


Determinants of Menstrual Hygiene Associated with Knowledge, Attitude and Practice among School-Going Adolescent Girls in Banke District, Nepal

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Article Information : Received : Jul. 21, 2025 Revised : Sep. 23, 2025 Accepted : Nov. 13, 2025

Abstract

Menstruation is a natural biological process showing periodic discharge of blood and ovum due to hormonal changes in the female reproductive system every month till the reproductive aged, and it signifies physical maturity. This study aimed to assess the factors associated knowledge, attitude, and practices regarding Menstrual hygiene among school-going adolescent girls in Banke district, Nepal. A school based cross-sectional study was used, and multistage random sampling technique was employed to select 430 school going adolescent girls from eight schools in March to April, 2025. Chi-square test was applied for bi-variate analysis. A multinomial logistic regression model was used to determine statistically significant factors.

The findings revealed that 71.2%, 79.8% and 54% of participants had good knowledge, positive attitude and good Menstrual hygiene practices. In comparison to good knowledge, respondents with older age were 1.68 times, mothers with secondary education were 4.05 times, respondents who received information from social media were 4.22 times more likely to had moderate knowledge. As compared to poor to good knowledge, respondents who did not track Menstrual cycle were 3.15 times, respondents who felt no influence from Menstrual portrayals were 7.14 times more likely to have poor knowledge, whereas menstruation information from social media is 75% less likely to have poor knowledge. Respondents whose mothers were illiterate being 5.36 times more likely to report poor attitudes, and adolescents whose fathers were illiterate being 68% less likely to report good attitudes compared to those whose mothers and fathers had a basic level of schooling. The respondents from private schools were 75% less likely to report a poor practice compared to those from government schools. Students from urban residence had 2% less likely to have poor practice, and private school students had 2.68 times better practice than government school students. Further, students with no cultural restrictions had 1.95 times better practice than students with cultural restrictions.

The parents' education showed a significant influence on their children's knowledge and attitudes of Menstrual hygiene. Also, cultural restrictions harmed Menstrual hygiene. The study identified a notable gap between knowledge and attitude versus actual practices. Thus, special attention should be given to students from government schools, from rural areas, and those facing cultural restrictions to improve Menstrual hygiene practices.

Keywords: Menstruation; Adolescent; Hygiene; Knowledge, Attitude and Practice

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ISSN : 2091-2161

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Published by Autar Dei Chaudharain Research Centre (ADCRC), Mahendra Multiple Campus, Nepalgunj, Banke

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Background

Adolescence is termed as the transition period from childhood to adulthood for each individual aged 10 to 19 years, involves significant learning and adaptation age, particularly for females undergoing psychological changes (World Health Organization, 1993). Menstruation is the natural biological process in which a girl's body sheds the lining of the uterus, resulting in bleeding through the vagina. (Khadilkar & Stanhope, 2006; Shokry et al., 2011). It usually takes place monthly between the ages of 11 and 15 years, with an average age of approximately 13 years (Aniebue et al., 2009). For many girls, menarche is described as a negative or frightening experience, or an inconvenience, often resulting with fear or shame (Crawford et al., 2018). Menstrual management is not only about management of hygiene but also involves embracing womanhood from the onset of menarche. On average, a woman spends approximately 2100 days menstruating, which is equivalent to nearly six years of her life (Pokhrel et al., 2014). As per UNICEF, Safe menstrual hygiene management encompasses absorbent type, change frequency, genital washing, and disposal (United Nations Children's Fund, 2019). Many girls in Nepal remain not informed about menstrual hygiene, and managing it continues to be a monthly challenge for women and girls. (Belayneh & Mekuriaw, 2019; Yadav et al., 2018).

A comparative study among Cambodia, Ethiopia, Ghana, and Tanzania revealed that girls across extremely different regions face similar kind of challenges (Sommer et al., 2014). In Nepal, menstruation deeply connects with socio-cultural and religious norms, restricting access to facilities, education, and rest, alike to global cultural restriction like menstrual blood harming livestock (Blanchet, 1987; Harries, 1985). Wrong beliefs cause misunderstanding which increase the risk of infections and gynecological issues, and cause shame for millions, including 350 million in India. (Belayneh & Mekuriaw, 2019; Rose, 2013; Yadav et al., 2018). Menstrual hygiene management in schools is often neglected. Girls continue to face different challenges due to gender biasness and insufficient facilities. Especially school-going girls find it difficult to handle their periods with dignity (Balayneh & Mekuriaw, 2019). In many cases, adolescent girls are uninformed of even basic reproductive anatomy and physiology, like the vaginal passage of menstrual blood. These knowledge gaps stem from cultural barriers that prevent open conversations, leading to further complications during adolescence (Thakre et al., 2011).

Various studies show adolescent school going girls had moderate regarding menstruation as a physiological process. In Nepal, Pokharel and Chaudhary (2025) studied 100 girls in Banke,

spotting barriers like shamefulness and pad costs despite partial awareness. Simavi (2020) reported 42.5% respondents had correct knowledge among, with mother's involvement as key factor. Paudel et al. (2024) found 52.86% good knowledge which associated with age and maternal education, while Neupane et al. (2023) observed 62.1% good knowledge in rural Jumla, influenced by grade of the students and pre-menarche information about mensuration. Only 32% good knowledge is observed in Birgunj (Shahi et al. 2022), and 83.3% in Morang, yet found vast gaps in physiology persever (Parajuli et al., 2016). Internationally, study showed average knowledge in Ghana was 73% pre-menarche aware (Ameade and Garti 2016), which is tied to the result obtained in India studied to 1000 participants (Deshmukh et al. 2019).

Attitudes leads positive but are undermined by cultural restriction of the respondents. A study in Birgunj reported 93% good attitudes despite poor practices (Shahi et al., 2022), and Paudel et al. (2024) 53.33% found positive attitude in Dhanusa. Sapkota et al. (2014) informed restrictions in rural Nepal, with mothers reinforcing myths. A UNICEF study in Nepal found that privacy concerns limited access in western and eastern areas like Achham, Bajura and Parsa, with restrictions ranging from 47% to 90% (UNICEF Nepal, 2018). In India, a study showed that 98.5% of people in rural areas held negative beliefs, similar to the situations in Nepal (Arora et al., 2013). while Balqis et al. (2016) found 78% good attitudes in Indonesia. Practices of menstrual hygiene shows very vast difference than knowledge and attitude of mensuration. A study conducted in Banke showed that 46.7% changing pads 3 times a day, 76% sun-drying (Pokharel and Chaudhary 2025). Tripathi (2022) reported majority pad use in Pokhara but more than 50% restrictions; Neupane et al. (2023) good practices tied to education (Tripathi, 2022). Globally, Shallo et al. (2020) found 54% unsafe practices in Ethiopia; 92% pad user in Nigeria (Garba et al., 2018). Different study shows mothers' education consistently liked with better knowledge, attitude and practice regarding menstrual hygiene. (Deshmukh et al., 2019; Paudel et al., 2024; Shoor, 2017). Students' Socio-economic status, education level, and residence in rural or urban plays important role in menstrual hygiene, while cultural taboos make a significant difference in barriers menstrual hygiene (Jain et al., 2017; Shah et al., 2019; Kapoor & Kumar, 2017).

