communicable diseases, particularly in resource-constrained settings like Nepal, where various factors influence maternal handwashing behaviours. A systematic search encompassing PubMed/Medline, Embase, PsycINFO, CINAHL and grey literature source was conducted. Extracted eligible articles underwent descriptive analysis and their quality assessment was carried out following STROBE guidelines. From the initial screening of 187 database articles and 18 from grey literature, a total of 120 full text articles and records were retrieved to evaluated for inclusion in the review, identifying nine articles meeting the inclusion criteria for the review. Maternal handwashing with soap frequencies varied during critical moments ranging from 6% to 100%, and a 47% availability of soap and water at the household level was reported. Factors influencing handwashing included education, wealth, ecology, and participation in health promotion campaigns. Barriers included knowledge gaps, contrary beliefs, unavailability of soap and water, financial constraints, maternal demotivation, and low participation in decision-making. Limitations include study design heterogeneity (cross-sectional, Randomized Controlled Trials-RCT, Cohort), sample size variability, and geographical bias, potentially limiting generalizability of this study, limited reporting on soap and water availability for mothers at the household level is noted, and temporal variability introduces study inconsistency. Availability of soap, water, and effective health education is crucial for promoting sustained handwashing practices. Community-based interventions involving mothers in decision making and policy initiatives are essential for overcoming barriers and promote behavioural change to improve public health outcomes. This paper aims to determine the rates of handwashing with soap among mothers in Nepalese households and explore the factors associated with the uptake of handwashing.

Keywords: determinants; handwashing; households; mothers; situation; soap; Nepal

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1. Introduction

Handwashing with soap is a practical, cheap, feasible, and straightforward way to prevent and control communicable diseases, especially in low-resource settings like Nepal [1–3]. It is a significant component of the prevention and control of skin infections, acute respiratory infections, and diarrhoea among children under five years [1,4–6]. This has been apparent at the global level with the campaigns related to COVID-19 transmission about prevention through handwashing with soap [7–9]. The COVID-19 pandemic has shown that hand washing with soap helps lower the risk of infection [10,11]. Reducing exposure to pathogens is a global health priority [12]; demonstrates, via the Sustainable Development Goals 6 (SDGs 2016–2030), that priority has been given to achieving universal access to all aspects of water, sanitation and hygiene (WASH) by 2030 [13,14].

Handwashing at the household level is determined by a several factors, such as knowledge of the importance of handwashing, risk communication, availability of water and soap, family ownership of soap, water and a fixed place for handwashing, installation of tippy taps (a hands-free way to wash hands—especially appropriate for water scarce rural areas—which is operated by a foot lever and may increase the rate of handwashing with soap), perceived cost, and an individuals' busy schedule and tiredness [15–20]. Household handwashing in Nepal is also influenced by context-specific handwashing policies, strategies and guidelines, as well as geographical and environmental factors [21–23]. Handwashing within households as a standard practice is still not widespread throughout the country. Despite these facilitators and challenges, handwashing remains a key method of reducing communicable diseases rates [4,24].

In Nepal, mothers are primarily caregivers for their children. They teach children at home about handwashing with soap, and managing handwashing facilities with family members support [25,26]. Handwashing with soap promotion campaigns have a positive impact on children's health [27]. Handwashing with soap practice provides children with safe and clean home environments [28]. Family members, such as the husband, father-in-law, and mother-in-law, can handwash with soap by buying soap, managing water and providing fixed places for handwashing. In this discourse, mothers are important persons, as they can be role models in the household.

The five key critical moments recommended to wash hands are: before eating or preparing food; before breastfeeding and feeding children; after defaecating or using the toilet; after cleaning a child faeces or handling nappies; and after touching a source of contamination [1]. In Nepal, the overall handwashing knowledge of mothers was 60% in 2014 [29]. The rate of handwashing with soap by mothers before handling food was 67% after a three-month awareness program in Kavre district, while the baseline survey rate of handwashing with soap was only 5% in 2015 [30]. A study conducted in Rolpa district showed the self-reported prevalence of handwashing was 8% at baseline, 96% after a handwashing intervention, and 77% at follow-up, 30 months after the intervention [31]. However, the rates of handwashing with soap before preparing food, before feeding children or breastfeeding, and after cleaning children's bottoms was between 6% and 22% in Nepal [29]. The application of existing knowledge regarding handwashing, especially before child feeding and breastfeeding and after the disposal of child faeces, is a challenge and barrier to good hygiene practices. With such varying rates of handwashing with soap during critical moments, it is essential to examine this issue in Nepal. This paper aims to determine the rates of handwashing with soap among mothers in Nepalese households and explore the factors associated with the uptake of handwashing.

