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SUPPLEMENTARY MATERIAL

A systematic review of knowledge, attitude, perception, burden, and impact of menstrual period on mental health and well-being of women of reproductive age in Nigeria

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Supplementary Table 1. Risk of bias assessment/quality assessment score.

Author (year)	Risk of bias assessment score	Quality assessment score
Nwachukwu *et al*. (2025)[4]	Low	High
Suleiman *et al*. (2023a)[14]	Moderate	Moderate
Suleiman *et al.* (2023b)[15]	Moderate	Moderate
Orobiyi and Adeola (2024)[16]	Moderate	Moderate
Bello *et al.* (2025)[18]	Low	High
Ene *et al*. (2024)[23]	Low	High
Edet *et al*. (2024)[24]	Low	High
Barka *et al.* (2025)[25]	Moderate	Moderate
Ogbolu *et al*. (2025)[26]	Moderate	Moderate
Eze *et al.* (2024)[27]	Moderate	Moderate
Kasali *et al*. (2026)[28]	Low	High
Adeyemo and Bello (2025)[29]	Low	High
Esan *et al.* (2024)[30]	Low	High
Addah *et al*. (2025)[31]	Low	High
Ayamolowo *et al.* (2024)[32]	Low	High
Edet *et al*. (2023)[33]	Moderate	Moderate
Adegoke *et al.* (2023)[34]	Moderate	Moderate
Adegbayi (2017)[35]	Moderate	Moderate
Odey *et al*. (2021)[36]	Moderate	Moderate
Femi-Agboola *et al.* (2017)[37]	Low	High
Kasali *et al.* (2020)[38]	Low	High
Adewuya *et al.* (2008)[39]	Moderate	Moderate
Udegbe *et al.* (2024)[40]	Low	High
Lawal *et al.* (2020)[41]	Low	High
Titlayo *et al*. (2009)[42]	Low	High
Egwuaba and Sunday (2025)[43]	Moderate	Moderate
Lawan *et al*. (2010)[44]	Moderate	Moderate
Nneka *et al*. (2023)[45]	Moderate	Moderate

Supplementary Table 2. Summary of the included studies.

Author (Year)	Objectives	Study design	Study setting and sample size	Key findings	Conclusion
Nwachukwu *et al*. (2025)[4]	Determine menstrual hygiene knowledge, attitude, and practices of adolescent girls in Cross River State	Mixed-method	Cross River State (South-South); 422 girls 10-19 years	74.6% had high knowledge; 41.2% said menstruation was something to tolerate; 85.3% used disposable pads; knowledge significantly associated with school status	Government and NGOs should educate girls, particularly out-of-school girls
Suleiman *et al*. (2023)[14]	Determine awareness, prevalence, and pattern of premenstrual syndrome among secondary school students in Kaduna State	Cross-sectional observational study	Kaduna State (North-West); 300 female students	Mean age 16.2; PMS prevalence 75.3%; dysmenorrhea most common physical symptom (81.0%); mood swings most common emotional symptom (58.4%); only 15.4% sought healthcare	High PMS prevalence with low health-seeking behavior; school-based mental health and menstrual education needed
Suleiman *et al.* (2023)[15]	Determine effect of premenstrual syndrome on school absenteeism and academic performance among secondary school students in Kaduna State	Nested case-control study	Kaduna State (North-West); 300 female students	PMS prevalence 76.1%; 44.2% absent from school due to PMS; significant association between PMS and absenteeism (OR=3.346); tension and mood swings linked to absenteeism	Policies needed to encourage school attendance during menstruation; address PMS-related absenteeism
Orobiyi and Adeola (2024)[16]	Explore experiences of in-school adolescents in a rural community in Ibadan, examining knowledge, stigma, and period poverty	Qualitative (thematic analysis) study	Rural community, Ibadan (South-West); 25 in-school adolescent girls	More than half had some pre-menstrual education, but others lacked basic knowledge; experienced stigma and period poverty; many felt depressed due to staining	Urgent interventions needed to address knowledge gaps, combat stigma, and eliminate period poverty
Bello *et al.* (2025)[18]	Examine association between common mental disorders and severity of dysmenorrhea among female medical students at University of Ibadan	Cross-sectional study	University of Ibadan (South-West); 171 female medical students	Positive collective association of anxiety, depression, stress with dysmenorrhea severity (β=1.17); anxiety had highest weight (0.36); stronger among those with unsatisfactory parental relationships	Integrated mental health support needed; address psychological and relational factors alongside physical symptoms
Ene *et al.* (2024)[23]	Examine knowledge, attitude, and practice of menstrual hygiene management among in-school adolescent girls in Abuja	Mixed-methods	Abuja FCT (North-Central); 420 girls from four schools plus 80 FGD participants	53.45% had good knowledge; 70.08% positive attitude; JSS3 class and menarche ≥15 years associated with good knowledge; Muslim respondents and parents with tertiary education had better attitudes	In-school girls in Abuja have good knowledge and positive attitudes; target younger adolescents and early menarche for education
Edet *et al.* (2024)[24]	Determine menstruation and menstrual hygiene knowledge among secondary school students in urban and rural Cross River State	Cross-sectional study	Cross River State (South-South); 1,006 girls from eight schools	Rural students had poorer knowledge (56.7%) than urban (42.2%); urban age at menarche 11.1 vs rural 10.71; mothers were main information source	Urban-rural knowledge gap exists; parental role in menstrual education is critical
Barka *et al.* (2025)[25]	Assess knowledge, attitude, and practices of menstrual hygiene among female university students in Gombe	Cross-sectional study	Federal University Kashere, Gombe (North-East); 372 female students	97% practised good menstrual hygiene; no significant knowledge difference between adolescents and adults; no correlation of attitude with SES or hygiene practice	No significant differences by age or mother's education; further investigation recommended