Adolescent girls in Nepal face major menstrual hinder like poor knowledge, limited sanitary facilities, and cultural taboos causing shame, isolation, and school absences. Rare family discussions leave girls unprepared, harming health, education, and well-being; addressing these ensures safe management. To address these issues, this study aimed to explore the key

determinants of menstrual hygiene associated with knowledge, attitude and practice among adolescent girls in Banke District, Nepal.

This study holds multidimensional value for Banke district public health/policy, enlightening socio-cultural norms, health service limits, and family influences on hygiene behaviors to guide targeted population regards the factor associated with the menstrual hygiene.

Materials and Methods

Study Design, Area, Population and samples

A School based cross-sectional study was conducted using multistage sampling where at first, four local bodies (Nepalgunj sub-metropolitan, Kolhapur municipality, Khajura rural municipality and Rapti-Sonari rural municipality) of Banke district were selected. Secondly, eight schools from those local bodies were randomly chosen. Then, 430 adolescent students from a total 1510 of classes of 7, 8 and 9 from those schools were selected randomly in March to April 2025. Cochran's sample size formula was employed to estimate the number of participants required for statistically reliable results. This method is particularly suitable when estimating proportions in large populations and ensures that the sample is both representative and efficient (Bartlett et al., 2011).

The initial sample size for an infinite population is calculated using: $n_0 = \frac{z^2 \cdot p \cdot (1-p)}{e^2}$

To account for a finite population (N=1510) and margin of error 4%, the following correction was applied: $n = \frac{n_0}{1 + \frac{(n_0-1)}{N}}$

This adjustment reduces the required sample size when the population size is known, ensuring precision without unnecessary oversampling. The sample size thus calculated was 430.

Data Collection Procedure and data Analysis

Socio-demographic questionnaire was developed by intensive literature review. Questionnaire for the practice, attitude and knowledge towards menstruation was taken from the similar study conducted by Balqis et.al. (2016) in Jatinangor. A written letter of assistance was taken from the college. Formal approval was taken from principal of the selected school in Banke after explaining the objective and method of the study. Verbal consent was taken from the respondents. Respondents who had achieved menarche and were willing to participate were given the questionnaire and confidentiality of the participants was maintained.

The collected raw data was checked for completeness. Then it was coded to simplify the data entry process. The data were entered and analyzed using Jamovi software (2.6.26 version). Frequencies and percentage were calculated for the descriptive part of the study. Chi square test was tested between the dependent and independent variables. Scoring was done according to Balqis et.al. (2016) where the level of knowledge is considered as good when total score is 76–100%, moderate when the score is 56–75% and poor when it is <56%. Whereas for attitude and practice, each question was multiplied by so that the total scores were 36 marks. Then, 36 was divided by 3 categories which is good when total scores is 25–36 marks, moderate when 13–24 marks, poor when ≤ 12 marks. Then the significant factors from the χ^2 test were fitted into the multinomial logistic regression model for inferential statistics.

Model Specification

Although the dependent variable is ordinal in nature viz. good, moderate and poor which was fitted by ordinal logistic regression model. The test of parallel line for the model was computed. Result shows that the null hypothesis of the slope coefficient in the model were same across the response categories whose p-value is less than 0.05 resulting rejecting null hypothesis. Which means that the ordinal logistic regression model doesn't suit for modeling. Hence, multinomial logistic regression model has been adopted.

To analyze the influence of multiple factors on respondents' levels of knowledge, attitude, and practice, this study utilizes multinomial logistic regression. This statistical method is well-suited for situations where the dependent variable falls into more than two categories. In this case, classified as good, moderate, and poor. It allows for a detailed understanding of how both discrete and continuous independent variables affect the likelihood of individuals being placed within these groups.

The assumptions for MNLR model are that the independent variables may either be numerical or categorical. The dependent variable has to be categorized into three or more groups. The data do not need to have a normal distribution, no linear relationship and no equality of variance.

Let us assume that the categories of the outcome variable, Y, are coded 1, 2, or 3. We contrast category 1 versus 3 and 2 versus 3. The missing contrast between categories 1 and 2 can easily be obtained in terms of the other two. Since

$$\ln \frac{\pi_{i1}}{\pi_{i2}} = \ln \frac{\pi_{i1}}{\pi_{i3}} - \ln \frac{\pi_{i2}}{\pi_{i3}}$$

Let, $Y_{ij} = \begin{cases} 1, & \text{if the individual fall in category } j \\ 0, & \text{otherwise.} \end{cases}$ Where, $j=1,2,3$, and

Let, $\pi_{ij} = \Pr(Y_{ij}|X)$, denote the probability that $Y_{ij}=j$

Assuming that the response categories are mutually exclusive then we can write,

$$\sum_{j=1}^3 \pi_{ij} = 1$$

We now consider model for π_{ij} , in particular, consider model where their probabilities depend on a vector X_k of covariates associated with the i^{th} individuals.

$$\ln \frac{\pi_{ij}}{\pi_{i1}} = \ln \frac{P(Y_{ij} = j|X)}{P(Y_{i1} = 1|X)} = \alpha_j + \sum_{k=1}^g \beta_{jk} X_k$$

Where $j= 2, 3$, and α_j is a constant

β_{jk} is the regression coefficient for $j=2, 3$ and X_k ($k=1, 2, \dots, g$) are explanatory variables.

The MNL model may also be written in terms of probability $\pi_{ij} = \frac{e^{\alpha_j + \sum_{k=1}^g \beta_{jk} X_k}}{1 + e^{\alpha_j + \sum_{k=1}^g \beta_{jk} X_k}}$

Estimation of the parameters of this MNL model is done by, what is known as iteratively reweighted least square, which is identical to the logarithm of fisher scoring or Newton-Raphsons, and lead to maximum likelihood estimates (McCullagh and Nelder, 1989).

Goodness of Fit of the Model and R²- Statistic

The variation of the dependent variable due to the variation in the independent variable in multinomial logistic regression model is explained by the coefficient of determination based on the likelihood. In this research work, R² has been computed and reported. To examine the goodness of fit of the model, three pseudo R² were calculated as McFadden's R² (McFadden, 1974), Cox and Snell's R² (Cox & Snell, 1989) and Nagelkerke's R² (Nagelkerke, 1991). These pseudo R² suggests the variation explained by the model.