2. Methods

2.1. Search Strategy and Criteria Selection

This systematic review adopted the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist (http://www.prisma-statement.org/PRISMAStatement/, accessed on 30 October 2023) [32]. The protocol was registered in PROSPERO (CRD42021158009). Published literature was searched in the following databases: PubMed/Medline, Embase, PsycINFO, and Cumulative Index to Nursing & Allied Health Literature (CINAHL). A manual search for articles was also conducted in Google Scholar. The grey literature (e.g., government reports, project reports, working papers, technical reports, and unpublished theses) was searched using keywords that were the same as those used to search the peer-reviewed literature. Relevant papers were also hand-searched. Articles were included if (i) the study was conducted in Nepal, (ii) information was collected from mothers, and (iii) the study was published in English. No limits were placed on the dates of data collection or publication. Articles were excluded if they were, non-mother samples, protocol papers, systematic reviews, abstracts only, or editorials. The search was completed in October 2023. The details of the screening of articles are in the PRISMA flow chart (Figure 1).

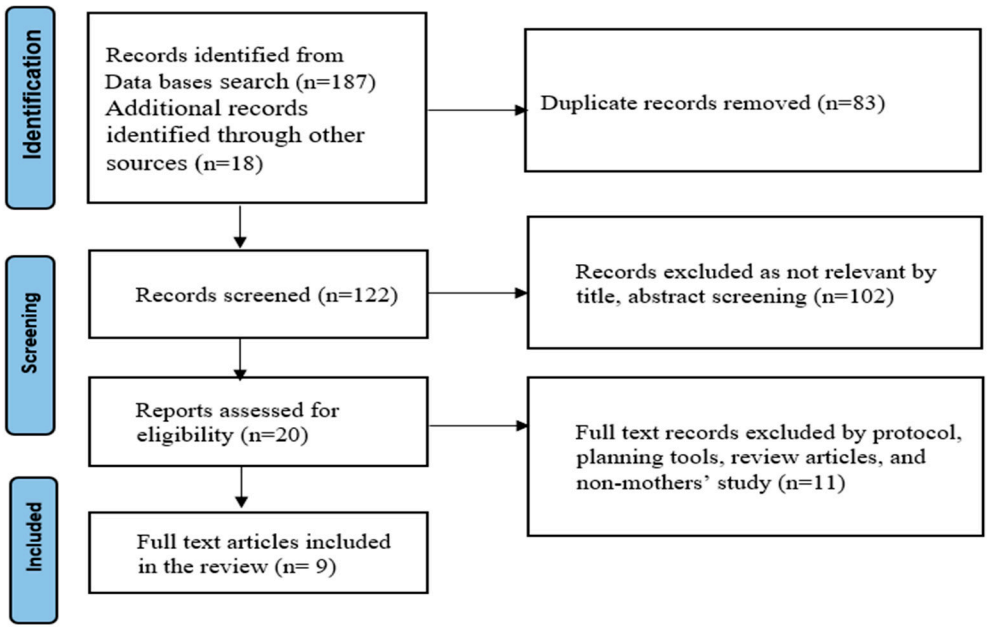

Figure 1. PRISMA flow diagram.

2.2. Data Extraction, Analysis and Quality Assessment

All eligible articles and records were extracted and recorded in an Excel spreadsheet. Extracted information included author, year of publication, study design, participants, age group, study place, study periods, and outcome measures.

Descriptive analysis was performed for this review paper. Two reviewers (SRD and TB) finalised the list of articles and records that would be included. Meta-analysis was impossible due to the low number of studies identified and the heterogeneity of the outcome measures. A quality assessment was done using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [33]. All required fields of the guidelines were completed by the first reviewer (SRD), and cross-verification was performed by the second reviewer (TB). Once the extraction of eligible studies was completed, a narrative synthesis was made to provide evidence about handwashing with soap by mothers. The characteristics recorded for all eligible articles comprised of first author's name, publication year, study design, study population, sample size, study periods, and key findings.

