

Interactions between menstrual hygiene management and sanitation systems: Landscape analysis of menstrual hygiene products and a waste-loading model

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BACKGROUND

To ensure successful integration of modern menstrual hygiene products (MHPs) with sanitation systems, it is important to understand what is currently done with menstrual waste in urban and peri-urban settings. This is particularly true in light of global trends towards urbanization and the increasing availability of disposable sanitary pads in these settings. The overall Menstrual Management & Sanitation Systems Project is led by the University of Maryland. To support the larger project and address the lack of existing research on women's menstrual hygiene management (MHM), PATH conducted two case studies in South Africa and India from March–December 2012.

OBJECTIVES

The primary goals of the case studies were to determine the impact of MHPs and practices on multiple sanitation systems (system focused) and, conversely, determine the impact of the sanitation systems on MHM experiences, product choices, and practices of women and adolescent girls (user focused). In support of the system-focused study, tools were developed to project the potential impacts of MHPs and practices on sanitation systems and solid waste streams.

METHODS

A myriad of MHPs were gathered from sites globally. PATH personnel calculated surface areas and volumes using calipers and graph paper and massed each MHP on a balance. Assumptions were collected from literature and anecdotal use preferences. PATH developed two tools from these data:

- 1) A landscape analysis of MHPs that includes attributes and properties.
 - 2) An interactive model for constructing menstrual waste-loading scenarios.
- These tools allow stakeholders to understand the attributes and properties of MHPs and to subsequently model different menstrual waste-loading scenarios by inserting values (e.g., population, percent usage of each type of product) appropriate to the local population and context. These tools were developed to share with project collaborators in both South Africa and India, as well as with stakeholders globally who are interested in MHM.

LANDSCAPE OF MENSTRUAL HYGIENE PRODUCTS

The landscape analysis of MHPs is intended to introduce private-, public-, and civil-sector actors to the myriad of product options, as well as the attributes and properties of those products. We captured some of the attributes affecting product acceptability, access, and ultimately usage which influence the loading upon sanitation systems and/or other waste streams. Key actors in the sanitation system and MHM sectors may benefit from consideration of key product attributes in selecting types of MHPs to introduce into various settings.

For example, a decision-maker may be tasked with promoting both an environmentally friendly and a culturally appropriate MHP for young girls in a location where vaginal insertion is not acceptable for unmarried females.

EXTERNAL WEAR



REUSABLE

Photo credit: L. Hoppenjans/PATH.

The landscape of MHPs also includes a brief summary of key product properties: number of uses per unit; dry volume per unit (cm³); dry mass per unit (g); and annual dry loading rate (cm³/female/year)

ACKNOWLEDGMENTS

PATH would like to acknowledge the support of our program assistants—Jai Sutherland and Adam Drolet—for their contributions to this poster and the overall project. Furthermore, this poster is based on research funded by the **Bill & Melinda Gates Foundation**. The findings and conclusions contained within are those of the authors and do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation.

PROJECT PARTNERS:



MENSTRUAL WASTE-LOADING MODEL

The model was made with Microsoft Excel software and includes a list of assumptions. Loading refers to the volume (cm³/female/year) or mass (grams/female/year) of menstrual waste that enters a sanitation or solid waste management system per year from menstruating females. The model (Version 2.0) was developed for the following purposes:

- Permit actors engaged in sanitation, waste management, and MHM to make data-based decisions regarding the potential impacts of MHPs upon sanitation systems and other waste streams by developing scenarios and modeling projected menstrual waste loads.
- Allow decision-makers to effectively plan for disposal requirements of sanitation facilities, including design of facilities, waste containment methods, transport, final disposal, staffing, training, protective equipment, and education materials.

The annual dry loading rates included in the landscape are derived from the loading model. Disposable sanitary pads contribute the largest mass and volume of menstrual waste, as noted in the bar graph below.

