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**Amrita Roy**  
Knitwear Design Department,  
National Institute of Fashion  
Technology Delhi, Hauz Khas,  
New Delhi, India

**Priyanka Gupta**  
Knitwear Design Department,  
National Institute of Fashion  
Technology Delhi, Hauz Khas,  
New Delhi, India

**Corresponding Author:**  
**Amrita Roy**  
Knitwear Design Department,  
National Institute of Fashion  
Technology Delhi, Hauz Khas,  
New Delhi, India

## **Awareness and perception towards menstrual panties: Identifying challenges and potential solutions**

**Amrita Roy and Priyanka Gupta**

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### **Abstract**

Menstrual hygiene management (MHM) has become a global issue, as disposable menstrual products have a higher environmental carbon footprint and are suspected to involve health risks. Recently, period panties have become an effective option against traditional menstrual products as these are reusable menstrual products that were created as part of an approach to sustainability and environmentally friendly options. This research paper discusses menstrual panty user experiences by presenting the background and challenges of MHM. Period panties which are comfortable provide leak protection and all around the convenience of an added layer able to contain menstrual flow have been a innovation in the field of disposable period items for some time now. The paper discusses the construction of these briefs such as absorbent materials and moisture wicking capability. In general, menstrual panties have received favorable reviews from users who tend to find them more comfortable and convenient than traditional menstrual products. The paper concludes by suggesting the potential of menstrual panties to transform the menstrual hygiene management, while recognizing the further research regarding the durability and the potential hazards linked to it uses.

**Keywords:** Menstrual hygiene management, period panties, menstrual panties, eco-friendly menstrual products

### **1. Introduction**

Menarche (the term also used in addressing the onset of menstruation) is indeed a momentous event and something women remember vividly. It is the shift from girlhood to womanhood, and heralds a girl's reproductive years. Most girls can expect to get their first period, or menarche, during the ages between 10 and 15 years old, although it varies widely as every girl's cycle is completely personal to them. Menarche is a pivotal moment in a girl's life, presenting a valuable opportunity to instill in them the understanding that they are in control of their own bodies.

Today, heightened awareness among adolescents has opened up access to a range of menstrual products that they consider comfortable and suitable for their needs. Common Menstrual Products among Adolescent are disposable menstrual pads, tampons, menstrual cup, period underwear (such as Thinx), and pantyliner.

Menstrual hygiene management (MHM) provides an essential nexus between public health and environmental sustainability challenges across the globe. The core issues surrounding menstrual hygiene concerns is the significant dependence on disposable menstrual products such as pads and tampons, which have been widely used in many communities.

These products, while offering convenience, pose significant environmental threats due to their high plastic content and contribute to the alarming proliferation of non-biodegradable waste. Furthermore, the health implications associated with the chemicals and synthetic materials in disposable menstrual products have raised substantial concerns, prompting a reevaluation of traditional MHM practices.

Single-use plastics have become increasingly severe; this is basically a result of the people's inclination to a waste generation lifestyle of throwing things after use. As a result, about eight million metric tons of plastic waste ends up in the oceans every year (Hellmann *et al.* 2018) [8].

With growing awareness about the environment and a push for sustainable living, menstrual panties - also known as period panties have become a popular new option for menstrual care. These eco-friendly panties offer a sustainable alternative to disposable products. They are designed to provide leak protection, comfort, and convenience, made from absorbent materials that keep you dry. Beyond their practical uses, menstrual panties help reduce environmental impact, supporting efforts to lessen plastic pollution and encourage care for our planet.

The advent of menstrual panties is not merely a technological innovation but also a cultural and social milestone that reflects changing attitudes towards menstruation and environmental responsibility. Their development and adoption signify a movement away from the disposable culture that dominates menstrual hygiene practices, proposing a model that emphasizes reusability, health safety, and environmental consciousness. However, despite the promising benefits of menstrual panties, their integration into mainstream MHM practices entails navigating various challenges. These include overcoming initial cost barriers, addressing cultural and social stigmas associated with menstruation, and ensuring widespread access to and education about this sustainable alternative.