3. Results

3.1. Study Flow and Characteristics of Included Studies

Initially, 187 articles were identified from the database search, and 18 records through the grey literature search. Of the total 205 records, 83 were excluded because of duplication. The remaining 122 were screened, and further records (n = 102) were excluded due to exclusion criteria of irrelevant titles or abstracts. A total of 20 records were assessed for eligibility. Then, 11 full text articles and records were excluded by protocol, planning tools, review articles, and non-mothers studies. Finally, nine full-text articles met all inclusion criteria (Figure 1). Of the nine studies found, three studies described randomized controlled trials (RCT), conducted in Kavre, Kathmandu, and Chitwan, Makwanpur, and Nuwakot districts. Five studies were cross sectional, conducted in a rural and urban settings. One study described a cohort study, conducted in Sarlahi district.

3.2. Rates of Household Handwashing with Soap by Mothers in Nepal

Maternal rates of handwashing with soap varied during different critical moments in the eligible studies. The rate of handwashing is normally called percentage of household mothers who washed their hands where denominator is the total number of households

mothers included in the study. In 2023, Dhital et al. conducted a cross sectional study using Nepal Demographic and Health Survey (NDHS) 2016 found the availability of soap and water was 47% [34]. Two municipalities Shankarapur and Tandi in Chitwan were 28% and 34%, respectively [35]. A cross-sectional study conducted by Kafle and Pradhan in Makwanpur district among 178 mothers in 2018 reported that approximately 43% of mothers washed their hands with soap at critical moment [36]. Gautam et al. conducted a RCT between October 2012 and December 2013 using structured observations of handwashing with soap among 239 mothers with children aged 6–59 months in Kavre showed that handwashing with soap before eating and feeding a child was 67% after a food hygiene campaign, which was significantly higher than the 5% who undertook handwashing with soap before eating or feeding a child at baseline [30]. Langford and Panter–Brick conducted a RCT in the slum area of Kathmandu in 2013. They reported that the handwashing with soap rates were 100% after using the toilet and after cleaning children's bottoms, 71% before cooking food, 62% before child feeding, and 60% before eating in the handwashing intervention arms of the study; while the results for the control arms were 91% after using the toilet, 84% after cleaning children's bottoms, 19% before child feeding, 2.3% before cooking and zero percent before eating [37]. An observational prospective cohort study carried out in 2008 in Sarlahi district showed that mothers' handwashing with soap prior to handling infants was only 15% [27]. Likewise, another retrospective cross-sectional study conducted in the Makwanpur district among 5411 mothers aged 15–49 years who had live births in the previous year in 2002 showed that approximately 50% of the birth attendants washed their hands prior to attending the deliveries [38]. These results indicated that handwashing with soap rates had a wide variation depending on the areas, circumstances, education, and critical time point being assessed, with the majority of results showing far less than optimal rates of handwashing with soap across the country. The key summary result of this review on household rates of handwashing with soap by mothers is presented in Table 1, while Table 2 outlines the factors associated with the uptake of handwashing.

Table 1. Rates of handwashing by household mothers.

First Author, Year	Study Design	Sample Size	Study Periods	Main Findings
Dhital, S.R., 2023 [34]	Cross sectional	11,040	1 year	The availability of soap and water was 47%.
Sekh, N., 2022 [35]	Cross sectional	40	1 month	Mean handwashing with soap rate by household mothers was 28% and 34%, respectively in Shakti Khor and Tandi Municipality of Chitwan Nepal. The handwashing rate was higher after defecation than before taking meals.
Kafle, S., 2018 [36]	Cross-sectional	178	Not specified	Mothers washed their hands with soap by 43% during the critical moments.
Gautam, O.P., 2017 [30]	RCT	239	3 months	Handwashing at home before feeding the child and eating increased from 5% to 67% after the health promotion food hygiene campaign.
Langford, R., 2013 [37]	RCT	88	6 months	Approximately 21% of mothers washed their hands with soap after defaecation and 14% after cleaning baby's bottom. No data were obtained about handwashing during/before cooking or feeding the child in non-intervention group. Intervention groups (baseline and post-intervention) showed that mothers washed their hands after defaecation (96% and 100%), after cleaning baby's bottom (82% and 100%), before cooking (12% and 71%), before feeding children (26% and 62%) and before eating (14% and 60%), respectively.
Rhee, V., 2008 [27]	Cohort study	23,662	40 months	Prevalence of maternal handwashing with soap before handling their infants was 15%.
Osrin, D., 2002 [38]	Cross-sectional	5411	Not specified	Approximately 50% of mothers who attended a birth had washed their hands with soap.

Table 2. Factors associated with the uptake of handwashing.