Results

Table-1: Frequency and percentage distribution of the socio-demographic variables of the adolescent girls (n=430)

Characteristics	Number (%)
Type of school	
Government	191 (44.4)
Private	239 (55.5)
Grade	
7	131 (30.5)
8	163 (37.9)
9	136 (31.6)
Age	
11-14	284 (57.67)
15-18	146 (42.33)
Religion	
Hindu	375 (87.2)
Muslim	28 (6.5)
Christian	26 (6.0)
Other	1 (0.2)
Ethnicity	
Brahmin/Chhetri	209 (48.6)
Madhesi	30 (7.0)
Janjati	67 (16.6)
Dalit	56 (13.0)
Other	68 (16.8)
Type of family	
Joint	187 (43.5)
Nuclear	243 (56.5)
Residential status	
Urban	204 (47.4)
Rural	226 (52.6)
Having elder sister	
Yes	153 (35.6)
No	277 (64.4)

Characteristics	Number (%)
Mother's educational status	
Illiterate	83 (19.3)
1-8	149 (34.7)
8-12	165 (38.4)
Graduation or above	33 (7.7)
Father's educational status	
Illiterate	47 (10.9)
1-8	124 (28.8)
8-12	176 (40.9)
Graduation or above	83 (19.3)
Mother's occupational status	
Employed	154 (35.8)
Unemployed	276 (64.2)
Father's occupational status	
Employed	378 (87.9)
Unemployed	52 (12.1)
Getting pocket money	
Yes	256 (59.5)
No	174 (40.5)
Track cycle	
Yes	337 (78.4)
No	93 (21.6)
Restrictions	
Yes	285 (66.3)
No	145 (33.7)
Water access	
Yes	404 (94.0)
No	26 (6.0)
Comfortable on discussion	
Comfortable	353 (82.1)
Neutral	53 (12.3)
Uncomfortable	24 (5.6)

Seek information about menstruation	
Often	139 (32.3)
Sometimes	266 (61.9)
Never	25 (5.8)
School providing information	
Yes	372 (86.5)
No	58 (13.5)
Respondents attending the health education session	
Always	180 (42.0)
Occasionally	195 (45.5)
Never	54 (12.5)
Supportive teacher	
Supportive	351 (81.6)
Neutral	68 (15.8)
Not supportive	11 (2.6)

Table 1 illustrates the socio-demographic characteristics of the respondents. Among 430 adolescent girls, more than half of the respondents 239 (55.6%) were from private school and 191 (44.4%) were from government school. 163 (37.9%) of the respondents were from class 8. And, almost equal percentage of the respondents were from class 7 and 9 i.e. 30.5% and 31.6% respectively. The respondents ranged in age from 11 to 18 years, with the largest group being of age 11 to 14 years 284 (57.67%). The majority of girls were Hindu 375 (87.2%), with minorities identifying as Christian 26 (6.0%). Ethnically, nearly half of the respondents belonged to the Brahmin/Chhetri group (48.6%), followed by Janjati (15.6%), and only Madhesi (7.0%). In terms of family structure, over half of the girls 243 (56.5%) came from nuclear families, whereas 187 (43.5%) lived in joint families. The girls were almost evenly split between rural (52.6%) and urban (47.4%) areas. A little over a third of the girls (35.6%) had an elder sister, while the majority (64.4%) did not.

The majority of mothers had attained education up to Grade 8–12 (38.4%), while a smaller proportion (7.7%) had completed graduation or higher. In contrast, fathers showed a slightly higher level of education, with 40.9% having completed Grades 8–12 and 19.3% having attained graduation or above. In this study, 64.2% of mothers were unemployed whereas 87.9% of fathers were employed. Among the 430 adolescent girls surveyed, 256 (59.5%) reported receiving pocket money for buying pads, while 174 (40.5%) did not. 337 respondents (78.4%) reported that they track their Menstrual cycle, 285 participants (66.3%) reported

experiencing cultural or religious restrictions during menstruation. Among the 430 adolescent girls surveyed, nearly all respondents (94.0%) have access to clean water during menstruation. And 353 respondents (82.1%) expressed feeling comfortable discussing menstruation. In terms of information-seeking behavior, a larger group of 266 girls (61.9%) reported that they seek information related to menstruation occasionally with a smaller group of 139 respondents (32.3%) doing so often. The majority of respondents, 372 out of 430 (86.5%) reported that their school provided information about menstruation, while 58 participants (13.5%) said their school did not. When it came to participation in health education sessions, 180 girls (42.0%) stated they always attended. In terms of support from educators, majority of the respondents (81.6%) described their teachers as supportive on the topic of menstruation.

Table 2: Level of knowledge

Level of knowledge	Number	Percentage
Good	306	71.2%
Moderate	100	23.3%
Poor	24	5.6%

The above table 2 shows that about three-fourth of the total respondents (71.2%) had good level of knowledge. And, almost a quarter of the participants (23.3%) had moderate level of knowledge whereas only 24(5.6%) respondents had poor level of knowledge about menstruation.

Table 3: Association of socio-demographic variables to the level of knowledge among adolescent girls

Characteristics	Level of Knowledge			χ^2 Value	P Value
	Good	Moderate	Poor		
Grade				43.3	<0.001**
7	70(53.4%)	49(37.4%)	12(9.2%)		
8	141(86.5%)	14(8.6%)	8(4.9%)		
9	95(69.9%)	37(27.2)	4(2.9%)		
Age				37.6	<0.001**
11-14	205 (72.1 %)	60(21.2%)	19(6.7%)		
15-18	101(69.2%)	40(27.4%)	5(3.4%)		
Religion				18.9	0.004**
Hindu	268(71.5%)	87(23.2%)	20(5.3%)		
Muslim	22(78.6%)	5(17.9%)	1(3.6%)		
Christian	16(61.5%)	8(30.8%)	2(7.7%)		
Other	0	0	1(100%)		

