

MENSTRUAL HEALTH LITERATURE REVIEW

FINAL PRESENTATION

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June 4th, 2024

START CENTER
STRATEGIC ANALYSIS, RESEARCH & TRAINING CENTER
Department of Global Health | University of Washington

AGENDA

01 Introduction & Methods

02 Literature Review Results

03 Product Specific Findings

04 Key Takeaways & Next Steps

05 Questions & Discussion



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PROJECT TEAM



Ana Krause, RN, MSc (IPH)

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Project Manager



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Global Health, Medicine, Pediatrics

Faculty Lead

START OVERVIEW

Leverages leading content expertise from across the University of Washington

Provides high quality research and analytic support to the Bill & Melinda Gates Foundation and global and public health decision-makers

Provides structured mentorship and training to University of Washington graduate research assistants

PROJECT BACKGROUND

REASON FOR REQUEST

• Globally ~500 million menstruators experience compromised menstrual health related to insufficient access to high-quality and affordable products.

• A more robust understanding of **how menstrual health affects women's health**, especially as it relates to reproductive tract infections and the use of different menstrual health products, is needed. In particular, **greater knowledge about the burden of negative health outcomes related to menstrual products is of key interest.**

• This work will help to inform the work and strategy for the Women's Health Innovation Team.

KEY PROJECT OBJECTIVE



To conduct a literature review to understand the effect of menstrual health product use on infectious outcomes (STIs, urogenital infections, & BV), & identify corresponding gaps in the literature.

PROJECT DELIVERABLES



A summary report outlining key findings from this literature review.

A presentation of findings to the Women's Health Innovation team.

METHODOLOGY

PROJECT STEPS

Initial Project Scoping

Meet with UW Librarian

Finalized list of exposures & outcomes to include based article #'s & timeline

Conducted Literature Review in Covidence

Synthesis of Findings

Findings Cross-check with Subject Matter Experts

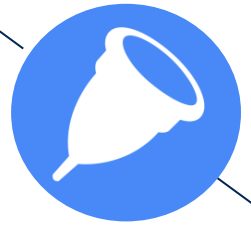
Deliverable Development:
- Report
- Presentation



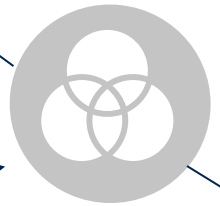
INCLUSION & EXCLUSION CRITERIA



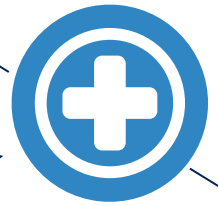
Population(s)
(Menstruators of any age group, located in any geography)



Exposure(s)
(Reusable/Disposable Menstrual Pads, Menstrual Cups, Homemade Alternatives, only worn during menstruation)



Comparator(s)
(Other menstrual products or no comparator)



Outcome(s)
(Reproductive & Urinary Tract Infections*)



Study Characteristics
(Any study design; no protocols; any year of publication)

*Included Infections:
- HPV, HIV, Syphilis, Gonorrhea, Chlamydia, Bacterial Vaginosis, Urinary Tract Infections, Vaginitis, & Candidiasis.

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ARTICLE DATA EXTRACTION CATEGORIES

CONDUCTED IN COVIDENCE

ARTICLE METADATA	METHODS & PARTICIPANTS	EXPOSURES & OUTCOMES	OTHER INFORMATION
Article Title	Primary/Secondary Aims	Menstrual Product	Ranking of Evidence (Level 1-5)
First author	Study Design	Outcome Reporting (e.g. Incidence, Prevalence for infections of interest)	
Publication Year	Data Collection Period		
Country	Population Information (e.g. SES, rural/urban, marginalized groups)	Outcome Measurement (e.g. self-report, confirmatory lab testing)	Author Identified Gaps re: menstrual product use & outcomes of interest
Article DOI	Participant Inclusion/ Exclusion Criteria		
	Sample Sizes	Results	Other Comments
	Participant Ages		

LITERATURE REVIEW & FINDINGS CROSS-CHECK

ADDED RIGOR IN OUR PROCESS

Literature search discussed UW Librarian, Teresa Jewell

2x

Two reviewers screened each article and assessed each full text for eligibility.

3

Three databases searched:

- PubMed
- Web of Science
- U.S. FDA Manufacturer & User Device Experience (MAUDE)

SUBJECT MATTER EXPERTS

Dr. Stephen E. Hawes

- Professor of Epidemiology & Global Health
- Expertise in HIV, HPV, STIs, Vaginal Microbiome

Dr. R. Scott McClelland

- Professor Epidemiology, Global Health, Medicine
- Expertise in women's reproductive health, STIs, & HIV