First Author, Year	Study Design	Sample Size	Study Periods	Main Findings
Dhital, S.R., 2023 [34]	Cross sectional	11,040	1 year	The handwashing with soap is influenced by education, wealth and ecology.
Kafle, S., 2018 [36]	Cross-sectional	178	Not specified	Access to an improved water source, sanitary toilets, and the availability of soap for handwashing are key determinants of handwashing indicators.
Kandel, P., 2017 [39]	Cross sectional	1421	Not specified	Availability of soap, water and a fixed place for handwashing was significantly associated with lower rates of faecal contamination in water sources.
Gautam, O.P., 2017 [30]	RCT	239	3 months	A comprehensive health promotion intervention involving mothers' participation and motivation factors has facilitated handwashing.
Miller, L.C., 2017 [40]	RCT	1011	48 months	Mothers used soap and had more water access at home than fathers, and the participatory Community Development program effectively improved household hygiene.
Langford, R., 2013 [37]	RCT	88	6 months	Culture and belief determine to have a handwashing with soap by mothers at households.
Rhee, V., 2008 [27]	Cohort study	23,662	40 months	Maternal handwashing with soap was associated with significantly lower rates of neonatal mortality.
Osrin, D., 2002 [38]	Cross-sectional	5411	Not specified	The level of knowledge is the most influential factor affecting handwashing with soap among household mothers.

3.3. Factors Associated with Maternal Handwashing in Nepal

The key factors associated with handwashing with soap and water are education, wealth and ecology [34]. A cross-sectional study carried out among randomly selected mothers from 178 households in Makwanpur district in 2018 found maternal knowledge and the household wealth index affect handwashing with soap practices [36]. In 2017, Kandel et al. conducted a cross sectional study using the 2014 Multiple Indicator Cluster Survey (MICS) dataset among 1421 households' mothers and reported that the faecal contamination of water was associated with the availability of adequate handwashing facilities with soap and water [39]. As mentioned above, an RCT carried out in a rural village in Kavre district in 2015 found mothers' participation in Health Mothers' Group meetings, and motivation through family support and rewards are enabling factors for handwashing with soap, while poor participation, demotivation, and punishment decrease handwashing with soap [30]. This study further found that an integrated health promotion campaign increased the rate of handwashing with soap. Miller et al. conducted a RCT in Chitwan, Nawalparasi, and Nuwakot districts reported that women who attained higher-level of education had more frequent use of soap during handwashing compared with women with no education in 2017 and the participatory community development program was an effective way of increasing hygiene practices [40].

A study carried out in Kathmandu in 2013 showed that family and community beliefs, such as believing handwashing with soap is unnecessary, being unsure about good health after using soap, and the financial burden of buying soap, are barriers to effective handwashing with soap [37]. This study found that community strongly believed that keeping children clean all the time causes illness, and some infectious diseases are caused by cold weather, fever, and evil spirits, not due to poor handwashing practices. A strong misconception that handwashing with soap may not be necessary to prevent diseases can have adverse health effects on the people, especially the vulnerable populations such as children, pregnant mothers and the elderly. A further barrier to handwashing with soap is that household members need to spend money on food, which takes priority over soap. A cohort study carried out in 2008 in the plain region in Sarlahi district of Nepal indicated that the possible factors associated with maternal handwashing were a lack of

education, absence of a toilet at home, and having low-birthweight babies [27]. A study conducted by Osrin and colleagues in the Makwanpur district among 4511 mothers in 2002 found a lack of knowledge about the importance of handwashing and hygiene, especially during breastfeeding and birth attendance, which is a possible factor affecting effective handwashing in Nepal [38].

4. Discussion

This paper aims to determine the rates of handwashing with soap among mothers in Nepalese households and explore the factors associated with the uptake of handwashing. Nepalese mothers typically take the primary caring role for children and family members, including household cleaning. These roles are traditionally established and socially constructed in Nepal. Although handwashing is a shared responsibility, mothers often experience feel more pressure to ensure safe hygiene for their children [41]. These caregiving roles are not recognized as work with the home in Nepal [42].

The first and foremost issue for a general family education on handwashing is improving maternal handwashing knowledge. The NDHS 2016 results showed that handwashing facilities with soap and water at the household level was 47%, whereas the MICS 2014 found that mothers' handwashing with soap knowledge varied depending on the specific critical moment being observed. For example, after cleaning children's bottoms or changing nappies, handwashing rates of 6% were found compared to before meal, when 92% washed their hands with soap [29,43]. The NDHS 2022 results showed that the availability of basic handwashing facilities with soap and water at household level was 72%, reflecting a 25% increase from the baseline data of NDHS 2016 [44] This surge could be attributed to the global COVID-19 pandemic, fostering a habitual practice of handwashing.