This paper explores the different aspects of menstrual hygiene management (MHM) and focuses on menstrual panties as a sustainable solution to the environmental and health issues caused by disposable products. By reviewing how menstrual panties are designed and how users experience them, this study aims to show their potential to change MHM practices. It also examines the economic and environmental effects of using menstrual panties, aiming to provide a clearer understanding of their role in promoting sustainable menstrual care and a more eco-friendly approach to MHM.

## 2. Review of literature

Maintaining cleanliness during menstruation is crucial for both health and comfort. Proper hygiene helps prevent infections, such as yeast infections and bacterial vaginosis, which can occur due to the presence of blood. It's important to change menstrual products like pads, tampons, or menstrual cups regularly to ensure they remain effective and to reduce odor.

Washing the genital area with mild soap and water at least once a day can help keep the area clean and fresh. Staying hydrated and wearing breathable fabrics can enhance comfort during this time. Overall, good hygiene practices during menstruation contribute to better physical health and a more positive experience throughout the menstrual cycle.

### 2.1 Menstrual Hygiene Management (MHM) challenges

McMahon *et al.* (2011) <sup>[3]</sup> delve into the perceptions and practices surrounding menstruation among schoolgirls in rural Kenya, offering insights into the complex interplay of personal feelings, environmental factors, and behavioral strategies in menstrual management. Their research highlights the profound impact of menstruation on girls' self-esteem, school attendance, and academic performance, pointing to a dire need for comprehensive MHM interventions that address these multifaceted challenges.

House *et al.* (2012) <sup>[2]</sup>; Sommer *et al.* (2016) <sup>[4]</sup>; Van Eijk *et al.* (2016) <sup>[5]</sup> offers practical advice on addressing menstrual hygiene in various water and sanitation, health, and education programs. It is based on in-depth research that identifies the challenges faced by women and girls and explores how these challenges are being tackled in many developing countries.

A study by Gandhi *et al.* (2022) <sup>[1]</sup> present a thorough overview of important intimate hygiene practices for women's health. The paper discusses the need to maintain vulvovaginal health to boost self-esteem, confidence, and intimacy. It suggests using proper cleaning methods, avoiding harmful hygiene practices, and using special intimate washes to prevent infections and support overall

health. It also points out the lack of professional guidelines for female intimate hygiene, particularly in India, and offers expert advice on appropriate practices.

Another study by Thurairasu (2023) <sup>[11]</sup> discusses the challenges that menstruating girls face globally, especially in schools and low-income countries. The paper highlights the importance of improving menstrual hygiene management (MHM) to improve girls' lives around the world. It looks at how MHM relates to several Sustainable Development Goals (SDGs) and reviews the progress made in policies and programs to address these issues. The paper emphasizes the need for MHM programs that are inclusive of all girls, including those with disabilities and those in emergencies, aiming for every girl to manage her menstruation with confidence and comfort by 2024.

The challenges of menstrual hygiene management in low-resource settings are multifaceted, impacting girls' educational attainment, health, and overall well-being. Phan *et al.* (2020) <sup>[7]</sup> provide an exploration into the acceptance and usage intentions of menstrual underwear among consumers, highlighting a growing scrutiny and awareness towards the environmental, economic, and social impacts of menstruation. Their study reveals a mix of utilitarian and hedonic benefits perceived by users, including comfort, affordability, waste reduction, and female empowerment, while also noting perceived risks that affect the adoption of menstrual underwear, such as concerns over absorbency and social stigma.

Kirana, Purwanto, and Anis (2022) <sup>[6]</sup> examine the association between vaginal hygiene practices and the occurrence of pathological leukorrhea, underscoring the significance of proper hygiene measures over physical activity levels in preventing adverse menstrual health outcomes. This study suggests that certain hygiene practices, particularly those related to urinary hygiene, are critical in mitigating the risk of infections that could exacerbate the challenges of menstrual management among active females.

