

Original Research Article

Assessing the effectiveness of a menstrual hygiene management and sexual and reproductive health education program in post-earthquake Nepal

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Abstract

This study assesses the effectiveness of a menstrual hygiene management (MHM) and sexual and reproductive health (SRH), school-based education program conducted in Dhading, Nepal after the 2015 mega-earthquake. The intervention aimed to improve MHM/SRH knowledge among adolescent girls on a range of topics including adolescence, female anatomy, menstruation, and more. Quantitative data were collected via cross-sectional, self-administered, community-based surveys after the 2015 earthquake with 3,319 adolescent girls in grades 7-9 in Dhading district. Data were collected using the same survey tool before and after the intervention and responses were compared using SAS 9.4. Before the intervention, the median MHM/SRH knowledge score was 50% of the pre-test questions answered correctly. After the intervention, the median MHM/SRH knowledge score improved to 73% of the post-test questions answered correctly. Topics with the greatest percentage improvements between pre- and post-tests included age of menarche (from 20.5% to 60.0%), timing of taking emergency contraceptive pills after unsafe sexual contact (from 14.8% to 54.1%), and approaches for managing menstrual pain (from 42.2% to 77.1%). The school-based MHM/SRH educational intervention led to significant improvements in participant MHM/SRH knowledge. Equipping girls with accurate information about MHM/SRH long before a disaster occurs by embedding the information into the national school curriculum is one way to ensure they are prepared with key information required to manage MHM/SRH needs if another disaster occurs.

Keywords: adolescent health, health education, Nepal, menstrual hygiene management, menstruation, post-disaster, sexual and reproductive health

Introduction

Menstrual hygiene management (MHM) is a growing global health issue, with researchers, practitioners, and organizations seeking to better understand and improve the experiences of women and girls during menstruation and reduce the stigma and health concerns associated with poor hygiene and harmful menstrual practices (Ranabhat et al., 2015; Sommer et al., 2015). In Nepal, menstruation can be particularly challenging, given the shortage of appropriate, affordable, and hygienic resources to manage menstruation, as well as cleaning and disposal facilities (Mahon & Fernandes, 2010; Morrison et al., 2018; WaterAid, 2009). In

Nepal, stigma and shame are feelings regularly associated with menstruation, during which women and girls are often considered “unclean” or “polluted” (Budhathoki et al., 2017; WaterAid, 2009). Furthermore, menstrual restrictions and taboos such as avoiding the home, the water tap, worship spaces, family members, toilets, or kitchens during menstruation, can bring additional challenges for addressing menstrual health and hygiene management in Nepal (Baumann et al., 2019; Baumann et al., 2020; Central Bureau of Statistics & UNICEF, 2015; Morrison et al., 2018; PSI/Nepal et al., 2017).

On April 25, 2015, a 7.8 Richter magnitude earthquake struck Nepal, which killed over 9,000 people and left over 3.5 million people displaced (Budhathoki et al., 2018). According to estimates released by the United Nations Population Fund (UNFPA), of the eight million earthquake-affected persons, 2 million are women of reproductive age, a particularly vulnerable population (UNFPA, 2015). With damaged health institutions and disrupted health and reproductive health services, women and adolescent girls face increased health risks (UNFPA, 2015). Additionally, a study conducted by UNFPA, and the Centre for Research on Environment Health and Population Activities (CREHPA) noted that existing health services and facilities are often not accessible, appropriate, or acceptable to adolescents, who account for nearly a quarter of Nepal’s population (United Nations Population Fund et al., 2015). The study concluded that health service providers lack sufficient training on providing adolescent-friendly services, adequate resources, privacy, monitoring, and supervision (United Nations Population Fund et al., 2015).

While emerging response operations and rescue and recovery efforts began immediately after the earthquake, there was a lack of attention to the menstrual hygiene needs of women and girls in the immediate aftermath of the disaster (Budhathoki et al., 2017, 2018; Lee, 2015; Thacker, 2015). For female evacuees, problems associated with living in makeshift camps with no toilet facilities and a lack of privacy were worsened by the lack of supplies for dealing with menstruation (Lee, 2015; Sommer et al., 2017). Women and girls fleeing for their lives had to leave behind basic materials for managing menstruation and purchasing new supplies was often not feasible or a high priority with limited household budgets after such a catastrophic event.