This review determined that maternal knowledge about the importance of handwashing with soap before eating or child feeding was higher after food hygiene intervention; [30] compared to after cleaning a child who has defaecated; [37] and this is one of Nepal's significant public health challenges [29]. Similarly, less than half of the mothers washed their hands with soap who attended childbirth [38]. The low rates of handwashing by mothers may be attributed to a lack of health knowledge about the threat and severity of not washing hands, unavailability of soap and water, financial crisis, and the cultural belief that communicable diseases (for example diarrhoea) exist because of colds, fever, or evil spirits, rather than lack of handwashing [37]. In Nepal, mothers who are poor and those in rural and hard-to-reach areas remain most vulnerable to communicable diseases, due to inadequate access to health education and handwashing services [29]. The gap between handwashing knowledge and access to handwashing facilities with soap and water is a further challenge in Nepal [36].

This review highlighted those key factors and barriers to handwashing with soap include a lack of knowledge, contrary beliefs, unavailability of soap and water, financial constraints, maternal demotivation, and low mother's participation in household decision-making. Maternal knowledge is associated with handwashing practices [45]. Availability of soap, clean water, fixed places for handwashing, adequate time, and family and community support positively influence handwashing by mothers [19,46]. Health education by trained health care providers in overcoming barriers, reinforcing the importance of handwashing at critical moments. Mothers as key role models, shape household handwashing situations. This statement is supported by a previous study carried out in Korea in 2013, which argued that providing health education improved handwashing [47]. The results of this review indicate that factors affecting handwashing were similar to a 2015 Nepal-specific study of four various plains districts (Mahottari, Siraha, Saptari and Sarlahi), which showed that participating mothers were more likely to wash their hands with soap when their hands looked dirty, to have their hands soft and smelling good, and to keep their dignity [48]. Challenges include providing high-quality education to increase health literacy and fostering habits of utilizing available resources. Other determinants include family roles, household structure, geography, and climate [31].

Effectively improving handwashing practices hinges on the challenging task of changing community mindsets, though this is complex and hindered by economic growth challenges and societal inequalities. This review highlights the need for health promotion campaigns, the production of context-specific handwashing materials, and timely, high-quality health education sessions on handwashing. The policy, guidelines and strategies documents are needed. Simple, affordable, and practical local interventions should consider cultural, social, economic, and geographical factors [49]. Community-based health promotion actions are recommended, involving advocacy, services delivery, and policy approaches [50,51]. This review suggests future research priorities, including multivariate and multi-level analyses on handwashing and sanitation facilities in Nepal. It advocates for participant observation studies and emphasizes the importance of health education, human resources and high-quality handwashing facilities.

The limitations of this review are acknowledged. Firstly, there is heterogeneity in study designs (cross-sectional, RCT and Cohort), posing challenges for the direct comparisons. Secondly, not all household-level handwashing rates and facilities were covered. Thirdly, none of the included studies reported the availability of soap and water at the household level for mothers in Nepal. Fourthly, information about corrective measures for effectively improving handwashing knowledge and behavioural change through community efforts was lacking. Finally, this review shows a variability of sample size and geographical bias with a focus on Nepal-specific studies, potentially limiting the generalizability of findings beyond the Nepalese context.

5. Conclusions

Addressing variations in handwashing practice among household mothers requires a comprehensive approach, considering education, economic status, geography and cultural influences. Challenges like knowledge gaps and limited soap and water underscore the need for fostering consistent handwashing habits. The lack of a specific handwashing policy and strategy in Nepal poses a challenge, emphasizing the potential benefits of adopting available handwashing guidelines, thereby benefitting from their implementation. This review highlights the crucial role of ensuring an adequate supply of soap and water, along with designated handwashing places and effective health education, to improve handwashing practices. Achieving this requires tailored community development and health promotion programs in Nepal.

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Abbreviations

MICS: Multiple Indicator Cluster Survey; PRISMA: Preferred Reporting Items for Systematic reviews and Meta-Analysis; RCT: Randomized Controlled Trails; STROBE: Strengthening the Reporting of Observational Studies in Epidemiology; SDGs: Sustainable Development Goals; WASH: Water, Sanitation and Hygiene.

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