LITERATURE REVIEW RESULTS

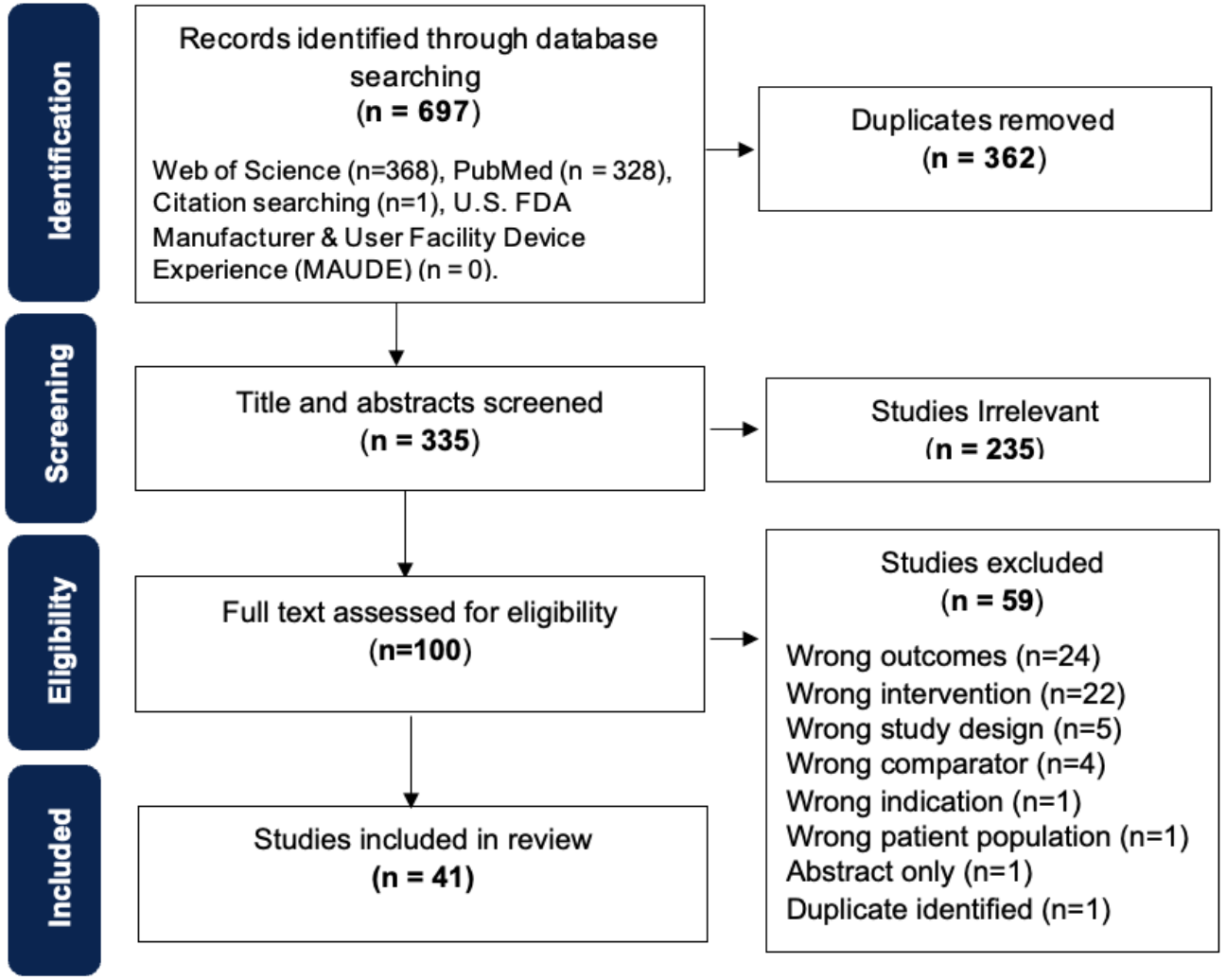
LITERATURE REVIEW

697 Articles identified

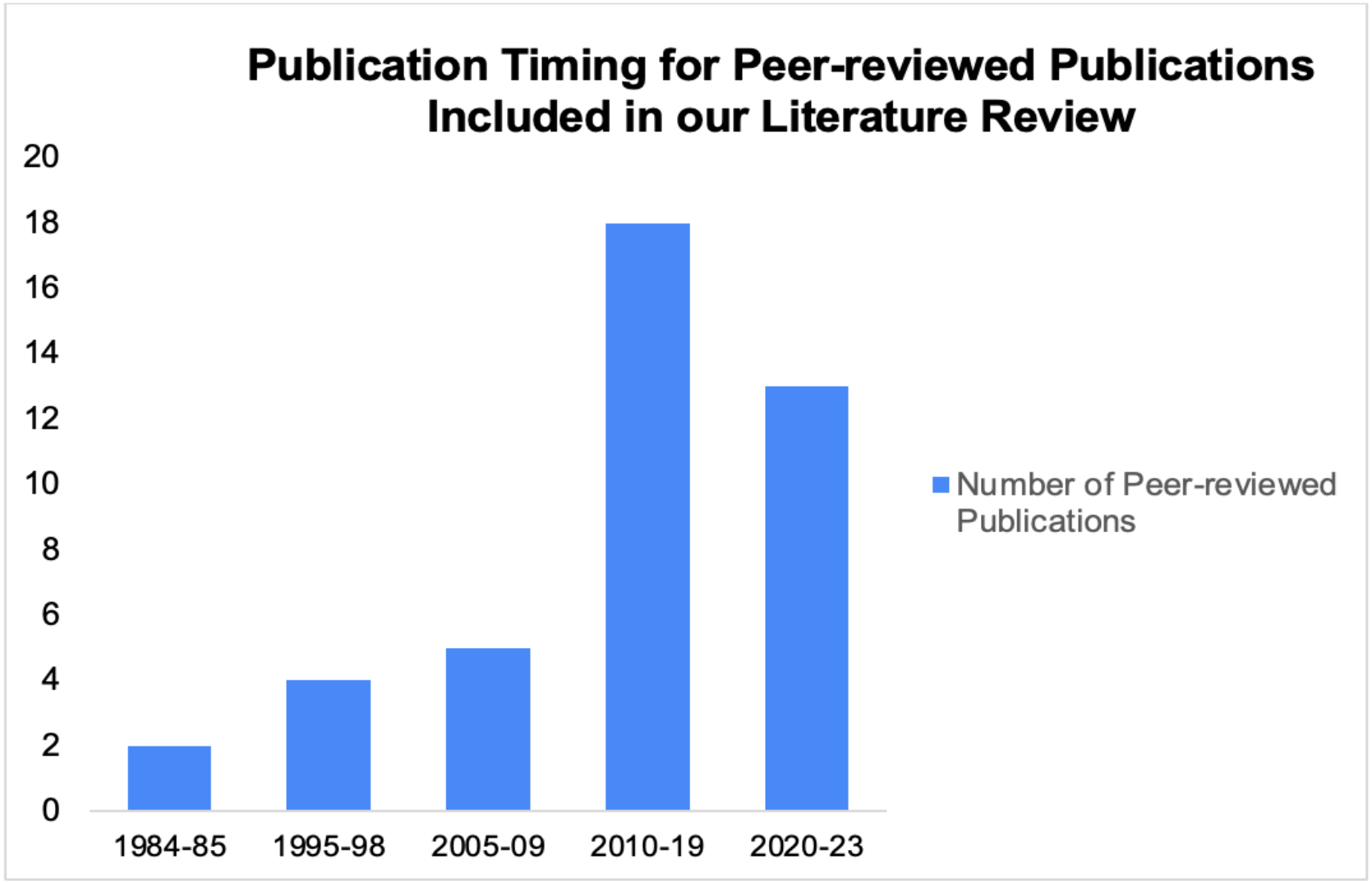
335 Articles double screened after duplicates removed

