

Innovations in Materials Science for a Transformative Menstrual Health and Hygiene Product

Grand Challenges Explorations Round 25
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THE OPPORTUNITY

Fundamental changes in menstrual health and hygiene (MHH) products are needed to meet the needs of women and girls in low and middle income countries (LMIC) who face challenges with regard to their overall menstrual health and to managing their menstrual periods with dignity. Women and girls in LMIC face significant challenges barriers related to MHH from menarche to menopause. Current literature, while limited, shows an association between inadequate access to MHH products and poorer physical and mental health outcomes.¹² In Ethiopia, for example, only 28% of women and girls reported having "everything they need" to manage their menstruation. Globally, based on data collected from 8 countries in PMA2020 (Performance Monitoring for Action, 2020), it is estimated that 528 million women and girls are lacking what they need for basic MHH care. Challenges can range from social stigma, lack of clean water for basic hygiene, and ineffective, inadequate, or expensive products.³ For example, many women and girls face limited economic resources to purchase supplies that best meet their needs. In addition, girls face inadequate or poor water and sanitation facilities at school, lack of privacy and lengthy travel to and from schools, which increases the likelihood of leaks/stains. Lack of access to MHH products that are context-appropriate, affordable and sustainable can have tangible biological and social impact. Additionally, limited access to MHH products leads to diminished dignity and respect and increased discrimination and stigma for many women and girls in LMIC across their reproductive life.

Key characteristics of MHH products for women and girls include effectiveness, safety, discretion, sustainability, and affordability. Currently available products (e.g., disposable pads, reusable pads, tampons, and menstrual cups) all involve trade-offs among one or more of these desired characteristics and attributes. For example, menstrual cups are discreet but expensive and difficult to use; disposable pads are discreet but create a lot of waste that is particularly problematic in LMICs. Additionally, lack of access to clean water limits the utility of reusable products (e.g., menstrual cups) for many women. As a result, some women and girls turn to inadequate and potentially harmful homemade alternatives such as goatskin, cow patties, or cloths in many settings. In India for example, 88% of women and girls use homemade alternative products to manage MHH.

While a multi-pronged approach to address dignified menstrual health is broadly necessary, one key need is **innovation in materials science and transformative product development to better meet user needs**. This Grand Challenge opportunity is focused exclusively on the product innovation domain. To date, changes in this field have been largely incremental – often focusing on increasing access through pricing or making current products with biodegradable materials. Disruptive innovation in this space has the potential to shift the current market structure and thus improve reach to poor and vulnerable populations. To be most impactful, significant changes in science and technology require mitigation of environmental impact with the aspirational goal to create zero waste and move toward a circular economy (defined as

¹ <https://www.unfpa.org/news/menstruation-not-girls-or-womens-issue-%E2%80%93-its-human-rights-issue#>

² [Hennegan J, et al. Women's and girls' experiences of menstruation in low- and middle-income countries: A systematic review and qualitative metasynthesis. *PloS Med.* 2019; 16:e1002803.](#)

³ [Kuhlmann AS, Henry K, Wall LL. Menstrual Hygiene Management in Resource-Poor Countries. *Obstet Gynecol Surv.* 2017;72:356-76.](#)

an economic system aimed at eliminating waste and the reuse, sharing, repair, refurbishment, remanufacturing, and recycling of resources).

The Challenge

We seek fundamentally transformative and innovative ideas to support the design and development of new MHH products that meet key criteria of being responsive to user needs – particularly in LMIC context; with priority focus on safety, unobtrusiveness, effectiveness (no leaking), cultural acceptability, and sustainability. While there are a number of challenges related to access to current products, reducing stigma, and shifting social norms, this opportunity is specifically focused on driving transformative innovation in the product development domain. We are particularly seeking new technologies, including those potentially used in adjacent fields such as materials science, that could be adapted to innovative MHH products. We fully recognize that technology alone does not automatically improve people's lives. Thus, these creative solutions must be contextually grounded and designed in response to the needs and preferences of women and girls living in LMIC and designed particularly with the future in mind.

Proposals should include how they will address the following criteria:

- **Innovation:** We are seeking radical transformation of existing MHH products, including leveraging materials science and other product innovations.
- **Discretion:** The ability to use a product without it being detected is of high importance to women and girls, specifically during: wear (e.g., no blood leaking and staining clothes), cleaning (e.g., for reusable products, washing product can be kept discreet and is feasible in the absence of clean water supply), and disposal (e.g., for disposable products, does not leave conspicuous waste). Other considerations include safety (e.g., obviating the need to access public sanitation facilities at night). Finally, functionality over the life course depends upon adaptability to times of irregular and sometimes heavy bleeding, including perimenarche, postpartum, and perimenopause.
- **Sustainability:** Current MHH products either require access to clean water to clean (e.g., menstrual cup) or result in waste (e.g., disposable pad). A transformative product would neither require clean water nor result in waste.

Note: Given the foundation's target geographies and populations, a MHH product needs to be affordable for a woman throughout her reproductive years. This criterion will need to be weighed carefully against the prior criteria. While striving for a low cost of goods sold (COGS), we also recognize that affordability can be addressed through multiple levers including market dynamics and scaled production.

The following will **not** be considered for funding:

- Basic research in materials science or product design that does not address the criteria as outlined above
- Proposals only focusing on innovative new materials science without a clear path toward developing an MHH prototype manufacturing process
- Proposals where there is no clear path forward to scale
- Proposals focused on current MHH product delivery and education, as opposed to a technological solution for innovations in new products
- Proposals that focus on incremental change of existing products
- Proposals focused on other aspects of MHH, including infrastructure/systems for addressing access to existing products, water and sanitation improvements or shifting social norms around stigmatization.