In emergencies, the everyday lives of people are affected, and basic needs for survival such as food, shelter, and medicine are often the immediate focus of interventions. MHM typically remains in the shadows and challenges are exacerbated during emergencies (Sommer, 2012). However, it is important to respond to the MHM needs of women and girls in post-disaster situations, as doing so serves to safeguard health and protect women and girls. Girls and women walk long distances and stand in distribution lines for long periods to receive basic supplies like food, water, and other provisions, and lacking appropriate MHM protection materials may pose many problems for them to collect necessary supplies for themselves and their families. Additionally, gender-based violence is often exacerbated in displacement sites; women and girls reported feeling threatened and insecure and face a lack of privacy in temporary shelters (Standing et al., 2016). In a post-earthquake assessment in Nepal, only 7 percent of displacement sites provided a segregated, sanitary space for managing menstruation or a dedicated women's safe space (UNOCHA, 2015), leaving them few or no options for hygienic disposal or washing and drying menstrual materials.

While there has been increasing attention for addressing MHM and SRH needs within the global humanitarian emergency response community – such as the need for a multi-faceted approach that includes adequate numbers of safe latrines, water, sanitary materials including

appropriate means of disposal, and appropriate education materials (Sommer, 2012) – more research is urgently needed to understand perceived gaps and recommendations for improving efforts to meet the menstrual hygiene needs of women and girls in post-disaster scenarios.

The MHM/SRH Intervention

To contribute to addressing this gap in knowledge regarding MHM and SRH in post-disaster contexts, and developing a long-term, sustainable strategy for addressing these topics in the school curriculum in Nepal, the Nepal Fertility Care Center (NFCC) partnered with the Government of Nepal and GIZ to implement an educational and behavior change program after the 2015 earthquake. The intervention aimed to equip female adolescents with appropriate and timely knowledge about hygienically managing menstruation, in particular after the earthquake when resources were extremely scarce, as well as essential SRH information in community schools. The objectives of the intervention were to 1) provide accurate information about menstruation and how to manage it hygienically, 2) provide training on how to make homemade (reusable) cloth pads to manage menstruation, and 3) provide information on a range of sexual and reproductive health topics to community schools in Dhading district in the post-earthquake context.

The package and intervention were designed and developed by NFCC, who has over 20 years of experience working on reproductive health issues in Nepal, and over 14 years working in menstrual and sexual health. NFCC worked closely with the Government of Nepal to develop the package, specifically The Family Welfare Division, Department of Health Services, and Center for Education and Human Resource Development. The development of the package was largely informed by the Menstrual Hygiene Matters comprehensive resource to improve MHM around the world, developed by Water Aid (House et al., 2012). The package includes a range of topics, including the meaning of adolescence, female anatomy, menstruation, premenstrual symptoms, pain management, calculation of menstrual cycle, and more. The educational sessions were conducted in community schools by trained school teachers and health workers from local schools and health facilities, after completing a training of trainers organized by NFCC. Technical support was provided by NFCC throughout the project based on the needs of facilitators. The intervention was funded by the German development agency, GIZ. Based on consultations with the District Education Office (DEO) and the District Public Health Office (DPHO), fifteen VDCs' and 42 schools were selected for the intervention, and a total of 4,128 students were reached with the educational package. The school orientation sessions were conducted over 1 day, or a period of 3 days with 2-hour sessions.

Study Aim

In this study, the authors aim to evaluate the impact of the MHM/SRH intervention on knowledge outcomes, by comparing survey outcomes before and after the intervention with adolescent, school-going girls in grades 7, 8, and 9 in Dhading, Nepal.

Methods and Materials

Study Design, Setting and Participants

Data were collected to assess the impact of an MHM/SRH intervention via cross-sectional, self-administered, community-based surveys in schools after the 2015 earthquake with 3,319 adolescent girls in Dhading district, Nepal. Dhading district was selected as it was one of the most severely affected districts by the disaster, with widespread loss of life, buildings/homes,

and assets, hundreds of injuries, and loss of road access due to landslides (UNOSOCC, 2015). Data were collected among female students from 42 community schools throughout the district where the educational intervention was implemented. The schools were selected in consultation with the District Education Office (DEO) and the District Public Health Office (DPHO). Since 587 out of 607 community schools were destroyed after the earthquake in Dhading (Shechen, 2015), the intervention began once community schools resumed in March 2016, approximately 11 months after the earthquake. All female students in grades 7-9 were invited to participate.