Characteristics	Level of Knowledge			χ^2 Value	P Value
	Good	Moderate	Poor		
Ethnicity					
Brahmin/Chhetri	143(68.4%)	54(25.8%)	12(5.7%)	6.7	0.005**
Madhesi	27(90%)	3(10%)	0		
Janjati	59(88.1%)	6(9%)	2(3%)		
Dalit	36(64.3%)	17(30.4%)	3(5.4%)		
Other	41(60.3%)	20(29.4%)	7(10.3%)		
Mother's educational status					
Illiterate	67(80.7%)	14(16.9%)	2(2.4%)	18.2	0.006**
1-8	103(69.1%)	36(24.2%)	10(6.7%)		
8-12	112(67.9%)	43(26.1%)	10(6.1%)		
Graduation or above	24(72.7%)	7(21.2%)	2(6.1%)		
Information about menstruation					
School	83(82.2%)	14(13.9%)	4(4.0%)	17.4	0.008**
Family	201(68.6%)	76(25.9%)	16(5.5%)		
Friend	14(63.3%)	4(18.2%)	4(18.2%)		
Media	8(57.1%)	6(42.9%)	0		
Track Menstrual cycle					
Yes	256(76%)	67(19.9%)	14(4.2%)	18.4	<0.001**
No	50(53.8%)	33(35.5%)	10(10.8%)		
Comfortable on discussion					
Comfortable	269(76.2%)	72(20.4%)	12(3.4%)	31.4	<0.001**
Neutral	25(47.2%)	19(38.5%)	9(17%)		
Uncomfortable	12(50%)	9(37.5%)	3(12.5%)		
Seek information					
Often	113(81.3%)	19(13.7%)	7(5%)	21.6	<0.001**
Sometimes	179(67.3%)	75(28.2%)	12(4.5%)		
Never	14(56%)	6(24%)	5(20%)		
Portrayal of menstruation					
Influenced	202(77.1%)	47(17.9%)	13(5%)	25.0	<0.001**
Neutral	90(65.2%)	43(31.2%)	5(3.6%)		
No influence	14(46.7%)	10(33.3%)	6(20%)		

Characteristics	Level of Knowledge			χ^2 Value	P Value
	Good	Moderate	Poor		
Access to water				11.7	0.003**
Yes	293(72.5%)	92(22.8%)	19(4.7%)		
No	13(50%)	8(30.8%)	5(19.2%)		
Attending health sessions				11.6	0.02*
Always	137(76.1%)	37(20.6%)	6(3.3%)		
Occasionally	124(63.6%)	55(28.2%)	16(8.2%)		
Never	44(81.5%)	8(14.8%)	2(3.7%)		

** Significant at 1% level of significance, * Significant at 5% level of significance

As per the above table, the p-values for grade, age, religion and ethnicity are less than 0.01 which indicates that grade ($\chi^2= 43.3$, P-value<0.001), age ($\chi^2=37.6$, p-value<0.001), religion ($\chi^2 =18.9$, P-value= 0.004) and ethnicity ($\chi^2= 22.2$, P-value= 0.005) are the factors that are significantly associated with the level of knowledge. Above result shows that at 1% level of significance, getting primarily information about menstruation ($\chi^2=17.4$, p-value=0.008), track Menstrual cycle ($\chi^2=18.4$, p-value<0.001), comfort on discussing menstruation ($\chi^2=31.4$, p-value<0.001), frequency of seeking information about menstruation ($\chi^2=21.6$, p-value<0.001) and influence of portrayal of menstruation ($\chi^2=25.0$, p-value<0.001) are significantly associated with the level of knowledge. The table presents that at 1% level of significance, access to water during menstruation ($\chi^2=11.7$, p-value= 0.003) is statistically associated to the level of knowledge among the adolescent girls. Also, the result demonstrates that at 5% level of significance, the frequency of attending health education sessions ($\chi^2=11.6$, p-value= 0.02) is significantly associated to the level of knowledge among the adolescent girls.

Table 4: Model fit measures for knowledge (n= 430)

Model	Deviance	R^2_{McF}	R^2_{CS}	R^2_N	Overall Model Test		
					χ^2	df	p
1	511	0.400	0.429	0.612	128	44	<.001

The results presented in the above illustrates that the overall multinomial logistic regression model is a strong fit with a deviance value of 511 and a statistically significant likelihood ratio test, $(_{44}) = 128$, $p < 0.001$. This suggests that the set of predictors collectively contributed meaningfully to explaining variations in Menstrual health attitude levels among respondents. Pseudo R^2 values i.e. McFadden's $R^2 = 0.400$, Cox & Snell $R^2 = 0.429$, and Nagelkerke $R^2 = 0.612$, indicate that the predictors explained approximately 40% to 61% of the variance in the outcome.

Table 5: Multinomial logistic regression model for knowledge

Knowledge level	Predictor	SE	p-value	Odds ratio	95% Confidence Interval		
					Lower	Upper	
Moderate - Good	Intercept	1.709	0.036	0.0281	0.0001	0.7989	
	Religion:						
	Muslim – Hindu	0.655	0.926	0.9411	0.2607	3.3966	
	Christian – Hindu	0.588	0.230	2.0256	0.6396	6.4151	
	other – Hindu	0.0001	<.001**	0.0182	0.0182	0.0182	
	Grade	0.237	<.001**	0.4110	0.2581	0.6544	
	Age	0.158	<.001**	1.6867	1.2370	2.2999	
	mother's educational status						
	1-8 – illiterate	0.625	0.356	1.7795	0.5231	6.0531	
	8-12 – illiterate	0.610	0.022*	4.0482	1.2243	13.3858	
	graduation or above – illiterate	0.671	0.195	2.3851	0.6397	8.8920	
	information about menstruation						
	family – school	0.357	0.055	1.9845	0.9853	3.9972	
	friend – school	0.714	0.891	0.9071	0.2239	3.6747	
	Social media – school	0.721	0.046*	4.2238	1.0287	17.3431	
	track cycle:						
	no – yes	0.313	0.067	1.7755	0.9609	3.2805	
	comfortable on discussion						
	neutral – comfortable	0.394	0.069	2.0470	0.9457	4.4308	
	uncomfortable – comfortable	0.545	0.153	2.1763	0.7485	6.3273	
	portrayal of menstruation						
	neutral – influenced	0.293	0.210	1.4436	0.8133	2.5626	
	no influence – influenced	0.507	0.037*	2.8767	1.0644	7.7747	