100 Full texts double reviewed

41 **Articles included in our review**

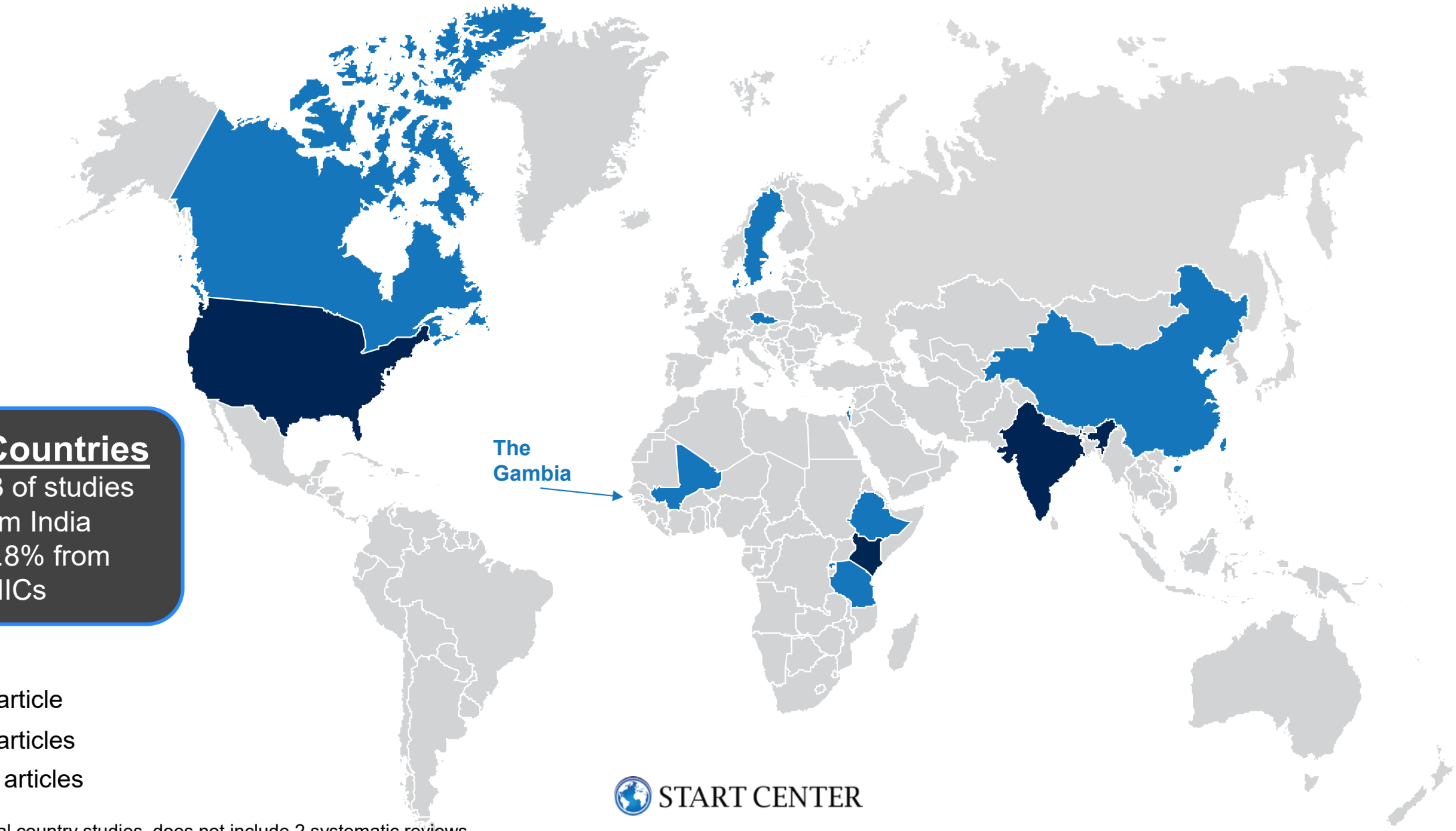


PUBLICATION DATES OF INCLUDED ARTICLES



STUDIES PUBLISHED 1984 - 2023

GEOGRAPHY OF INCLUDED ARTICLES (n=42)*



14 Countries

- 1/3 of studies from India
- 73.8% from LMICs

1 article

3 articles

≥6 articles

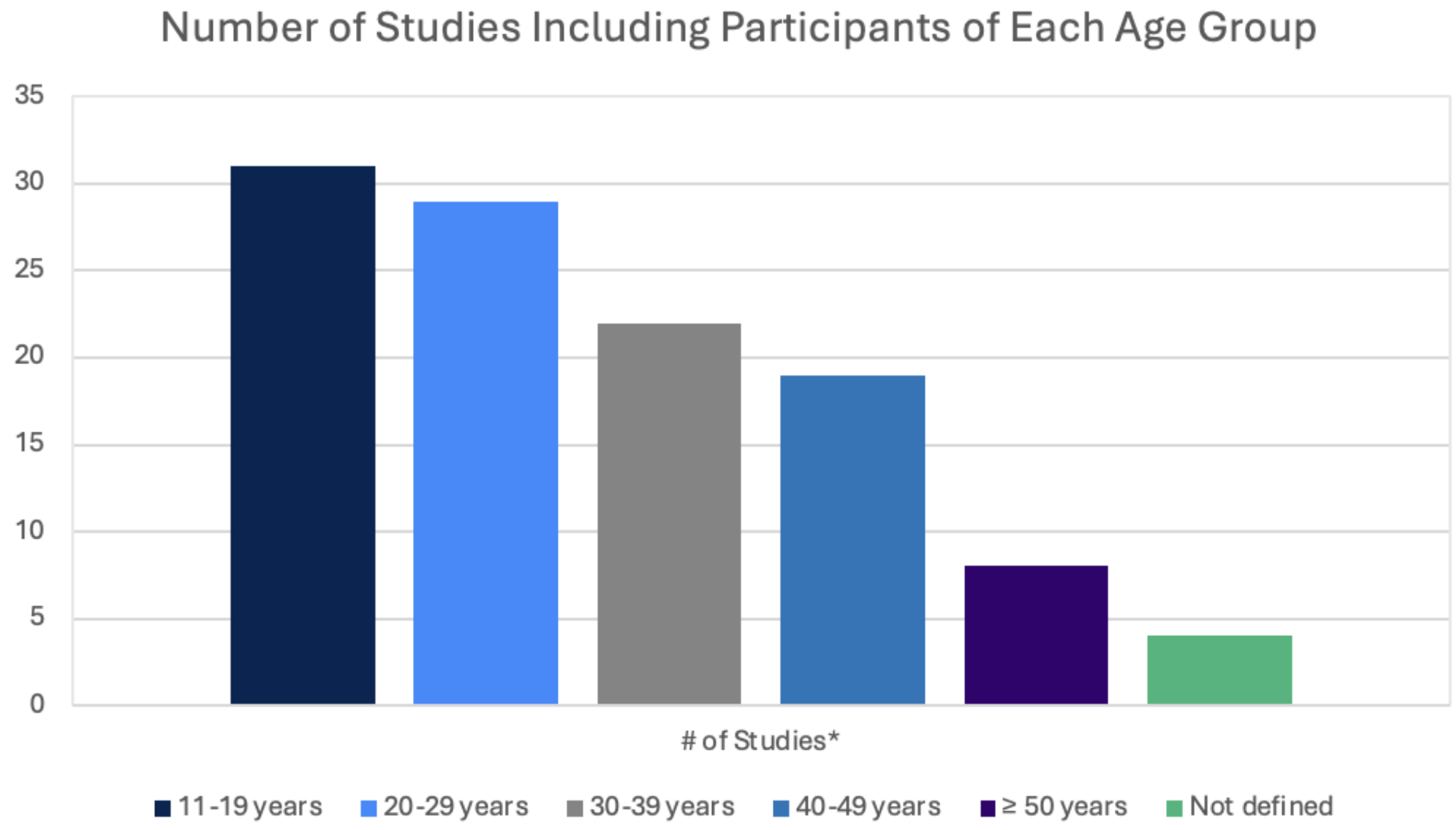
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*For individual country studies, does not include 2 systematic reviews

PARTICIPANT AGES IN INCLUDED ARTICLES

73.8% OF STUDIES INCLUDED TEENS ≤19 YEARS

19.0% OF STUDIES INCLUDED WOMEN ≥50 YEARS

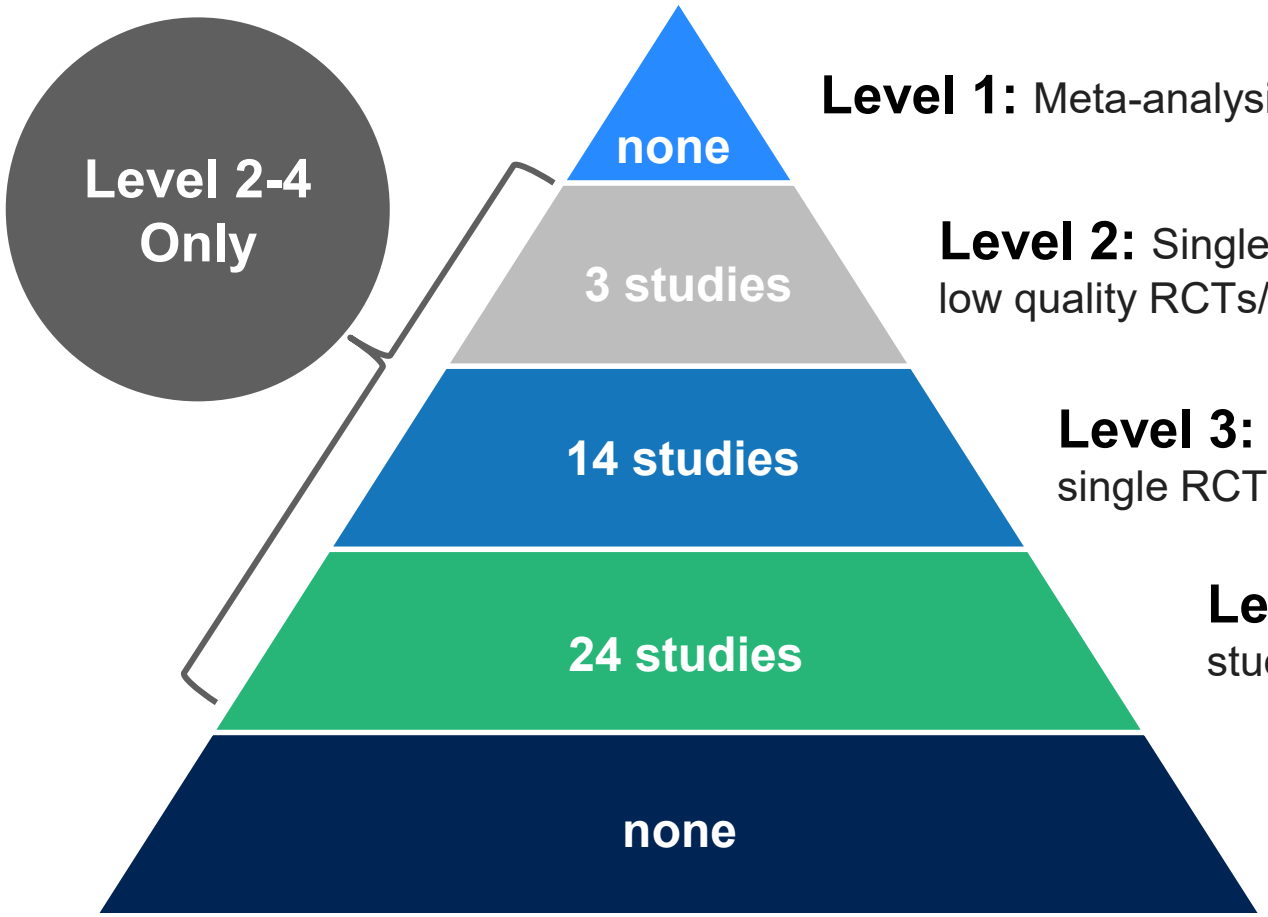


*# of studies equals more than total number of studies (n=41) as 88.1% of studies included participants of multiple age groups. Four studies did not report ages of their participants.