A total of 4,148 female students completed the initial intervention orientation. This analysis included those participants who completed both the pre- and post-tests, a total of 3,319.

Data Collection

To measure the impact of the intervention, a pre-test was conducted before the intervention to assess the extent of pre-existing knowledge on MHM and SRH with 22 multiple choice questions (4 response options) associated with key aspects of the intervention. Questions assessed knowledge on topics such as the age and physical changes that occur during adolescence, reproductive organs, the menstrual cycle, pain, management and hygiene, handwashing, menstrual restrictions, family planning, health services, and more. Each response was categorized as correct or incorrect. After the completion of the intervention, the same post-test was conducted and comparisons of the pre and post-test scores were completed to understand changes in MHM and SRH knowledge.

Community/Academic Partnership

This study is part of an ongoing community-academic research partnership between the Nepali non-governmental organization, NFCC and the University of Pittsburgh School of Public Health. NFCC collected the data as part of a program evaluation and the University of Pittsburgh School of Public Health research team analyzed the data regarding menstrual knowledge before and after the intervention.

Data Analysis

Pre and post-test scores could not be matched by participant, and thus the results were averaged based on schools and school districts. Normality was assessed for pre and post-test data using SAS 9.4. The distribution of pre and post-tests for schools and school districts was not normally distributed, and thus, the Wilcoxon Rank Sum test was conducted to test whether there was a significant difference between pre and post-tests results. Pearson chi square was calculated to test significant differences between pre and post-test results at the question level. A P-value of <0.001 was used to determine statistical significance.

Ethical Considerations

Since the data utilized in this study was obtained for evaluating the impact of an intervention, local Institutional Review Board (IRB) approval in Nepal was not required. However, verbal informed consent was collected for all participants over 18 years. For those under 18 years of age, verbal assent was collected from the participants as well as parental consent. Consent and assent were collected before data collection through a trained data enumerator from NFCC, after providing verbal details about the intervention, as well as risks, benefits, and measures to maintain privacy (e.g., identifiers removed, no names collected). For this analysis of the intervention data, the University of Pittsburgh Institutional Review Board (IRB) reviewed and approved this study, and classified it as not human subjects research (IRB Number: 19060183). Confidentiality was

maintained by providing a unique identification number for each participant, and all personal identifiers were removed from the dataset before analysis.

Results

Level of MHM/SRH Knowledge Before and after Intervention

Measured before the intervention, the median knowledge score on topics regarding menstruation and sexual and reproductive health was 0.50, or participants answered half of the pre-test questions correctly. Median knowledge scores ranged from 0.45 to 0.59 depending on the school district, with some schools performing higher than others (Table 1). Notably, all the school districts in the sample significantly improved knowledge scores between the pre and post-test. Post-test scores had an overall median of 0.73, or participants on average were able to answer 73% of the post-test questions correctly, a significant improvement from the pre-test scores. Median post-test scores ranged from 0.68 to 0.82 depending on the school district.

Table 1

Pre- and Post-test Scores for MHM/SRH Intervention, Dhading Nepal 2015

School district	Pre-test median (25th percentile, 75th percentile)	Post-test median (25th percentile, 75th percentile)
Sunaula Bazar (n=546, 473)*	0.45 (0.36, 0.59)	0.82 (0.68, 0.91)
Salbas (n=336, 399)*	0.45 (0.36, 0.55)	0.81 (0.69, 0.86)
Chainpur (n=104, 106)*	0.50 (0.41, 0.59)	0.77 (0.73, 0.82)
Salyantar (n=447, 402)*	0.50 (0.41, 0.59)	0.77 (0.64, 0.81)
Tripureshwor (n=718, 743)*	0.50 (0.36, 0.59)	0.73 (0.59, 0.82)
Benighat (n=342, 469)*	0.59 (0.50, 0.73)	0.73 (0.59, 0.82)
Salyantar RC (n=48, 49)*	0.50 (0.36, 0.55)	0.73 (0.64, 0.73)
Jogimara (n=289, 209)*	0.45 (0.36, 0.64)	0.68 (0.59, 0.82)
Gajuri (n=367, 369)*	0.45 (0.32, 0.59)	0.68 (0.55, 0.77)
Salbas RC (n=92, 100)*	0.47 (0.36, 0.55)	0.68 (0.59, 0.75)
Total (n=3289, 3319)*	0.50 (0.36, 0.59)	0.73 (0.64, 0.82)