Knowledge level	Predictor	SE	p-value	Odds ratio	95% Confidence Interval		
					Lower	Upper	
Poor - Good	Intercept	3.133	0.482	9.0401	0.0195	4194.7624	
	Religion						
	Muslim – Hindu	1.452	0.883	1.2381	0.0718	21.3354	
	Christian – Hindu	1.025	0.413	2.3150	0.3108	17.2461	
	other – Hindu	0.0001	<.001**	2.13	0.156	3.658	
	Grade	0.499	0.155	0.4919	0.1851	1.3075	
	Age	0.317	0.695	0.8831	0.4744	1.6439	
	Mother's educational status						
	1-8 – illiterate	1.214	0.316	3.3760	0.3125	36.4755	
	8-12 – illiterate	1.164	0.166	5.0219	0.5128	49.1788	
	graduation or above – illiterate	1.270	0.207	4.9602	0.4115	59.7938	
	Information about menstruation						
	family – school	0.662	0.319	1.9352	0.5282	7.0899	
	friend – school	0.980	0.118	4.6239	0.6769	31.5849	
	social media – school	0.0001	<.001**	0.256	0.163	3.725	
	Track cycle:						
	no – yes	0.583	0.049*	3.1526	1.0046	9.8931	
	Comfortable on discussion						
	neutral – comfortable	0.627	0.016*	4.5294	1.3254	15.4779	
	uncomfortable – comfortable	0.960	0.709	1.4301	0.2179	9.3875	
	Portrayal of menstruation						
	neutral – influenced	0.690	0.096	0.3169	0.0820	1.2241	
	no influence – influenced	0.723	0.007**	7.1396	1.7300	29.4659	

* Significant at 5% level of significance, ** significant at 1% level of significance

The results in Table 5 shows several factors associated with knowledge levels toward menstruation, comparing moderate vs. good and poor vs. good categories. For moderate vs. good knowledge, respondents who were older were 1.68 times (95% CI: 1.24 to 2.30) more likely to report a moderate knowledge rather than a good knowledge, Similarly, those whose mothers had secondary education (8–12 years) were 4.05 times (95% CI: 1.22 to 13.39) more likely to hold a moderate at knowledge compared to those whose mothers were illiterate ($p = .022$). Similarly, respondents who received information from social media were 4.22 times (95% CI: 1.03 to 17.34) more likely to report a moderate knowledge than a good one ($p = .046$). Additionally, those who felt “no influence” from Menstrual portrayals were 2.88 times (95% CI: 1.06 to 7.77) more likely to hold a moderate knowledge than a good one ($p = .037$). Some predictors like tracking cycle and comfort in discussing about menstruation approached significance (both $p \approx .07$) showing potential relevance.

For poor vs. good knowledge, tracking one’s Menstrual cycle was significantly associated with poor knowledge, respondents who did not track were 3.15 times (95% CI: 1.00 to 9.89) more likely to report poor knowledge compared to good ($p = .049$). Those who were “neutral” in their comfort discussing menstruation were 4.53 times (95% CI: 1.33 to 15.48) more likely to report poor knowledge compared to those who felt comfortable ($p = .016$). Likewise, respondents who felt no influence from Menstrual portrayals were 7.14 times (95% CI: 1.73 to 29.47) more likely to have poor knowledge than good ones ($p = .007$). Similarly, regarding poor knowledge compared good knowledge about information about menstruation, information from school to social media is 75% less likely of poor knowledge.

Table 6: Level of attitude

Level of attitude	Number	Percentage
Poor	19	4.4%
Moderate	68	15.8%
Good	343	79.8%

Table 6 shows the level of attitude among the school going girls towards Menstrual hygiene. More than three quarters of the participants (79.8%) were found to have good attitude followed by 15.8% moderate level of attitude. Only 4.4% of the total respondents had poor attitude towards menstruation.

Table 7: Association of socio-demographic variables with the level of attitude among adolescent girls

Characteristics	Level of attitude			χ^2 Value	p value
	Good	Moderate	Poor		
Grade				10.5	0.033*
7	103(78.6%)	25(19.1%)	3(2.3%)		
8	131(80.4%)	19(11.7%)	13(8%)		
9	109(80.1%)	24(17.6%)	3(2.2%)		
Mother's educational status				16.3	0.012*
Illiterate	58(69.9%)	15(18.1%)	10(12.0%)		
1-8	120(80.5%)	26(17.4%)	3(2.0%)		
8-12	137(83.0%)	23(13.9%)	5(3.0%)		
Graduation or above	28(84.8%)	4(12.1%)	1(3.0%)		
Father's educational status				12.7	0.048*
Illiterate	30(63.8%)	12(25.5%)	5(10.6%)		
1-8	103(83.1%)	14(11.3%)	7(5.6%)		
8-12	143(81.3%)	29(16.5%)	4(2.3%)		
Graduation or above	67(80.7%)	13(15.7%)	3(3.6%)		
Seek information				11.7	0.019*
Often	106(76.3%)	21(15.1%)	12(8.6%)		
Sometimes	214(80.5%)	46(73.3%)	6(2.3%)		
Never	23(92.0%)	1(4.0%)	1(4.0%)		

** Significant at 1% level of significance, * Significant at 5% level of significance

The above table illustrates the association of socio-demographic variables to the level of attitude among the participants. At 5% level of significance, grade ($\chi^2 = 10.5$, p-value= 0.033) is found to be statistically significant to the level of attitude. At 5% level of significance, mother's educational status and father's educational status with ($\chi^2 = 16.3$, p-value= 0.012) and ($\chi^2 = 12.7$, p-value= 0.048) respectively are significantly associated to the level of attitude. Also result revealed that p-value for frequency of seeking information is less than 0.05. The null hypothesis is rejected at 5% level of significance indicating that the frequency of seeking information ($\chi^2 = 11.7$, p-value= 0.019) is statistically significant to the level of attitude.

Table 8: Model fit measures for attitude towards menstruation (n= 430)

Model	Deviance	Overall Model Test					
		R ² _{MCF}	R ² _{CS}	R ² _N	χ ²	df	p
1	465	0.413	0.449	0.534	59.3	42	0.041

The overall model fit was evaluated using multiple indices. The model yielded a deviance of 465 indicating improved fit relative to the intercept-only model. Pseudo R² values i.e. McFadden's R² = 0.413, Cox & Snell R² = 0.449, and Nagelkerke R² = 0.534 suggest that the predictors accounted for a modest proportion of the variance in the outcome. Importantly, the overall model was statistically significant, χ²₍₄₂₎ = 59.3, p = .041, confirming that the set of predictors collectively contributed meaningfully to explaining the dependent variable.