EVIDENCE RANKING

INCLUDED ARTICLES

Our literature review identified **a lack of high-quality evidence** regarding menstrual health product use and reproductive tract infections.



Level 1: Meta-analysis, systematic reviews of high quality RCTs

Level 2: Single high-quality RCTs, or a meta-analysis, systematic review of low quality RCTs/other types of studies

Level 3: Cohort, case control studies, quasi-experimental studies, or a single RCTs with methodology deficiencies/limitations

Level 4: Descriptive studies including case series, ecological studies, or cross-sectional studies

Level 5: Expert opinion, case report or clinical examples or experiences

Ranking adapted from Sackett's Evidence Based Medicine

IDENTIFIED GAPS IN THE LITERATURE

AS IDENTIFIED & REPORTED BY INCLUDED STUDIES

HIGH QUALITY EVIDENCE IS LACKING

UNCLEAR EXPOSURE & OUTCOME DEFINITIONS

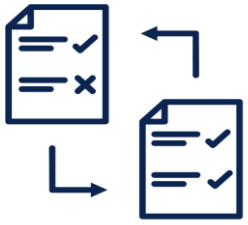
DATA HETEROGENEITY LIMITS COMPARABILITY

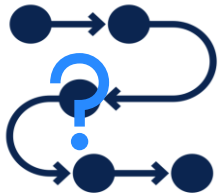
MECHANISMS BEHIND PRODUCTS & OUTCOMES NOT CLEAR

CONFOUNDERS ABOUND & NOT ALWAYS CONSIDERED





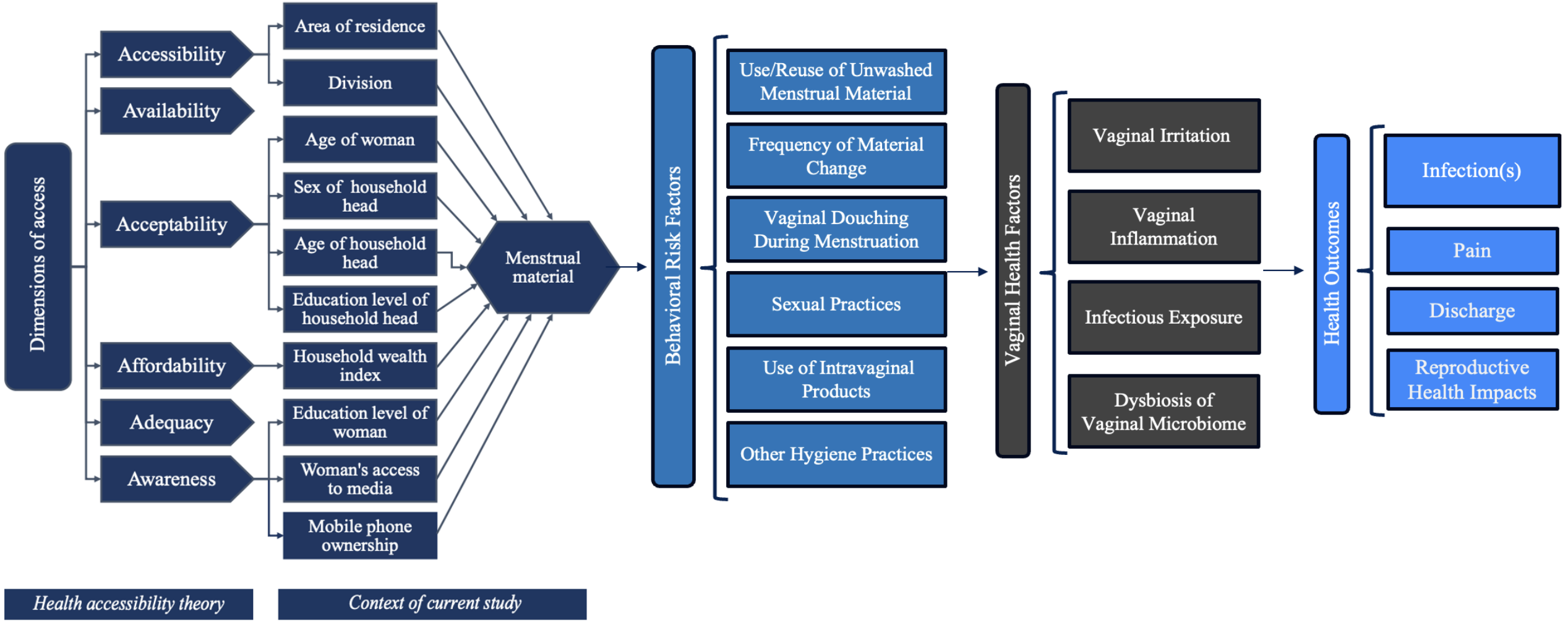






THEORIZED PATHWAY

EXPANDED FROM AFIAZ & BISWAS, 2021 (NAVY Figure)



Navy figure shows the theory of healthcare access in the context of women's access to modern menstrual material in Bangladesh (Afiaz & Biswas, 2021)

PRODUCT FINDINGS

DISPOSABLE PADS



ALSO TERMED 'SANITARY NAPKINS' OR 'PANTY LINERS'

KEY FINDINGS

33 articles (17 cross-sectional) provided information on disposable pads for menstruation and its association with bacterial vaginosis, STIs, UTIs, and RTIs. **12** of these studies were conducted in India, **6** in the United States, and **5** in Kenya.

Of the 28 studies examining the association of disposable menstrual pads to the infectious outcomes of interest, only **two** were identified as highest-quality (Level 2). An additional **four** were identified as high-quality case-control or cohort studies (Level 3).

All high-quality studies showed **no significant associations** between the use of disposable pads and adverse health outcomes of interest, such as bacterial vaginosis or UTIs, when controlling for relevant confounders.

DISPOSABLE PADS

HIGHEST QUALITY STUDIES - OVERVIEW

HIGHEST QUALITY EVIDENCE				
Study	**Design**	**Comparator**	**Outcome**	**Findings**
Sumpter (2013, multi-country)	Systematic review	'good' menstrual absorbents 'bad' menstrual absorbents	Confirmed BV	Pooled OR for BV for higher quality studies: good vs. bad menstrual absorbents: 1.07 (95% CI: 0.52–2.24, p = 0.85) *good absorbents included disposable pads, bad absorbents included reusable cloths
Phillips-Howard (2016, Kenya)	3-arm, single-site, open cluster randomized controlled pilot study	Treatment Arm 1: Menstrual Cups (n = 144) Treatment Arm 2: Sanitary Pads (n=202) Treatment Arm 3: Usual practice without menstrual cups or sanitary pads provided (n=156)	Prevalence of RTIs > 9-months of follow-up, Prevalence of STIs > 9-months of follow-up. Est. adjusted prevalence ratios	BV with pads vs. cloths/underwear/sponges: 19.8% vs. 20.5% (PR: 0.97, 95% CI: 0.65-1.44, p = 0.86) BV with cups vs. pads: 14.6% vs. 19.8% (PR: 0.74, 95% CI: 0.51-1.08, p = 0.12) STI Prevalence with pads: 4.5% vs. control: 7.7% (aPR: 0.62, 95% CI: 0.37-1.03, p = 0.063) STI Prevalence with cups: 4.2% vs. pads: 4.5% (aPR: 0.93, 95% CI: 0.56-1.55, p = 0.78)