### 2.2 Acceptance levels and characteristics of menstrual panties

Recent advancements in menstrual hygiene products have brought to light the growing importance of sustainable and comfortable alternatives to traditional disposable items. As awareness of environmental issues increases, many consumers are seeking eco-friendly options that reduce waste and lessen their ecological footprint. Innovations in materials and design are now offering a range of choices from reusable menstrual cups and period panties to organic cotton products that prioritize both comfort and sustainability. This shift not only enhances the user experience but also promotes a more responsible approach to menstrual health.

According to Fourcassier *et al.* (2022) <sup>[9]</sup>, this paper aims to provide guidance for industry stakeholders, policymakers, and consumers on environmentally-friendly menstrual product options. A comparative analysis of various products including disposable nonorganic and organic tampons, pads, reusable pads, menstrual underwear, and cups over one year across eight environmental impact indicators in three countries: France, India, and the U.S. Utilizing Life Cycle Assessment (LCA) methodology, the findings reveal that menstrual cups exhibited the lowest environmental impact, scoring 99% lower than disposable nonorganic tampons.

Menstrual underwear ranked second, followed by reusable pads. Notably, organic disposable pads had higher impact scores than their nonorganic counterparts. According to the study the combination of menstrual cups and underwear demonstrated the most favorable results across all indicators.

Vanleeuwen *et al.* (2018) <sup>[10]</sup>, examines the hypothetical acceptability and potential utility of reusable menstrual underwear by analyzing beliefs, behaviors, and practices related to menstrual hygiene within a Middle Eastern population residing in a refugee setting. The results indicate that menstrual hygiene beliefs and practices are largely consistent with existing literature. Although there was a degree of acceptance for reusable menstrual underwear, participants perceived that its advantages did not outweigh traditional practices. Nonetheless, menstrual underwear was considered a valuable complement to conventional absorbents, particularly in enhancing dignity.

Knížek *et al.* (2022) <sup>[12]</sup> describe an innovative development in menstrual panties, emphasizing the collaboration between the Technical University of Liberec and a private company. This partnership focused on creating sustainable menstrual aids, leading to the development of menstrual panties that feature four functional layers designed for maximum thermo-physiological comfort. These layers include a transport layer for quick moisture transfer, an absorbent layer for moisture distribution, a protective nanofiber membrane layer for preventing leaks while maintaining vapor permeability, and an aesthetic outer layer. The study underscores the potential of menstrual panties in providing a sustainable and comfortable option for menstrual hygiene, particularly in developing countries where traditional disposable aids may not be readily available.

The literature underscores the growing concern over the environmental impact of disposable menstrual products and the health hazards they pose. The emergence of menstrual panties offers a promising solution by providing an eco-friendly, sustainable alternative that not only addresses environmental concerns but also offers significant benefits in terms of comfort, convenience, and cost-effectiveness. Studies such as those by Knížek *et al.* (2022) <sup>[12]</sup> and Thurairasu (2023) <sup>[11]</sup> contribute to a better understanding of the potential of menstrual panties and MHM improvements to revolutionize menstrual hygiene practices, echoing the need for further research on their long-term use and impact.

### 3. Methodology

This study employed a mixed-methods research design to comprehensively assess the economic, ecological, and user experience aspects of menstrual panties compared to traditional menstrual hygiene products. The mixed-methods approach allowed for the triangulation of data, enhancing the validity of the findings through both quantitative analysis and qualitative insights. The research was conducted in two phases: an initial quantitative survey to gather broad data on user experiences, costs, and environmental impacts, followed by in-depth qualitative interviews and focus group discussions to explore these themes in greater detail.