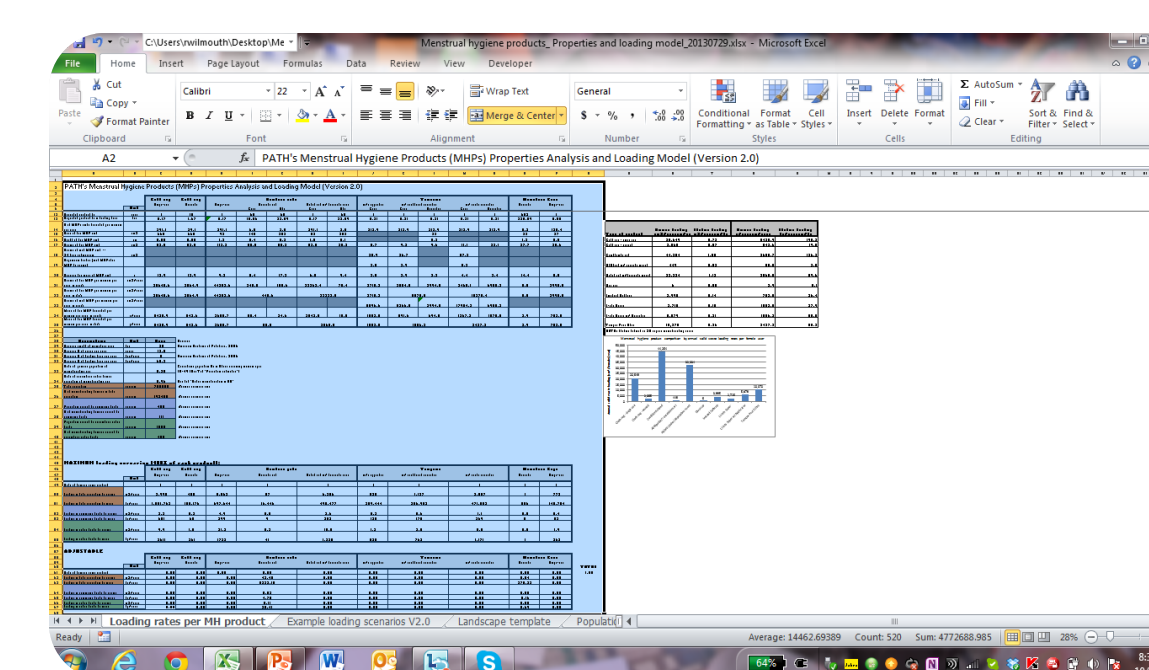
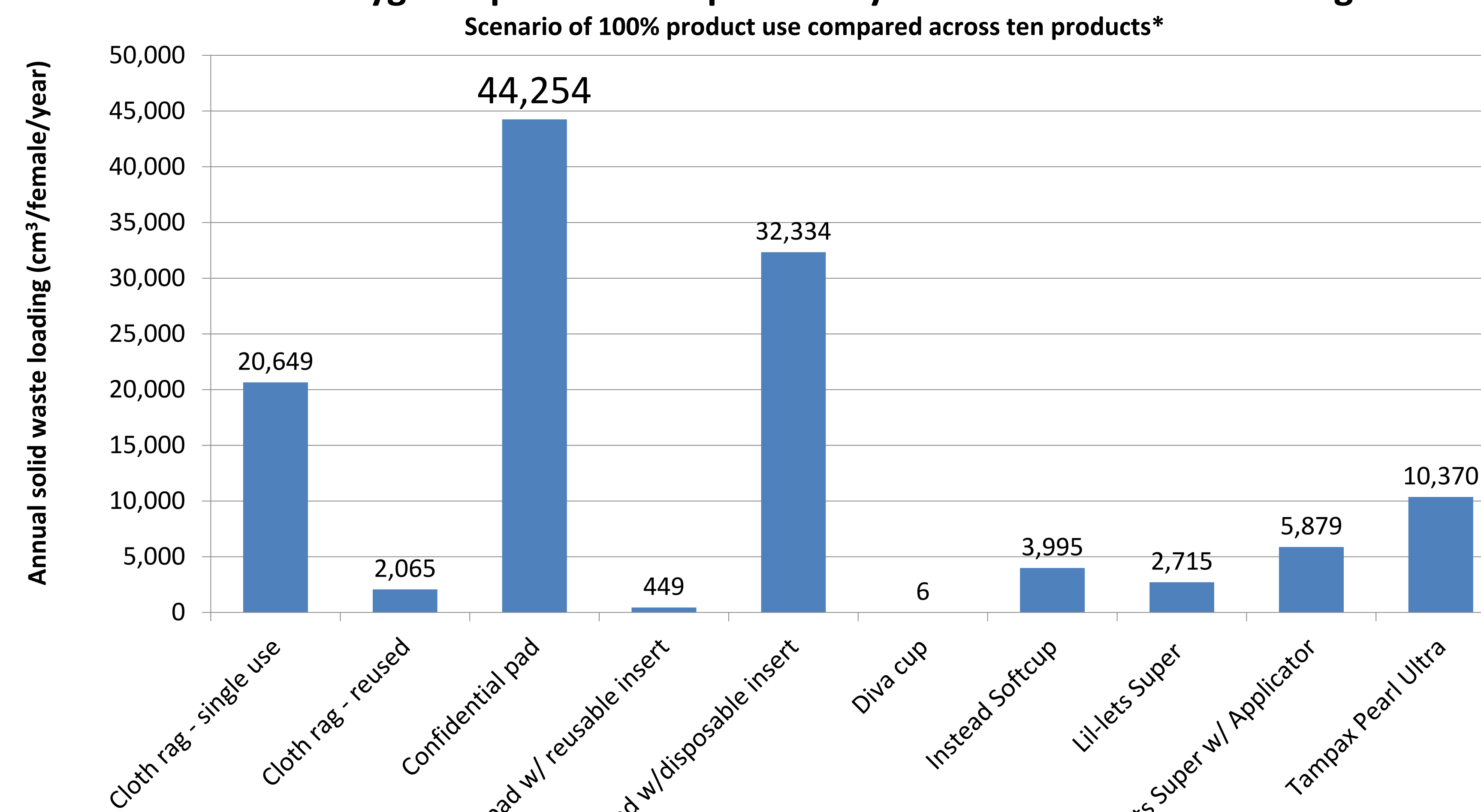