DISPOSABLE PADS

CASE CONTROL & COHORT STUDIES - OVERVIEW

OTHER HIGH-QUALITY EVIDENCE				
Study	**Design**	**Comparator**	**Outcome**	**Findings**
Geiger, 1996	Case Control (among university students)	Population Controls	Vulvovaginal Candidiasis	Crude OR for any sanitary napkin use during last menses vs. controls: 0.89 (95%CI: 0.44-1.82) Adjusted OR for any sanitary napkin use during last menses vs. controls: 1.30 (95% CI: 0.58-2.91) ***Adjusted for multiple factors, including race.*
Janoowalla, 2019	Prospective Cohort	Controls (no pad use) Pads in intervention group were provided single-use biodegradable pads made from banana fibres	Positive Urine Culture Urinary Symptoms Vulvovaginal Symptoms	Pos. urine culture: Pad use: 5.5% vs. control: 3.2% (aOR: 2.09, 95% CI: 0.89-4.91, p=0.090) Urinary symptoms: Pad use: 52.3% vs. control: 56.6% (aOR: 1.02, 95% CI: 0.66-1.58, p=0.934 Vulvovaginal symp: Pad use: 46.8% vs. control: 51.0%; (aOR 0.89, 95% CI: 0.52-1.52, p=0.669) **Adjusted for multiple MHM, SES, and health history factors.*
Foxman, 1995	Case Control (among university students)	Controls *(Tampon results as well)*	First- time UTI	Sanitary Napkins Only in past 2 weeks: Cases: 22.4%; Controls: 23.6%; OR: 1.0 (ref. group) Both Sanitary Napkins & Tampons in past 2 weeks: Cases: 48.2%; Controls: 52.8%; OR: 0.57
Das, 2015	Case Control (hospital based)	Controls *(Results for reusable absorbents as well)*	Urogenital Infection Symptoms BV/UTIs UTIs BV	aOR for symptomatic case with reusable cloths: vs. disposable pads: 2.3 (95%CI: 1.5-3.4, p<0.001) aOR for BV or UTI with reusable cloths vs. disposable pads: 2.8 (95%CI: 1.7-4.5, p<0.001) aOR for UTI with reusable cloths vs. disposable pads: 2.0 (95%CI: 1.0-4.0, p = 0.06) aOR for BV with reusable cloths vs. disposable pads: 1.23 (95%CI: 0.8-2.0, p = 0.4)

DISPOSABLE PADS

FINDINGS – BACTERIAL VAGINOSIS

Sumpter 2013: Systematic review found that use of disposable pads **does not significantly** decrease the risk of BV compared to reusable or traditional menstrual absorbents, with a pooled odds ratio of 1.07 (95% CI: 0.52–2.24, p = 0.85).

Phillips-Howard 2016: Pilot RCT found that the prevalence of BV was comparable between participants using pads (19.8%) and those using cloths, underwear, or sponges (20.5%), with a PR of 0.97 (95% CI: 0.65 to 1.44, p-value: 0.86). Compared to menstrual cups, pads demonstrated a non-significant trend towards a higher BV prevalence (19.8% vs. 14.6%; PR: 0.74; 95% CI: 0.51 to 1.08; p = 0.12).

Das 2015: Case control study found AdjOR for BV with the use of disposable pads compared to reusable cloths was 1.23 (95% CI: 0.8-2.0, p = 0.4), indicating **no significant difference** in the risk of BV.

DISPOSABLE PADS

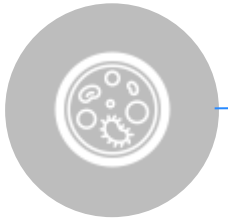
FINDINGS – URINARY TRACT INFECTIONS



Janoowalla 2020: Prospective cohort study found a non-significant aOR for positive urine culture that was higher for pad users compared to non-pad users (Pad use: 5.5% vs. non-pad use: 3.2%; OR 1.60, aOR 2.09, p=0.090).



Foxman 1995: Case-control study on first-time UTIs found that the OR for UTI cases was 1.0 for those using sanitary napkins only (Cases: 22.4%; Controls: 23.6%), 0.57 for those using tampons only (Cases: 29.4%; Controls: 23.6%), and 0.57 for those using both sanitary napkins and tampons (Cases: 48.2%; Controls: 52.8%).



Das 2015: Case-control study found that the aOR for UTIs with the use of disposable pads compared to reusable cloths was 2.0 (95% CI: 1.0-4.0, p = 0.06), indicating **a non-significant trend** towards a higher risk of UTIs with reusable cloths.

DISPOSABLE PADS

FINDINGS – VULVOVAGINAL CANDIDIASIS

Geiger 1996: Case-control study on VVC found that the crude OR for any sanitary napkin use was 0.89 (95% CI: 0.44-1.82), while the adjusted OR was 1.30 (95% CI: 0.58-2.91), indicating **no significant difference** in the risk of vulvovaginal symptoms with sanitary napkin use.

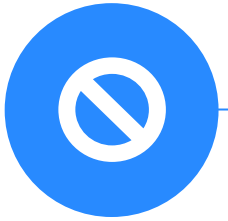
Janoowalla 2020: Prospective cohort study found a **non-significant** aOR for vulvovaginal symptoms was lower for pad users compared to non-pad users (Pad use: 46.8% vs. non-pad use: 51.0%; OR 0.62, aOR 0.89, p = 0.669).

DISPOSABLE PADS

FINDINGS – SEXUALLY TRANSMITTED INFECTIONS



Phillips- Howard 2016: Pilot RCT found that the aPR for STIs was lower for pad users compared to the control group (4.5% vs. 7.7%; aPR: 0.62, 95% CI: 0.37 to 1.03, p = 0.063), indicating **a non-significant trend** towards lower STI prevalence with pad use.



Phillips- Howard 2016: Also found that the prevalence of STIs was similar between pad users and menstrual cup users(4.2% vs. 4.5%; aPR: 0.93, 95% CI: 0.56 to 1.55, p = 0.78), indicating **no significant difference** in STI prevalence between the two groups.

DISPOSABLE PADS

KEY TAKEAWAYS



1. **Limited Evidence of Risk**: All high-quality studies show no significant association between disposable menstrual pads and adverse infectious outcomes of BV, STIs, UTIs, and RTIs.

2. **Research Quality**: Most studies are low-quality, limited to specific geographic areas or populations, and cross-sectional in design, thus decreasing generalizability, increasing risk for bias, and hindering the ability to determine temporality.

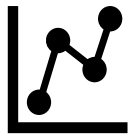
3. **Future Research Direction**: There is an important gap in comparative research between pads or other external menstrual products versus internal products, including menstrual cups. Future research should be conducted to understand how modes of use impact risk of negative health outcomes.

MENSTRUAL CUPS

ARTICLE SUMMARY



Nine articles regarding menstrual cup use and related urogenital infectious outcomes were identified, including randomized controlled trials (n=3), systematic reviews (n=2), RCT-nested observational studies (n=2), and cross-sectional studies (n=2).



Non-systematic review were conducted in Kenya (n=4), India (n=2), and Canada (n=1). Additionally, a systematic review by Sumpter 2013 presented results from a 2010 RCT assessing menstrual cup use and school attendance in Nepal.



Systematic reviews (**Sumpter 2013; Daher 2022**) highlight a pronounced **gap in relevant literature on menstrual cups and related health outcomes prior to 2016**.

MENSTRUAL CUP

SEXUALLY TRANSMITTED INFECTIONS

In a four-group, cluster RCT by **Zulaika 2023**, there was **no significant difference in risk of incident HIV infection** comparing:

- Menstrual Cup versus Control Arm (aRR = 0.88; 95% CI: 0.38,2.05)
- Pooled Menstrual Cup/Conditional Cash Transfers versus Control Arm (aRR = 0.80; 95% CI: 0.33, 1.94)

In a prospective analysis, nested within a cluster RCT, by **Mehta 2023**, the **risk of incident bacterial STI acquisition** (defined as the composite occurrence of *Chlamydia trachomatis, Neisseria gonorrhoeae, or Trichomonas vaginalis*) **was significantly lower among individuals using menstrual cups**:

- Menstrual Cup versus Control Arm (aRR = 0.77; 95% CI: 0.62,0.95)
  - The protective effects of menstrual cup use were found after adjustment for age, sexual activity at baseline, SES, and school WASH score.