A structured questionnaire was developed to collect data on the personal demographics and menstrual hygiene management (MHM) practices, frequency and preference of menstrual hygiene products used, specifically focusing on menstrual panties versus traditional methods, Perceived

economic impact of menstrual hygiene choices, awareness and perceptions regarding the ecological impact of MHM options. The survey was administered electronically via a secure online platform to ensure confidentiality and ease of access for participants. Semi-structured interviews and focus group discussions were designed to explore participants' detailed experiences, perceptions, and the socio-cultural context influencing their MHM practices.

### 3.1 Participants and setting

The study targeted female participants aged between 18 to 45 years. A total of 250 participants were surveyed, and from this group, 40 were selected for follow-up in-depth interviews and focus group discussions based on their varied experiences and willingness to share detailed personal narratives. The majority (60%) were between the ages of 18 and 30, with 40% aged 31 to 45. Approximately 70% had completed secondary education or higher.

### 4. Results and Discussions

Quantitative data from the survey were analyzed using statistical software SPSS (Version 26). Descriptive statistics provided an overview of participant characteristics and MHM practices. Qualitative data from interviews and focus groups were analyzed using thematic analysis. Transcripts were coded independently by two researchers to identify recurring themes and patterns related to the use, perception, and impact of menstrual panties versus traditional MHM methods. Discrepancies in coding were discussed and resolved through consensus, ensuring reliability in the thematic analysis process.

#### 4.1 Menstrual hygiene management practices

As per the survey around 60% of participants reported using traditional menstrual products (pads and tampons), while 40% had tried or were regularly using menstrual panties. Users of menstrual panties reported a significant reduction in monthly spending on menstrual hygiene products compared to those using traditional disposable products ( $\chi^2 = 15.24, p < 0.001$ ).

Around 85% of participants expressed concern over the environmental impact of disposable menstrual products, but only 50% were aware of the ecological benefits of menstrual panties before the survey. A positive correlation was found between ecological awareness scores and the use of menstrual panties ( $r = 0.45, p < 0.001$ ), suggesting that as ecological awareness increases, so does the likelihood of choosing menstrual panties.

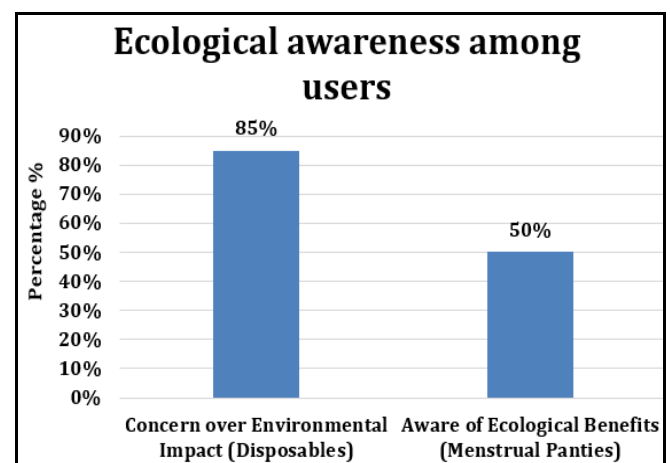


Fig 1: Ecological awareness among users

Participants cited comfort, reduced environmental impact, and cost savings as key benefits of menstrual panties. One participant remarked, "I feel more at ease during my period and am proud to contribute less waste to the environment." Some participants expressed that cultural norms and misconceptions about menstrual hygiene prevented them from discussing or trying menstrual panties.

A lack of comprehensive information on menstrual panties was identified as a barrier to making informed decisions about menstrual hygiene management.