Table 9: Result for multinomial model fit for attitude

Attitude level	Predictor	SE	p	Odds ratio	Lower	Upper
Poor - Moderate	Intercept	3.665	0.750	0.311	2.361	19.305
	Grade	0.445	0.869	0.929	0.3889	2.221
	mother's educational status:					
	illiterate – 1-8	0.869	0.033	5.361	0.9756	29.460
	8-12 – 1-8	0.960	0.241	3.084	0.4701	20.231
	graduation or above – 1-8	1.625	0.491	3.066	0.1268	74.148
	father's educational status:					
	illiterate – 1-8	0.846	0.217	0.352	0.0671	1.847
	8-12 – 1-8	0.904	0.285	0.380	0.0646	2.239
	graduation or above – 1-8	1.172	0.369	0.349	0.0351	3.474
	seek information:					
	sometimes – often	0.678	0.118	0.347	0.0919	1.310
	never – often	1.605	0.349	4.499	0.1937	104.472
Good - Moderate	Intercept	1.565	0.294	5.164	0.2402	111.037
	Grade	0.190	0.810	1.047	0.7214	1.519
	mother's educational status:					
	illiterate – 1-8	0.448	0.941	1.034	0.4299	2.487
	8-12 – 1-8	0.387	0.316	1.474	0.6903	3.149
	graduation or above – 1-8	0.724	0.512	1.607	0.3887	6.647
	father's educational status:					
	illiterate – 1-8	0.516	0.029	0.323	0.1175	0.889
	8-12 – 1-8	0.410	0.182	0.579	0.2592	1.292
	graduation or above – 1-8	0.546	0.215	0.508	0.1744	1.482
	seek information:					
	sometimes – often	0.332	0.661	0.864	0.4506	1.658
	never – often	1.094	0.129	5.249	0.6156	44.763

The results in Table 9 shows that Mother’s educational status approached significance; with respondents whose mothers were illiterate being 5.36 times (95% CI: 0.98 to 29.46) more likely to report poor attitudes compared to those whose mothers had 1–8 years of schooling ($p = .033$). Father’s educational status showed a significant association, with adolescents whose fathers were illiterate being 68% (95% CI: 0.12 to 0.89) less likely to report good attitudes compared to those whose fathers had 1–8 years of schooling ($p = .029$).

Table 10: Level of practice

Level of practice	Number	Percentage
Poor	43	10.0%
Moderate	155	36.0%
Good	232	54.0%

The above presented table represents the level of practice among adolescent girls in Banke. It shows that more than half of the respondents (54.0%) have good practice followed by 36.0% moderate and 10% poor level of practice.

Table 11: Association of socio-demographic variables with the level of practice among adolescent girls

Characteristics	Level of practice			χ^2 Value	P Value
	Good	Moderate	Poor		
Type of school					
Government	83(43.5%)	84(44.0%)	24(12.6%)	15.3	<0.01**
Private	149(62.3%)	71(29.7%)	19(7.9%)		
Residential status					
Rural	96(42.5%)	103(45.6%)	27(11.9%)	25.4	<0.001**
Urban	136(66.7%)	52(25.5%)	16(7.8%)		
Cultural and religious restrictions					
Yes	165(57.9%)	89(31.2%)	31(10.9%)	8.53	0.014*
No	67(46.2%)	66(45.5%)	12(8.3%)		

** Significant at 1% level of significance, * Significant at 5% level of significance

Table 11 illustrates the association of socio-demographic variables with the level of practice. At 1% level of significance, type of school ($\chi^2=15.3$, p-value <0.001) and residential status

($\chi^2=25.4$, p-value <0.001) are found to be significantly associated to the level of practice. The p-value for the cultural and religious restrictions is less than 0.05 in the above given table. Null hypothesis is rejected at 5% level of significance signifying association between cultural and religious restrictions ($\chi^2=8.53$, p-value = 0.014) and the level of practice regarding Menstrual hygiene.

Multinomial Logistic Model Fitting

Table 12: Model fit measures for practice (n= 430)

Overall Model Test							
Model	Deviance	R ² _{McF}	R ² _{CS}	R ² _N	χ^2	df	p
1	467	0.370	0.409	0.426	53.8	38	0.046

The results in Table 12 show that the model demonstrated adequate fit, with a deviance value of 467 indicating improvement over the intercept-only model. Pseudo R² values, McFadden's R² = 0.370, Cox & Snell R² = 0.409, and Nagelkerke R² = 0.426 suggest that the set of predictors explained a modest proportion of variation in the outcome. Although the R² values were relatively low, overall, the model was statistically significant, ($\chi^2 = 53.8$, p = .046) indicating that the included predictors collectively contributed meaningfully to the model's explanatory power.

Table 13: Result of multinomial logistic regression model for practice

Practice level	Predictor	SE	p	Odds ratio	95% Confidence Interval	
					Lower	Upper
Poor - Moderate	Intercept	0.781	0.146	0.32096	0.069	1.484
	Type of school					
	private – Government	0.978	0.022*	0.4995	0.259	4.582
	Residential status					
	urban – rural	0.834	0.032*	0.998	0.194	5.119
	Cultural restrictions					
Good - Moderate	no – yes	0.601	0.252	1.989	0.612	6.458
	Intercept	0.464	0.114	2.081	0.838	5.170
	Type of school					
	private – Government	0.453	0.039*	2.681	0.280	6.655
	Residential status					
	urban – rural	0.385	0.336	1.448	0.681	3.077
	Cultural restrictions					
no – yes	0.345	0.021*	1.961	0.997	3.853	

The results in Table 13 demonstrates that respondents from private schools were 75% (95% CI: 0.259 to 4.582) less likely to report a poor practice compared to those from government school. Similarly, respondents from urban residence had 2% less likely (95% CI: 0.194 to 5.119) to have poor practice than respondents from rural residence. Similarly, with respect to good practice with reference to moderate practice, private school students had 2.68 times (95% CI: 0.280 to 6.655) better practice than government school students. Results shows students with no cultural restrictions had 1.95 times better practice than the students having cultural restriction.

Discussion

The study's results indicated that the mean age of participants was 14.0 ± 1.2 years, which contrasts significantly with the findings of Balqis et al. (2016) and Shallo et al. (2018), where the mean age was reported as 16 years. The study further revealed that more than half (54%) of the participants exhibited good practice, similar findings to those of Shallo et al. (2018). However, Kaur et al. (2018) reported a comparatively lower percentage of good practices. This study found that 79.8% and 71.2% of participants showed a good attitude and knowledge regarding menstruation, respectively. These results closely align with Balqis et al. (2016), where 78.15% had a good attitude and 75.63% had good knowledge about menstruation. In opposed, Poudel et al. (2024) found that good practice, attitude, and knowledge were found among 54.77%, 53.33%, and 52.86% of participants, respectively. Thakre et al. (2011) found residential status as significantly affecting Menstrual hygiene practices; however, this study found that living area did not influence practice. Instead, parental education and family type were recognized as influential factors.