A RC pilot study by **Phillips-Howard 2016**, found the composite **prevalence of bacterial STIs** (*Chlamydia trachomatis, Neisseria gonorrhoeae, or Trichomonas vaginalis*) at the end of study follow-up **was significantly lower among individuals using menstrual cups**:

- Menstrual Cup versus Control Arm (4.2% vs. 7.7%; aPR = 0.48; 95% CI: 0.24,0.96)
- Menstrual Cup + Pads versus Control Arm (4.3% vs. 7.7%; aPR = 0.54; 95% CI: 0.34,0.87)
  - Assessment for prevalence of *Chlamydia trachomatis, Neisseria gonorrhoeae, or Trichomonas vaginalis* **alone found no significant protective effects with menstrual cup use alone.**

MENSTRUAL CUP

REPRODUCTIVE TRACT INFECTIONS & BACTERIAL VAGINOSIS

In **Phillips-Howard 2016** and **Mehta 2023**, researchers observed **non-significant differences in the association between menstrual cup use and BV or the prevalence of RTIs**:

- **Phillips-Howard 2016** – assessed prevalence of RTIs (presence of either BV or *Candida albicans*):
  - Menstrual Cup vs. Control Arm (21.5% vs. 26.9%; aPR = 0.79; 95% CI: 0.48,1.30)
  - Pooled Menstrual Cup + Pads vs. Control Arm (25.7% vs. 26.9%; aPR = 0.93; 95% CI: 0.66,1.31)

- **Mehta 2023** – assessed OR of BV:
  - Menstrual Cup vs. Control (OR = 0.82; 95% CI: 0.51,1.32) - compared to the control arm, **the odds of BV in the menstrual cup arm was 18% lower**, although not statistically significant.

A nationally representative survey conducted in India (n=27,983) indicated that **using hygienic menstrual products, including cups, was associated with a lower prevalence of RTI-specific symptoms** compared to unhygienic materials (**Chakrabarty 2023**)

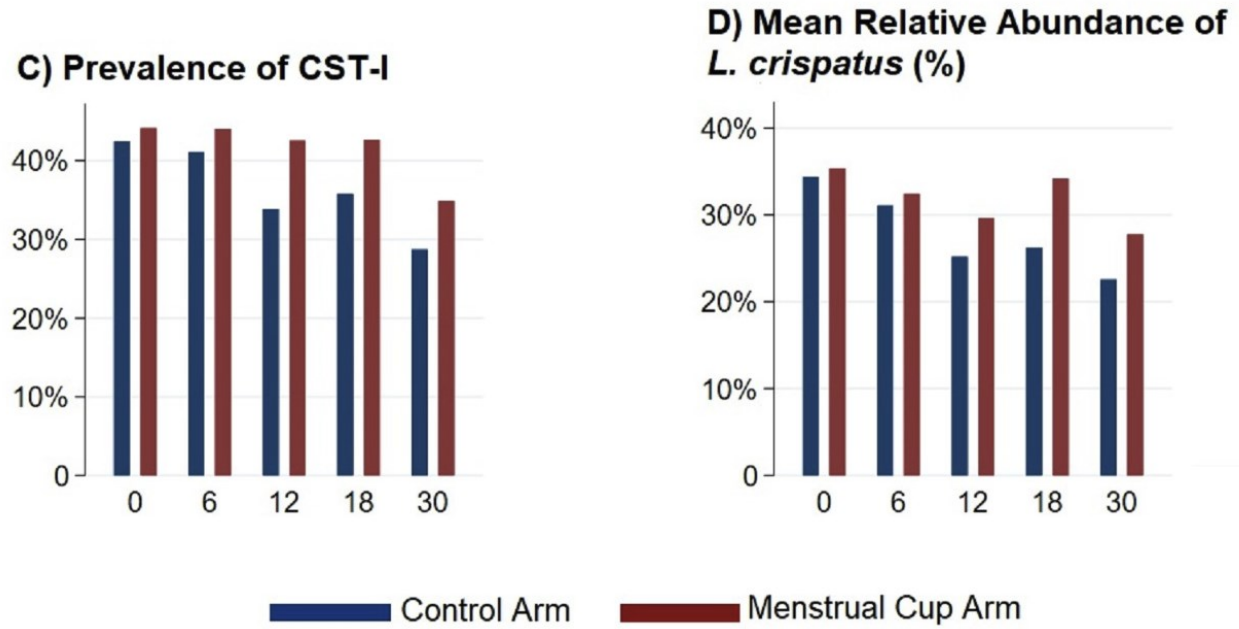
- **Parikh 2022** found that, among a cross-sectional sample of university students in Gujarat, India, **use of menstrual cups was low (~0.7%)**. Findings from Chakrabarty 2023 should be evaluated with caution, given the combination of hygienic menstrual products under review.

MENSTRUAL CUP

REPRODUCTIVE TRACT INFECTIONS & BACTERIAL VAGINOSIS

Although **Mehta 2023** observed non-significant differences in the odds of BV across intervention arms**, researchers found that the menstrual cup arm had 42% higher odds of having *Lactobacillus crispatus*-dominated vaginal microbiomes when compared to the control arm** (OR = 1.42; 95% CI: 1.21,1.67).

Lactobacillus crispatus-dominated vaginal microbiomes are **broadly associated with lower risk for the development of bacterial vaginosis.**



Mehta 2023: Fig 2. Bar chart showing the prevalence of (C) CST-I (*L. crispatus* dominated) and (D) mean relative abundance of *L. crispatus*, by intervention status over study visit in months. Measures from participants in the control arm are depicted in navy bars, and from participants in the menstrual cup arm in maroon bars. Study visit in months is depicted on the x-axis. BV, bacterial vaginosis; CST-I, community state type I

MENSTRUAL CUP

KEY TAKEAWAYS



1. Overall, the current body of peer-reviewed literature indicates **varying levels of uncertainty in the associations between menstrual cup use and either reductions in STIs and RTIs or the general promotion of a healthy vaginal microbiome**.

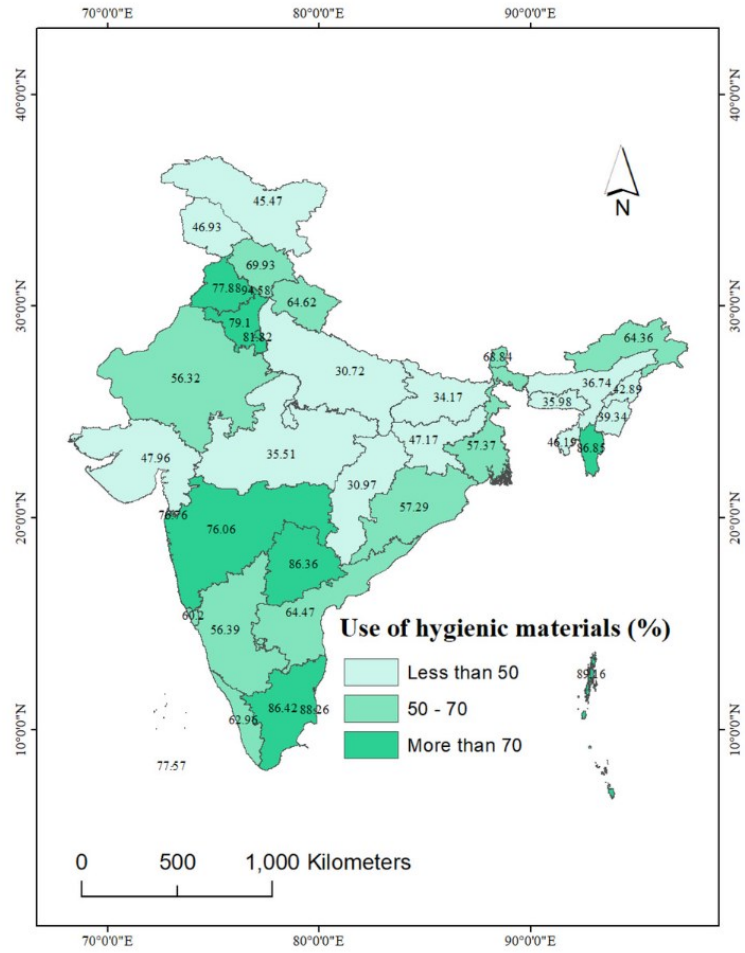
2. Limitations in study design, exposure/outcome assessment, and small sample sizes highlight the need for further research to draw more definitive conclusions.