Photo credit: PATH/L. Hoppenjans

Menstrual hygiene product comparison by annual solid waste-loading rates:



*Assumptions for # of MHPs used per day: 6 cloth rags/day; 6 pads/day; 5 tampons/day

Menstrual Hygiene Product Information										
Product type	Cloth rag - single use	Cloth rag - reusable	Disposable sanitary pad w/ non-biodegradable plastics	Reusable sanitary pad w/ reusable insert*	Reusable sanitary pad w/ disposable insert	Tampon w/o applicator	Tampon w/ cardboard applicator	Tampon w/ plastic applicator	Reusable menstrual cup	Disposable menstrual cup
Product photo										
Type of use: Reusable		✓		✓	✓				✓	
Type of use: Single-use	✓		✓			✓	✓	✓		✓
Type of materials: Biodegradable	✓	✓		✓		✓	✓	✓		✓
Type of materials: Non-biodegradable			✓						✓	✓
Type of materials: Mixed materials					✓					
Type of wear: External wear	✓	✓	✓	✓	✓					
Type of wear: Internal wear (insertion)						✓	✓	✓	✓	✓
Stage of product: Consumer product			✓	✓	✓	✓	✓	✓	✓	✓
Stage of product: Informal material	✓	✓								
Stage of product: R&D prototype					✓					

Menstrual Hygiene Products—Data										
Example product	NA	NA	Confidential	AFRIPad*	Hybrid pad*	Lil-Lets Super	Lil-Lets Super w/ applicator	Tampax Pearl Ultra	Divacup*	Instead Softcup
Number of uses per unit	1	10	1	65 (inserts); 65 (shells)	1 (insert); 65 (shells)	1	1	1	652	1
Dry volume per unit (cm ³)	52.8	52.8	113.2	108.3	117.7	8.7	18.8	33.1	27.7	30.6
Dry mass per unit (g)	13.9	13.9	9.2	25.7	15.9	3.5	5.1	7.8	14.4	5.8
Average loading rate (cm ³ /person/year)	20,649	2,062	44,254	449	32,334	2,715	5,879	10,370	6	3,995
Average loading rate (g/person/year)	5,436	544	3,606	85	2,561	1,082	1,586	2,437	3	753

*Note: AFRIPads: 1 year kit includes 6 inserts and 2 shells; Hybrid pad includes 2 reusable shells; Diva Reusable menstrual cup product life is estimated at 5 years.