The impact of media-based information on knowledge levels underscores the importance of diversifying educational channels beyond traditional school curricula. This finding is consistent with studies such as Thakre et al. (2011), which identified mothers and media as key informants in Menstrual education. Moreover, age, grade, father's education, tracking Menstrual cycles, and comfort in discussing menstruation were significant factors in this study. Similarly, a direct association between level of knowledge and both religion and mother's education were found in a study by Crawford et al. (2014), although no such association was observed in this study. The present analysis identified family type, mother's educational status, father's education, lack of teacher support, and discomfort in discussing menstruation as significant predictors of Menstrual attitudes. These findings align with existing literature. Sharma et al. (2022) emphasized that inadequate school infrastructure and limited teacher engagement contribute

to negative Menstrual perceptions among adolescent girls in Nepal, supporting the strong association observed in this study between lack of teacher support and Menstrual attitudes. The role of paternal involvement in reproductive health education, which corresponds with the significance of father's education in the current model (Pandey et al., 2021). Furthermore, the discomfort associated with discussing menstruation highlights broader psychosocial barriers (Sharma et al. 2022; Pandey et al. 2021), who advocate for enhanced communication and support systems within educational institutions and families.

Limitations

Despite its contributions, this study followed a cross-sectional design, causality cannot be assessed. The findings of this study cannot be generalized as the data was collected from selected schools of Banke district, Nepal. Furthermore, data were collected through a structured questionnaire, which may have reporting bias or recall bias. Future research should consider longitudinal or mixed method designs to capture changes over time.

Conclusion

This study revealed that about three fourth of the participants have good level of attitude and knowledge about Menstrual hygiene. Half of the participants have good practice. The findings showed that parent educational status, social media influence and teachers' support are key determinants associated with knowledge, attitude and practice with Menstrual Hygiene. The residential status implies the necessity of considering factors, specifically exploring into more significant cultural and infrastructural elements for better practice. These observations provide a more detailed comprehension of adolescent Menstrual health within Banke, as a result contributing to wider initiatives aimed at promoting practice and awareness about Menstrual hygiene.

Competing interests

The authors declare that they have no competing interests.

References

Ameade, E. P. K., & Garti, H. A. (2016). Relationship between female university students' knowledge on menstruation and their Menstrual hygiene practices: A study in Tamale, Ghana. *Advances in Preventive Medicine*, 2016, Article 1056235. <https://doi.org/10.1155/2016/1056235>

- Aniebue, U. U., Aniebue, P. N., & Nwankwo, T. O. (2009). The impact of pre-menarcheal training on Menstrual practices and hygiene of Nigerian school girls. *The Pan African Medical Journal*, 2, 9. <https://pubmed.ncbi.nlm.nih.gov/21532905/>
- Arora, A., Mittal, A., Pathania, D., Singh, J., Mehta, C., & Bungler, R. (2013). Impact of health education on knowledge and practices about menstruation among adolescent school girls of rural part of district Ambala, Haryana. *Indian Journal of Community Health*, 25(4), 492–497. <https://www.iapsmupuk.org/journal/index.php/IJCH/article/view/361>
- Balqis, M., Arya, I. F. D., & Ritonga, M. N. A. (2016). Knowledge, attitude and practice of Menstrual hygiene among high schools students in Jatinangor. *Althea Medical Journal*, 3(2), 230–238. <https://doi.org/10.15850/amj.v3n2.783>
- Belayneh, Z., & Mekuriaw, B. (2019). Knowledge and Menstrual hygiene practice among adolescent school girls in southern Ethiopia: A cross-sectional study. *BMC Public Health*, 19(1), Article 1595. <https://doi.org/10.1186/s12889-019-7973-9>
- Blanchet, T. (1987). *Meanings and rituals of birth in rural Bangladesh*. University Press. <http://indianmedicine.eldoc.ub.rug.nl/id/eprint/43052>
- Cox, D. R., & Snell, E. J. (1989). *The analysis of binary data* (2nd ed.). Chapman and Hall.
- Crawford, M., Menger, L. M., & Kaufman, M. R. (2014). ‘This is a natural process’: Managing Menstrual stigma in Nepal. *Culture, Health & Sexuality*, 16(4), 426–439. <https://doi.org/10.1080/13691058.2014.887147>
- Deshmukh, V., Sandhu, G. K., Rachakonda, L., Kakde, M., & P, A. S. (2019). Knowledge, attitudes and practices (KAP) regarding menstruation among girls in Aurangabad, India and their correlation with sociodemographic factors. *International Journal of Reproduction Contraception Obstetrics and Gynecology*, 8(3), 979. <https://doi.org/10.18203/2320-1770.ijrcog20190868>
- Garba, I., Rabi, A., & Abubakar, I. (2018). Menstrual hygiene among adolescent school girls in Kano. *Tropical Journal of Obstetrics and Gynaecology*, 35(2), 153. https://doi.org/10.4103/Ejog.Ejog_81_17
- Harries, P. (1985). Wives for cattle: Bridewealth and marriage in Southern Africa [Review of the book by A. Kuper]. *The Journal of African History*, 26(1), 128. <https://doi.org/10.1017/S0021853700023227>

- Jain, R., Anand, P., Dhyani, A., & Bansal, D. (2017). Knowledge and awareness regarding menstruation and HIV/AIDS among schoolgoing adolescent girls. *Journal of Family Medicine and Primary Care*, 6(1), 47. <https://doi.org/10.4103/2249-4863.214970>
- Kapoor, G., & Kumar, D. (2017). Menstrual hygiene: Knowledge and practice among adolescent school girls in rural settings. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, 6(3), 959–962. <https://doi.org/10.18203/2320-1770.ijrcog20170564>
- Kaushal, K., & Mahajan, A. (2017). A descriptive study to assess the knowledge and practice regarding Menstrual hygiene among adolescent girls of government school of Shimla, Himachal Pradesh. *CHRISMED Journal of Health and Research*, 4(2), 99. https://doi.org/10.4103/cjhr.cjhr_103_16
- Khadilkar, V. V., & Stanhope, R. G. (2006). Secular trends in puberty. *Indian Pediatrics*, 43(6), 475–478. <https://pubmed.ncbi.nlm.nih.gov/16820656/>
- McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. In P. Zarembka (Ed.), *Frontiers in econometrics* (pp. 105–142). Academic Press
- McCullagh, P., & Nelder, J. A. (1989). *Generalized linear models* (2nd ed.). Chapman and Hall.
- M, Y., Trivedi, N. S., Damor, R., Patel, M., Ladani, H., Ramachandran, A., Vamja, R., & Surati, B. (2023). Assessment of knowledge, attitudes, and practices regarding Menstrual hygiene management among adolescent schoolgirls (10–19 years) in the Saurashtra region, Gujarat. *Cureus*, 15(11), Article e50950. <https://doi.org/10.7759/cureus.50950>
- Nagar, S., & Aimol, K. R. (2010). Knowledge of adolescent girls regarding menstruation in tribal areas of Meghalaya. *Studies of Tribes and Tribals*, 8(1), 27–30. <https://doi.org/10.1080/0972639X.2010.11886610>
- Nagelkerke, N. J. D. (1991). A note on a general definition of the coefficient of determination. *Biometrika*, 78(3), 691–692. <https://doi.org/10.1093/biomet/78.3.691>
- Neupane, P., Neupane, S., Amgain, K., Lama, N., & Panta, P. P. (2023). Level and associated factors of knowledge regarding Menstrual hygiene among school-going adolescent girls in rural Jumla District, Nepal. *Journal of Chitwan Medical College*, 13(4), 59–63. <https://doi.org/10.54530/jcmc.1456>