3. Future studies evaluating the association between menstrual cups and incident urogenital infections, changes to the vaginal microbiome, and other safety outcomes **must account for the duration of menstrual cup use and how differences in use over time impact susceptibility** to negative health outcomes.

REUSABLE PADS & HOMEMADE ALTERNATIVES

DEFINITIONS WHICH MAY OVERLAP

- **Reusable Pads**: Cloth based menstrual pads, intended for reuse for one year or more.
- **Homemade Alternatives:** Strips of fabric repurposed for menstrual absorbency. May be used/reused and washed/ unwashed. Also termed cloths/rags in studies.
- **Unhygienic MHM methods:** Inadequate washing or drying of reusable pads, or the use of cloth, rags, cotton, cotton wool or toilet paper as absorbents.
- **Hygienic MHM methods:** Use of disposable pads, or the use of reusable products when washed with clean water and dried in the sun.



Chakrabarty (2023). State-wise use of hygienic materials during menstruation among women in India, NFHS-5, 2019-21.

REUSABLE PADS

CLOTH BASED MENSTRUAL PADS, INTENDED FOR REUSE FOR ≥1 YEAR

KEY FINDINGS

Five articles provided information on the use of reusable pads and their association with BV, UTIs and Candidiasis. Study designs included case-control (n=2) and cross-sectional (n=2) studies and a systematic review (n=1). Non-systematic reviews originated from India (n=3) and Mali (n=1). From these articles, 1 provided adequate quality of evidence.

Reusable pad users had higher odds of RTI symptoms, BV or UTI, and Candidiasis. Higher percentages of Candidiasis have been related to the washing, drying and storing practices.

Reusable pads, when adequately washed and dried, are considered hygienic, but lack of access to safe water and sanitation might hinder the adequate maintenance of these products.

REUSABLE PADS

CLOTH BASED MENSTRUAL PADS, INTENDED FOR REUSE FOR ≥1 YEAR

ARTICLES WITH HIGHEST QUALITY EVIDENCE FOR REUSABLE PADS

LoE	Study	Design	Comparison arms	Outcomes	Findings
3	Das (2015, India)	Hospital based case-control study for women seeking out-patient care *note study used reusable cloths and reusable pads/ reusable cloth pads interchangeably. No specific product definitions provided.	Cases: symptomatic women seeking care for vaginal discharge, genital burning/itching /sores, burning with voiding (n=228) Controls: asymptomatic women seeking care for menstrual/ breast health (n=258) Ref. group is disp. Pads	Urogenital Infection Symptoms BV/UTI (lab confirmed) UTIs (lab confirmed) BV (lab confirmed)	aOR for **symptomatic case** with reusable cloths vs. disposable pads (ref): 2.26 (95% CI: 1.5, 3.4; p<0.001) aOR for **BV or UTI** with reusable cloths vs. disposable pads: 2.8 (95% CI: 1.7, 4.5; p<0.001) aOR for **UTI** with reusable cloths vs. disposable pads: 2.0 (95% CI: 1.0, 4.0; p = 0.06) aOR for **BV** with reusable cloths vs. disposable pads: 1.23 (95% CI: 0.8, 2.0; p = 0.4)

HOMEMADE ALTERNATIVES



ALSO TERMED CLOTHS, RAGS, OR UNHYGIENIC MATERIALS

KEY FINDINGS

25 articles included information about the use of cloths-rags and infectious outcomes. Study designs included cross-sectional (n=1), case-control (n=3), cohort (n=1), observational study nested in a cluster RCT (n=1), quasi-experimental (n=1), and systematic review (n=1). Non-systematic review originate from India (n=13), Kenya (n=4), The Gambia (n=3), China (n=1), Ethiopia (n=1), The Rwanda (n=1), Tanzania (n=1). After careful review, **4 articles were selected as they showed adequate methodological rigor**.

Although no significant association with UTIs was found, a study suggests the potential role of the vaginal microbiome (VMB) in the association between the use of homemade alternatives and BV.

Since the consequences of cloth use as a menstrual product have been mostly explored in low-resource setting, cloth use could be related to socioeconomic status and access to sanitation.