Note. *Significant at $P < 0.001$

Highest Scoring Questions in Post-Test

The MHM/SRH intervention topics included in the intervention training package included topics such as the meaning of adolescence, female anatomy, menstruation, premenstrual symptoms, pain management, calculation of menstrual cycle, and more. Based on a review of post-test results, there were certain topics on which students performed particularly well (Table 2). For example, 93.7% of participants were able to correctly answer the question, "What physical changes occur during adolescence," and 86.9% were able to correctly answer the question, "How many steps of handwashing are there?" A high percentage of participants also correctly answered questions regarding the definition of menstruation (86.7%), exercise and menstruation (86.6%), how to maintain hygiene during menstruation (86.6%), the age of adolescence (86.4%), and adequate disposal practices for menstrual materials (86.4%).

Table 2*Highest Scoring Questions from Post-test, Dhading, Nepal, 2015*

Question	Percentage of sample answered correctly
What physical changes occur during adolescence?	93.70%
How many steps of handwashing are there?	86.92%
What is menstruation?	86.70%
Can you exercise during menstruation?	86.60%
How can the cleanliness of genitals be maintained during menstruation?	86.60%
What is the age of adolescence?	86.44%
What are adequate ways to dispose of materials used during menstruation?	86.40%

Lowest Scoring Questions from Post-Test

While the intervention overall led to significant improvements in knowledge for adolescent girls in all intervention school districts, there were certain topical areas in which participants consistently performed poorly according to post-test results (Table 3). These included the questions, “How long does menstruation last?” in which only 21.4% were able to answer the question correctly, “What is the menstrual cycle,” in which only 37.4% provided correct answers, and “What are premenstrual symptoms,” in which 46.6% answered correctly. These are topics in which more resources are needed to better equip adolescent girls with accurate information, and the intervention may require revisions to the curriculum or added attention and follow up in future iterations of the intervention.

Table 3*Lowest Scoring Questions from Post-Test, Dhading, Nepal, 2015*

Question	Percentage of sample answered correctly
What is the age of menarche?	59.99%
How frequently should menstrual materials be changed during menstruation?	58.48%
How quickly should emergency contraceptive pills be taken after unsafe sexual contact?	54.14%
What are premenstrual symptoms?	46.55%
What is the menstrual cycle?	37.42%
How long does menstruation last?	21.42%

Significant Improvements before and after Intervention

There were several topics in which participants made significant improvements in knowledge, determined by comparing pre-and post-test scores (Table 4). For example, there was significant improvement in the percentage of participants who could correctly identify the age of menarche (from 20.5% to 60.0%). For the question, “How quickly should emergency contraceptive pills be taken after unsafe sexual contact?” participants significantly improved their knowledge, from 14.8% initially answering the question correctly, to 54.1% after the intervention. While this finding demonstrates that only slightly more than half of the sample could answer the question correctly after the intervention, considering the pre-test scores, this is a significant achievement in terms of knowledge improvement. Participants could also articulate how to manage menstrual pain after the intervention (from 42.2% to 77.1%). These findings

demonstrate specific areas in which the intervention has demonstrated effectiveness in significantly improving knowledge. While some of the post-test scores are not ideal, they demonstrate a strong starting point and highlight areas in which the intervention could invest more time and resources to continue to improve knowledge outcomes over time.

Table 4

Questions with the Greatest Significant Improvements, Dhading, Nepal, 2015

Question	Pre-test answered correctly	Post-test answered correctly	Change in percentage answered correctly
What is the age of menarche?*	20.49%	59.99%	39.50%
How quickly should emergency contraceptive pills be taken after unsafe sexual contact?	14.84%	54.14%	39.30%
How do you manage menstrual pain?*	42.23%	77.07%	34.84%
How many steps of handwashing are there?*	54.09%	86.92%	32.83%
What is the age of menopause?*	36.97%	69.51%	32.54%
What are the qualities of health service providers providing adolescent-friendly health services?*	47.19%	77.70%	30.51%

Note. *Significant at $P < 0.001$

Discussion

The MHM/SRH educational intervention implemented after the 2015 mega earthquake in Nepal demonstrated significant improvement in MHM/SRH knowledge among adolescent girls in Dhading district who completed the intervention. In all the intervention school districts, participants significantly improved their level of MHM/SRH knowledge after completing the educational intervention.