Ogbolu *et al*. (2025)[26]	Assess menstrual hygiene practices and influence of sociodemographic factors among female adolescents in Amai, Delta State	School-based cross-sectional study	Amai, Delta State (South-South); 380 girls 10-19 years	Mean age 14.7 years; sanitary pads most common absorbent (32.6%); 65% good hygiene; age, class, and parental occupation not linked to hygiene status	Gaps in product access remain; recommend education, affordable products, and supportive school environments
Eze *et al.* (2024)[27]	Investigate knowledge and factors impacting menstrual hygiene practices among adolescent girls in Abia State	Cross-sectional study	Umuahia, Abia State (South-East); 315 secondary school students	58.7% had good knowledge; 83.8% and 94.6% learned from parents and school respectively; knowledge strongly associated with good practices	Parents and schools are key sources of menstrual education; reinforce both channels
Kasali *et al*. (2026)[28]	Assess menstrual hygiene knowledge and determinants among secondary school girls in Nasarawa West Senatorial Zone	Cross-sectional study	Nasarawa State (North-Central); 1,250 post-menarche students from 25 schools	59% had poor knowledge; maternal education strongest predictor (AOR=1.98 for tertiary); urban residence and private school attendance also predictive	Strengthen school curricula and target rural outreach with parental involvement
Adeyemo and Bello (2025)[29]	Determine predisposing factors, effects on activities, and health-seeking behavior for dysmenorrhea among university students in Ibadan	Analytic cross-sectional study	University of Ibadan (South-West); 319 female students	Dysmenorrhea prevalence 82.1%; low mood most common symptom (51.9%); only 35.1% sought medical attention	High prevalence, low health-seeking; health education on effective management needed
Esan *et al.* (2024)[30]	Determine prevalence of dysmenorrhea and its effect on QoL among female undergraduate students of a private university in Nigeria	Descriptive cross-sectional study	Private university (South-West); 397 female undergraduates	Dysmenorrhea prevalence 69.8%; affected routine work (37.8%), sleep (29.2%), social withdrawal (33.8%); significant association with age	Dysmenorrhea adversely affects multiple QoL domains; health education on management essential
Addah *et al.* (2025)[31]	Examine relationship between menstrual patterns, menstrual disorders, and health-related QoL among female patients in a state hospital	Cross-sectional study	Osun State (South-West); 182 female patients of reproductive age (mean 29.6 years)	Menstrual patterns positively impacted HRQoL (β=0.269); disorders negatively affected HRQoL (β=0.486); together accounted for 33.3% of HRQoL variance	Consistent cycles enhance QoL; severe menstrual disorders diminish it; address menstrual health in clinical care
Ayamolowo *et al*. (2024)[32]	Assess prevalence of menstrual disorders and self-care practices among female undergraduates in Southwestern Nigeria	Descriptive cross-sectional study	Obafemi Awolowo University (South-West); 216 female undergraduates	Dysmenorrhea (81.9%), amenorrhea (41.7%), menorrhagia (30.6%), irregular cycles (30.5%); 59.7% lacked self-care awareness	High menstrual disorder prevalence; tailored interventions by policymakers and healthcare providers needed
Edet *et al.* (2023)[33]	Assess factors associated with school absenteeism by urban and rural adolescent girls during their period in Cross River State	Cross-sectional study	Cross River State (South-South); adolescent female students (JSS and SSS)	Mean age 14.4; fear of ridicule ($p \leq 0.001$) and unavailability of towels ($p=0.006$) significantly associated with missing school; towel access linked to location and mothers' SES	Access to sanitary towels and WASH facilities needed to motivate attendance.
Adegoke *et al*. (2023)[34]	Investigate prevalence of PMDD and influence of sociodemographic variables on psychological health of female adolescents in Ibadan	Cross-sectional study	Ibadan (South-West); 985 secondary school girls aged 12-20 years	Religiosity significantly influenced psychological health; age, parental education, and SES showed no significant influence	More needs to be done to reduce psychological burden of premenstrual syndromes despite high awareness
Adegbayi (2017)[35]	Explore menarche narratives of undergraduate females in a Nigerian private university,	Qualitative study	Redeemer's University, Ede (South-West); 136 undergraduate females	95% received information from mothers and female relatives; viewed menarche as a crisis; themes of	Only certain aspects of menstruation discourse have