Photo credits: PAI/H. Wilmoth

Assumptions [†]	Unit	Value
Average length of menstrual cycle	day	28
Average # of cycles per year	cycles	13.0
Average # of bleeding days per cycle	day/cycle	5
Average # of bleeding days per year	day/year	65.2

[†]American Academy of Pediatrics, 2006

EXAMPLE MENSTRUAL WASTE-LOADING SCENARIOS

The model includes specific scenarios, such as total population, a communal facility setting, or a school facility setting. Each scenario allows users to insert their own data for the population served. For example, the following scenario tables capture the estimated total solid waste from MHPs over one year with an estimate of 0.26 of the population of menstruating age in two locations: Durban, South Africa assuming a total population of 595,000; and Bihar, India assuming a total population of 103,800,000:

Scenario: Durban, South Africa	Disposable pad	Tampons without applicator	Cloth rag (re-useable)	Menstrual cup (re-useable)	Total solid waste
Present use distribution ⇄	7,132 m ³ /yr (98%)	4 m ³ /yr (1%)	3 m ³ /yr (1%)	0 m ³ /yr (0%)	7,139 m ³ /yr
Use distribution after campaign encouraging use of tampons	1,892 m ³ /yr (26%)	326 m ³ /yr (73%) ✦	3 m ³ /yr (1%)	0 m ³ /yr (0%)	2,221 m ³ /yr
Use distribution after campaign with subsidy or financing model for menstrual cups	4,294 m ³ /yr (59%)	4 m ³ /yr (1%)	3 m ³ /yr (1%)	0.4 m ³ /yr (40%) ✦	4,301 m ³ /yr

Scenario: Bihar, India	Disposable pad	Cloth rag (single use)	Cloth rag (re-useable)	Re-useable sanitary pad w/ re-useable insert	Menstrual cup (re-useable)	Total solid waste
Present use distribution ⇄	76,181 m ³ /yr (6%)	421,809 m ³ /yr (71.2%)	13,507 m ³ /yr (22.8%)	0 m ³ /yr (0%)	0 m ³ /yr (0%)	511,498 m ³ /yr
Use distribution after campaign encouraging use of re-useable sanitary pads ✦	76,181 m ³ /yr (6%)	303,324 m ³ /yr (51.2%)	1,659 m ³ /yr (2.8%)	5,148 m ³ /yr (40%)	0 m ³ /yr (0%)	386,312 m ³ /yr
Use distribution after campaign with subsidy or financing model for menstrual cups ✦	76,181 m ³ /yr (6%)	303,324 m ³ /yr (51.2%)	7,583 m ³ /yr (12.8%)	0 m ³ /yr (0%)	48 m ³ /yr (30%)	387,135 m ³ /yr

⇄ MHP product-use data from MHP demand study led by V. Hoffmann and S. Adelman

✦ Projected MHP product-uptake rates from MHP demand study led by V. Hoffmann and S. Adelman

✦ Hypothetical scenario

CONCLUSION

Two attributes in the MHP landscape—type of use and type of materials—have the greatest impact upon sanitation systems. Type of use compares single-use MHPs against reusable products. The number of uses possible for each product impacts the volume/mass of waste produced, which requires containment, hygienic handling, and final disposal. Such questions as the following are relevant:

- Should national government campaigns limit females to one MHP option?
- Are disposable sanitary pads the most appropriate MHP for national government campaigns?
- What educational messages are needed to support the correct use and disposal of each MHP with the sanitation systems locally available?

All actors within the sectors of sanitation and menstrual hygiene management may be best positioned to address the needs of female users and sanitation systems if both the product attributes and properties are assessed for the local context of use.