The level of initial menstrual knowledge found among participants in this study (0.50) is comparable to levels found in other studies in different parts of Nepal. For example, one study conducted in southern Terai, specifically Chitwan, found that menstrual knowledge was relatively low (0.42) (Adhikari et al., 2007). Another study conducted in Sunsari in eastern Terai similarly found low levels, in which 36.1% of the sample had accurate knowledge about menstruation (Sapkota et al., 2014). A third study that was conducted across nine districts and covered all three geographical belts in Nepal also found low levels of menstrual knowledge, with less than half of respondents (48.1%) able to correctly answer at least three out of four questions about menstruation (Baumann et al., 2019). All these studies suggest that there is still a need for interventions that aim to improve menstrual knowledge across Nepal, while also keeping in mind that the studies did use different menstrual education questions making it challenging to directly draw comparisons across studies. However, considering the significant impact of the MHM/SRH intervention assessed in this study, the approach appears appropriate for improving knowledge outcomes and should be considered for scale-up in additional locations across Nepal, since menstrual knowledge appears to be limited in both earthquake and non-earthquake affected districts.

The need for interventions targeting MHM, especially in post-disaster scenarios, is confirmed by a mixed-method study focused on exploring experiences and perceptions on MHM after the earthquake in Nepal. The study found that while there are numerous other

competing priorities such as food, shelter, water, and clothes, MHM needs are immediate and pressing for affected women and girls and should be considered as a core need in post-disaster contexts (Budhathoki et al., 2018). As such, equipping women and girls with accurate information about MHM and SRH long before a disaster occurs, by embedding the information into the national school curriculum, is one way to ensure that girls are prepared if a disaster occurs. This approach aligns with the MHM in Ten international guidance, which suggests that a priority action for moving the MHM agenda forward is “[integrating] MHM and the capacity and resources to deliver inclusive MHM into the education system (p.5)” (Sommer et al., 2016). This includes the recognition of MHM as an integral part of the education sector resources, plans, budgets, services, and ensuring inclusive education for all children and adolescents (Sommer et al., 2016).

This study is limited to Dhading district of Nepal; thus, the results are not generalizable nationwide. However, given the same size of over 3,000 participants, collected across 42 schools in the district, the study team is confident that the results are valuable for providing initial insights as to the potential impact of the MHM/SRH educational intervention developed by NFCC and the Government of Nepal. Future studies that measure the impact of the intervention in additional districts will be required.

Demographic data were not collected for study participants, limiting the analysis to comparisons by schools and school district; however, future studies may consider collecting demographic data such as age, caste/ethnicity, religion, educational attainment of parents, grade in school, and other factors which may potentially act as confounders, complicating or clarifying our understanding of MHM/SRH knowledge patterns.

Since individual participant scores were unable to be matched between the pre- and post-test, our quantitative analysis was limited to aggregate calculations. Future studies should ensure that pre- and post-test data can be matched, to better understand improvements in knowledge at the individual level.

Finally, knowledge outcomes were assessed immediately before and after the intervention, which does not allow for measurement of knowledge retention over time. By implementing the post-test directly after the intervention, knowledge scores may be higher than if assessed at a later date. Future studies should consider a follow-up post-test one to three months after the intervention to measure knowledge retention, which would allow researchers to assess the longer-term impact of the intervention and provide insight concerning the potential need for follow up training.

Conclusion

Considering the significant improvements in participant knowledge after the MHM/SRH intervention, the approach appears appropriate for improving knowledge for adolescent girls in Nepal. It is critical to equip girls with accurate information about MHM and SRH long before a disaster occurs. By embedding accurate and timely information into the national school curriculum, practitioners and educators can help to ensure that girls are prepared with key information and knowledge required to manage menstrual and SRH needs, especially during complex times such as disasters.

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