	focusing on discourse, sources of information, and period management			celebration and advice; all used sanitary towels; 61% used pharmacological agents for cramps	evolved; findings useful for health intervention programmes
Odey *et al.* (2021)[36]	Describe period poverty during COVID-19 pandemic and its impact on Nigerian girls and women	Mixed-methods	Multi-region, Nigeria; sample size not stated.	Supply shortages, price increases, lockdowns disrupted product access; led to transactional sex for products; pre-menstrual anxiety increased	Menstrual health management must be part of emergency responses; period poverty is a public health priority
Femi-Agboola *et al.* (2017)[37]	Determine prevalence of dysmenorrhea, effects on school activities, and associated school absenteeism among secondary school girls in Ibadan	Mixed-method	Ibadan (South-West); 460 secondary school girls.	Dysmenorrhea prevalence 73%; absenteeism 13.1%; severe dysmenorrhea predicted absenteeism (OR=4.2); age and duration of menstruation predicted dysmenorrhea	High dysmenorrhea prevalence; analgesics should be available in schools; health education on self-medication dangers needed
Kolawole *et al.* (2020)[38]	Identify premenstrual and menstrual symptoms among adolescents and their effect on QoL in Ile-Ife	Descriptive cross-sectional	Ile-Ife (South-West); 357 adolescent girls	Mean QoL score 41.31; significant negative relationship between menstrual symptoms and overall QoL, physical and psychological domains; self-care most used coping strategy	Female adolescents should be taught how to manage premenstrual and menstrual symptoms
Adewuya *et al*. (2008)[39]	Estimate rate of PMDD among Nigerian undergraduates and evaluate psychosocial correlates and comorbid psychiatric conditions	Cross-sectional study	University (South-West); Nigeria; sample size not stated	PMDD prevalence 6.1%; correlates: older age, painful menstruation, high neuroticism	PMDD is a significant condition among Nigerian undergraduates; mental health services should be integrated
Udegbe *et al*. (2024)[40]	Investigate gender differences in five dimensions of menstrual attitudes among undergraduate students at University of Ibadan	Cross-sectional study	University of Ibadan (South-West); 370 undergraduates (male and female)	Significant gender difference only in the 'Pleasant' dimension, with females more positive	Health education promoting positive attitudes should be targeted at males to reduce female discrimination
Lawal *et al*. (2020)[41]	Test direct and interactive effect of anxiety and body esteem dimensions on dimensions of menstrual attitudes among adolescent girls in Ibadan	Cross-sectional study	Ibadan (South-West); 276 secondary school girls aged 12-19	Lower anxiety predicted positive attitude (anticipating onset); body esteem-appearance influenced debilitating and bothersome dimensions; interactive effects found	Body esteem and less anxiety are important for positive menstrual attitude; reduce apprehension and encourage body respect
Titlayo *et al*. (2009)[42]	Investigate prevalence of dysmenorrhea and menorrhagia and their psychosocial effects among female undergraduates at Obafemi Awolowo University	Mixed-methods	Obafemi Awolowo University (South-West); 415 female undergraduates plus 37 in-depth interviews	Dysmenorrhea prevalence 64%; significantly associated with dizziness, headache, depression, and irritation; menstrual disorder ever called for medical attention	Menstrual disorders have significant psychosocial effects; more research and public health attention needed
Egwuaba and Sunday (2025)[43]	Examine menstrual hygiene management and educational disruption among adolescent girls in Ekwulobia	Mixed-methods	Ekwulobia, Anambra State (South-East); secondary school girls (400 students)	Menstruation-related absenteeism reported by number of girls; lack of proper WASH facilities and product access contributed to disruption	Improved school WASH infrastructure and access to menstrual products essential to reduce educational disruption
Lawan *et al*. (2010)[44]	Assess menstruation and menstrual hygiene amongst adolescent school girls in Kano, Northwestern Nigeria	Cross-sectional study	Kano State (North-West); adolescent schoolgirls (400 adolescents)	Majority had poor pre-menarche knowledge; mothers were the main source of information	Need for pre-menarche education and improved menstrual health literacy

Nneka *et al*. (2023)[45]	Explore experiences of shame, embarrassment, stigma, and absenteeism among pubscent girls in semi-urban and rural secondary schools in Enugu state	Qualitative study	Enugu State (South-South); (200 pubescents schoolgirls)	Four themes that influence pubescents' menstrual behavior are individuals' bio-physiological status, knowledge of menstrual health and characteristics; regimenting school through strict rules enforcement, punishment/motivation, forced participation, and compliance; scheduling academic activities/examinations, sporting, and other extra curricula activities; providing menstrual support by individual and institution efforts to pubescents	Menstrual influencers requires the interaction between menstrual support and menstrual enablers by institution for positive menstrual behavior

NGOs, non-governmental organizations; PMS, premenstrual syndrome; OR, odds ratio; FCT, Federal Capital Territory; FGD, focus group discussion; SES, socioeconomic status; JSS3, junior secondary school 3; AOR, adjusted odds ratio; HRQoL, health-related quality of life; WASH; water, sanitation, and hygiene; QoL, quality of life; PMDD, premenstrual dysphoric disordor.