HOMEMADE ALTERNATIVES

FINDINGS FOR BV, UTIs, & VULVOVAGINAL SYMPTOMS

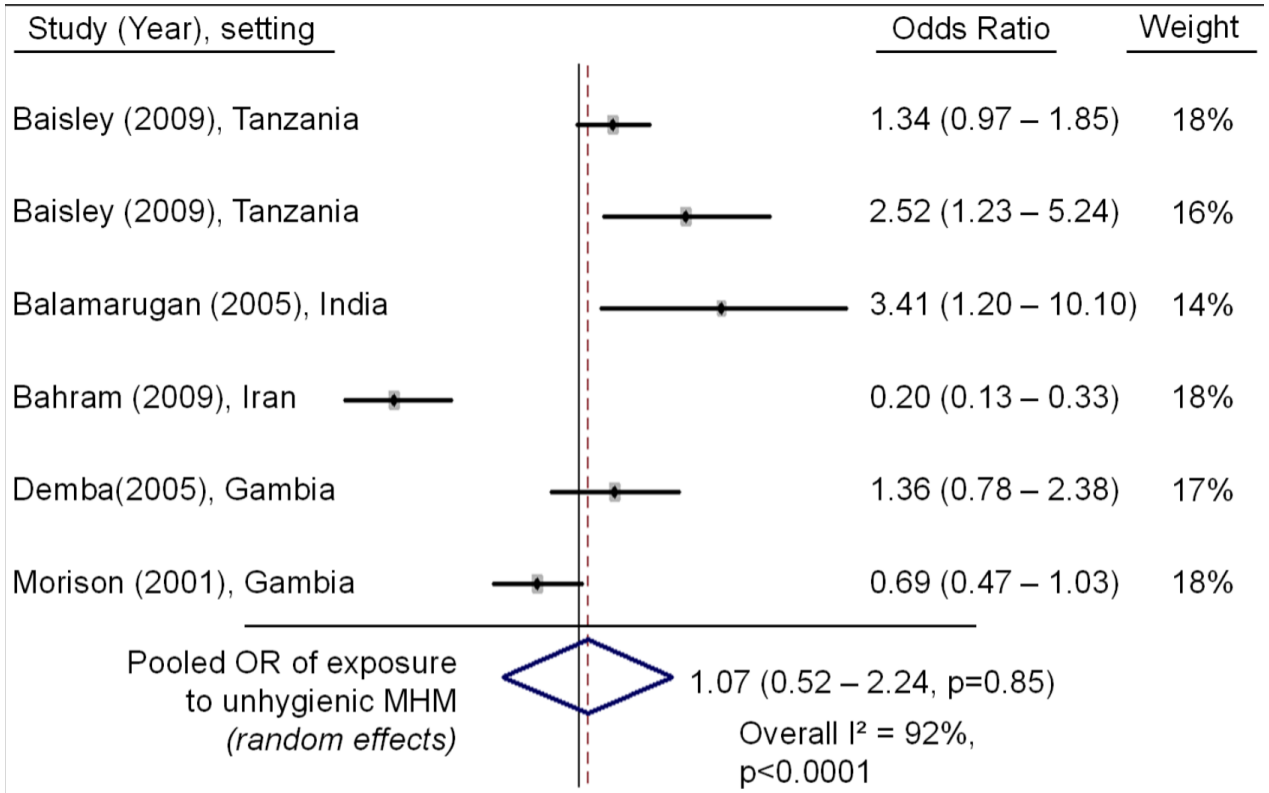
ARTICLES WITH HIGHEST QUALITY EVIDENCE FOR HOMEMADE ALTERNATIVES

LoE	Study	Design	Comparison Arms	Outcomes	Findings
2	Sumpter (2013, multi-country)	Systematic review	'Good' menstrual absorbents 'Bad' menstrual absorbents	Confirmed BV	Pooled OR for **BV** for higher quality studies: good vs. bad absorbents: 1.07 (95% CI: 0.52, 2.24; p = 0.85) *good absorbents included disposable pads, bad absorbents included reusable cloths
3	Janoowalla (2019, Rwanda)	Prospective cohort study	Arm 1: single-use biodegradable pads made from banana fibres x 6 months Arm 2: not provided with pads, not using menstrual pads, & no plans to change habits during study	UTI Urinary symptoms Vulvovaginal symptoms	**Pos. urine culture**: Pad use: 5.5% vs. control: 3.2% (aOR: 2.09, 95% CI: 0.89-4.91, p=0.090) **Urinary symptoms**: Pad use: 52.3% vs. control: 56.6% (aOR: 1.02, 95% CI: 0.66-1.58, p=0.934 **Vulvovaginal symp**: Pad use: 46.8% vs. control: 51.0%; (aOR 0.89, 95% CI: 0.52-1.52, p=0.669) **Adjusted for multiple MHM, SES, and health history factors*
4	Mehta (2021, Kenya)	Cross – sectional (N= 436)	Arm 1: Cloth use during last period Arm 2: No cloth use during last period	BV	OR: 1.59 (95% CI: 1.17, 2.17) for ***L. iners* dominant VMB** for cloth use during last period (p <0.01) OR: 1.72 (95% CI: 1.03, 2.86) for ***G. vaginalis dominant VMB*** for cloth use during last period (p <0.05)
4	Torondel (2018, India)	Hospital based cross-sectional study for women seeking out-patient care	Arm 1: Reusable cloths (includes old cotton, nylon, silk) Arm 2: Disposable pads (ref. group) *specific sample sizes not reported for this analysis	BV prevalence Candidiasis prev. Trichomonas Vaginalis (TV) prev.	aPRR for **BV** with reusable vs. disposable pads (ref): 1.23 (95% CI: 1.0, 1.54; no p-value) aPRR for **Candidiasis** with reusable vs. disposable pads: 1.54 (95% CI: 1.21, 2.00) aPRR for **Candidiasis** among individuals drying reusable materials inside their house/hidden in toilet compartment vs. in the sun: aPRR 1.78 (95% CI: 1.34, 2.38) aPRR for **Candidiasis** among individuals drying reusable materials inside their house/hidden in toilet compartment vs. in a changing room cupboard: aPRR 1.96 (95% CI: 1.49, 2.57) aPRR for **TV** with reusable vs. disposable pads: 1.78 (95% CI: 0.81, 3.90) **adjusted for age, education*

HOMEMADE ALTERNATIVES

META-ANALYSIS DATA FOR BACTERIAL VAGINOSIS

- Evidence from other countries show heterogeneous results.
- No clear association between menstrual product use and BV.



Sumpter (2013). Forest plot of odds ratios of using 'poor' menstrual absorbent vs. 'good' menstrual absorbents in those with confirmed bacterial vaginosis.

START CENTER

REUSABLE PADS & HOMEMADE ALTERNATIVES

KEY TAKEAWAYS





1. While limited to only a few studies, **the evidence suggests a plausible association BV and homemade alternatives; and between Candidiasis, BV, UTIs, and reusable pads.** Further research should include washing and drying methods for reusable products which may impact risk for Candidiasis.

2. Further research on the association of reusable pads, homemade alternatives and RTIs should be encouraged, given the high prevalence of use in LMICs. **Access to sanitation and the VMB should be considered in the causal pathway.**

3. Definitions of reusable pads varied across studies and may differ in material, frequency of change, or be conflated with reusable cloths. **The lack of high-quality studies in diverse populations and geographies limits the generalizability of these findings.**

SUMMARY OF STUDIES BY EXPOSURE & OUTCOME

Number of studies in our review that reported on **each exposure** and **outcome of interest** for each level of evidence

Bacterial Vaginosis was the most frequently assessed outcome, followed by Candidiasis / Vaginitis

NUMBER OF STUDIES REPORTING ON EACH OUTCOME OF INTEREST							
MENSTRUAL PRODUCT	Bacterial Vaginosis	Sexually Transmitted Infections*	Candidiasis or Vaginitis	Urinary Tract Infections	HIV	HPV	TOTAL # OF STUDIES
LEVEL 2 EVIDENCE							
Disposable Pads	1		1				**2**
Reusable Products	2		2				**1**
Menstrual Cups					1		**1**
LEVEL 3 EVIDENCE							
Disposable Pads	3	1	1	3			**8**
Reusable Products	2			2			**4**
Menstrual Cups	1	2	1				**4**
LEVEL 4 EVIDENCE							
Disposable Pads	7	6	5	3	2	1	**23**
Reusable Products	6	4	5	1	2	1	**19**
Menstrual Cups							
TOTAL # OF STUDIES	**22**	**13**	**15**	**9**	**5**	**2**	

KEY TAKEAWAYS

KEY PROJECT TAKEAWAYS

The evidence on menstrual product use and the reproductive and urinary tract infections of interest **is mixed** and **of low to moderate quality**.

The heterogeneity of data from observational studies & definitions of products also limits comparability of findings.

While product safety is important, **menstruators health outcomes are influenced by multi-dimensional factors**. In order to correctly evaluate product safety, studies must evaluate the effect of multi-dimensional confounding factors (e.g. social determinants and sexual practices, including transactional sex).

SUGGESTED NEXT STEPS



Consider addressing research gaps, particularly for candidiasis, vaginitis, UTIs, & BV, with ongoing investment & well-designed studies accounting for confounding factors.

Support initiatives that seek to improve access to menstrual products as well as water, sanitation and hygiene and the broader social determinants of health.

QUESTIONS & DISCUSSION

THANK YOU

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STRATEGIC ANALYSIS,
RESEARCH & TRAINING CENTER

APPENDIX

Table: Number of Articles by Country and World Bank Income Grouping

Country	World Bank Income Grouping*	Menstrual Products of Focus†	Outcomes of Interest	Number of Articles	Publication Years
Canada	High-income	•Menstrual Cup	•Urogenital Infection Prevalence	1	2011
China	Upper-middle income	•Menstrual Pads •Cloths/rags	•HPV Prevalence •# of HPV Infections	1	2017
Czech Republic	High-income	•Menstrual Pads	•Bacterial Vaginosis Prevalence •Urogenital Infection Prevalence	1	2007
Denmark	High-income	•"Other types" (not tampons)	•Bacterial Vaginosis Prevalence	1	1985
Ethiopia	Low income	•Menstrual Pads •Cloths/rags		1	2019
Gambia (The)	Low income	•Menstrual Pads •Cloths/rags	•Bacterial Vaginosis Prevalence •Bacterial Vaginosis Incidence •HIV Prevalence •Urinary Tract Infection Prevalence	3	2005 x2 2021
India	Lower middle-income	•Menstrual Cup •Menstrual Pads (disposable & reusable) •Cloths/rags	•Bacterial Vaginosis Prevalence •Cervical Cancer Associations •# of Reproductive Tract Infections •STI Prevalence •# of STI Infections •Urogenital Infection Prevalence •# of Urogenital Infections	14	2012 2013 2015 2017 x2 2018 2019 2020 2021 x2 2022 x3 2023
Israel	High-income	•Menstrual Pads	•Urinary Tract Infection Prevalence	1	1984
Kenya	Lower middle-income	•Menstrual Cup •Menstrual Pads (disposable & reusable)	•Bacterial Vaginosis Prevalence •HIV Prevalence •# of HIV Infections •HIV Incidence •STI Prevalence •# of STI Infections	6	2015 2016 2017 2021 2023 x2
Mali	Low income	•Menstrual Pads (disp. & reus.)	•Cervical Cancer Associations	1	2002
Rwanda	Low income	•Menstrual Pads •Cloths/rags	•Urinary Tract Infection Incidence	1	2019
Sweden	High-income	•Menstrual Pads	•Urinary Tract Infection Prevalence	1	1998
Tanzania	Lower middle-income	•Menstrual Pads •Cloths/rags •Cotton wool/toilet paper	•Bacterial Vaginosis Prevalence	1	2009
United States	High-income	•Menstrual Pads	•Bacterial Vaginosis Prevalence •# of Urogenital Infections •STI Prevalence •Urinary Tract Infection Prevalence	6	1995 1996 1998 2010 x2 2011

*Per current World Bank Income groupings which may not reflect a country's income grouping at the time of each study

†Menstrual pads were assumed or defined as disposable unless specifically indicated to be reusable

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