- Paudel, N. M., Ray, N. R., Rijal, N. M., & Chaudhary, N. T. (2024). Knowledge, attitude and practice regarding Menstrual hygiene among secondary level students. *Janaki Medical College Journal of Medical Science*, 12(3), 73–84. <https://doi.org/10.3126/jmcjms.v12i03.73979>
- Pokharel, S., & Chaudhary, S. (2025). Menstrual hygiene management among school girls. *HPE FORUM*, 17(1), 60–69. <https://doi.org/10.3126/hpef.v17i1.76539>
- Pokhrel, S., Mahantashetti, N., Angolkar, M., & Devkota, N. (2014). Impact of health education on knowledge, attitude and practice regarding Menstrual hygiene among pre-university female students of a college located in urban area of Belgaum. *IOSR Journal of Nursing and Health Science*, 3(4), 38–44. <https://www.iosrjournals.org/iosr-jnhs/papers/vol3-issue4/Version-1/I03413844.pdf>
- Roberts, T. (2004). Female trouble: The Menstrual self-evaluation scale and women’s self-objectification. *Psychology of Women Quarterly*, 28(1), 22–26. <https://doi.org/10.1111/j.1471-6402.2004.00119.x>
- Rose, G. (2013). *Celebrating womanhood: Menstrual hygiene management report*. Water Supply and Sanitation Collaborative Council. <https://www.issuelab.org/resources/19523/19523.pdf>
- Sapkota, D., Sharma, D., Pokharel, H. P., Budhathoki, S. S., & Khanal, V. K. (2014). Knowledge and practices regarding menstruation among school going adolescents of rural Nepal. *Journal of Kathmandu Medical College*, 2(3), 122–128. <https://doi.org/10.3126/jkmc.v2i3.9962>
- Sarkar, I., Dobe, M., Dasgupta, A., Basu, R., & Shahbabu, B. (2017). Determinants of Menstrual hygiene among school going adolescent girls in a rural area of West Bengal. *Journal of Family Medicine and Primary Care*, 6(3), 583. <https://doi.org/10.4103/2249-4863.222054>
- Shah, V., Nabwera, H. M., Sosseh, F., Jallow, Y., Comma, E., Keita, O., & Torondel, B. (2019). A rite of passage: A mixed methodology study about knowledge, perceptions and practices of Menstrual hygiene management in rural Gambia. *BMC Public Health*, 19(1), Article 1404. <https://doi.org/10.1186/s12889-019-6599-2>
- Shahi, B., Singh, S., Joshi, D. R., & Maharjan, A. (2022). Knowledge, attitude and practice regarding Menstrual hygiene among girls of government school. *Journal of Nepal Paediatric Society*, 42(3), 29–35. <https://doi.org/10.3126/jnps.v42i3.47435>

- Shallo, S. A., Willi, W., & Abubeker, A. (2020). Factors affecting Menstrual hygiene management practice among school adolescents in Ambo, Western Ethiopia, 2018: A cross-sectional mixed-method study. *Risk Management and Healthcare Policy*, 13, 1579–1587. <https://doi.org/10.2147/RMHP.S267534>
- Sharma, P., Karki, S., & Adhikari, B. (2022). Systematic review of Menstrual health and hygiene in Nepal employing a social ecological model. *Reproductive Health*, 19(1), Article 219. <https://doi.org/10.1186/s12978-022-01456-0>
- Shoor, P. (2017). A study of knowledge, attitude, and practices of Menstrual health among adolescent school girls in urban field practice area of medical college, Tumkur. *Indian Journal of Health Sciences and Biomedical Research (KLEU)*, 10(3), 249. https://doi.org/10.4103/kleuhsj.ijhs_375_16
- Shanbhag, D., Shilpa, R., D'Souza, N., Josephine, P., & Singh, J. (2012). Perceptions regarding menstruation and practices during Menstrual cycles among high school going adolescent girls in resource limited settings around Bangalore city, Karnataka, India. *International Journal of Collaborative Research on Internal Medicine & Public Health*, 4(7), 1353–1362. <https://doi.org/10.18203/2394-6040.ijcmph20161384>
- Sommer, M., Hirsch, J. S., Nathanson, C., & Parker, R. G. (2015). Comfortably, safely, and without shame: Defining Menstrual hygiene management as a public health issue. *American Journal of Public Health*, 105(7), 1302–1311. <https://doi.org/10.2105/AJPH.2014.302525>
- Simavi. (2020). *Knowledge, attitude and practice regarding Menstrual health among school students: A survey conducted in schools of Banke and Surkhet districts in Nepal*. <https://simavi.nl/media/pages/medialibrary/bef3c6d795-1623139912/kap-study-nepal-june-2021.pdf>
- Thakre, S. B., Thakre, S. S., Reddy, M., Rathi, N., Pathak, K., & Ughade, S. (2011). Menstrual hygiene: Knowledge and practice among adolescent school girls of Saoner, Nagpur District. *Journal of Clinical and Diagnostic Research*, 5(5), 1027–1033.
- Tripathi, K. P. (2022). Knowledge and practice of Menstrual hygiene among the girls in Janapriya Multiple Campus, Pokhara. *Asian Journal of Population Sciences*, 1(1), 66–76. <https://doi.org/10.3126/ajps.v1i1.43597>

- UNICEF Nepal. (2018). *Analysis of Menstrual hygiene practices in Nepal: The role of WASH in schools programme for girls' education*. <https://www.unicef.org/nepal/reports/analysis-Menstrual-hygiene-practices-nepal>
- World Health Organization. (1993). *The health of young people: A challenge and a promise*. <https://iris.who.int/handle/10665/37353>
- World Health Organization. (2023, May 28). *Menstrual health, not just hygiene: The path toward a strong cross-sectoral response*. <https://www.who.int/news/item/28-05-2023-Menstrual-health-not-just-hygiene-the-path-toward-a-strong-cross-sectoral-response>
- Yadav, R. N., Joshi, S., Poudel, R., & Pandeya, P. (2018). Knowledge, attitude, and practice on Menstrual hygiene management among school adolescents. *Journal of Nepal Health Research Council*, 15(3), 212–216. <https://doi.org/10.3126/jnhrc.v15i3.18842>