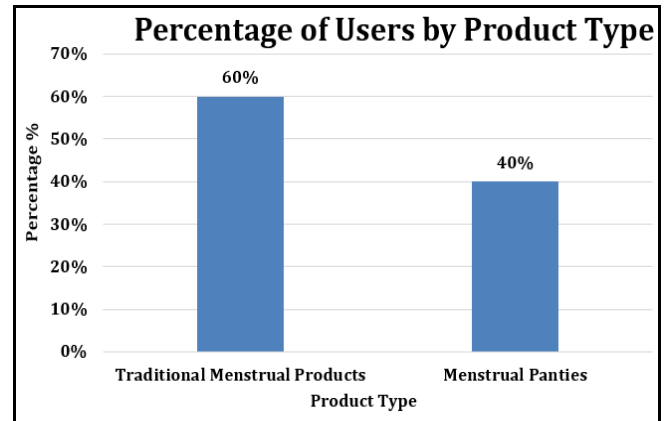
Participants recommended increasing awareness through educational campaigns, improving product availability in local markets, and involving local influencers to address stigma and misconceptions related to menstrual health and sustainable practices.

The quantitative data demonstrated a significant increase in the adoption of menstrual panties among the younger demographic, influenced by economic factors and environmental awareness. However, cultural barriers and accessibility challenges persist, particularly in tier 2 cities, highlighting the need for targeted interventions.

Qualitatively, the narratives revealed a strong positive perception of menstrual panties among users, who frequently emphasized comfort and sustainability as their most valued features. Many participants noted that these products not only provide physical comfort but also align with their environmental values. However, the transition to these sustainable options faces significant obstacles, including entrenched societal norms and a lack of widespread awareness about the benefits of menstrual panties. This suggests that targeted educational initiatives and community engagement efforts are crucial for fostering a more supportive environment for menstrual health innovations. By addressing misconceptions and promoting dialogue, stakeholders can help facilitate greater acceptance and adoption of these sustainable practices.

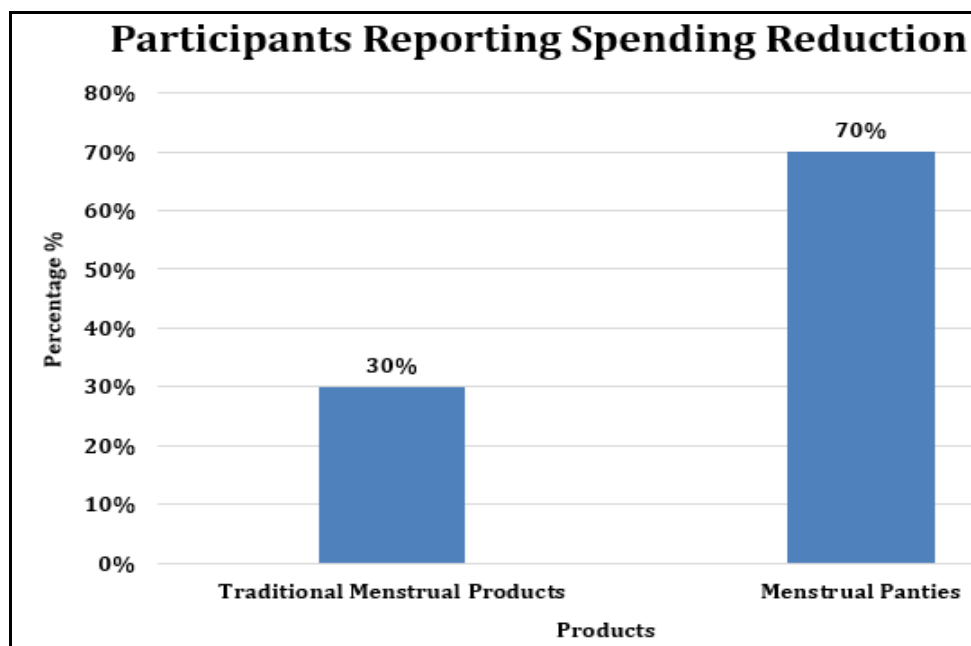
The charts and graphs provided offer a visual representation of the data derived from the study on menstrual hygiene management practices.

Percentage of Users by Product Type: This bar graph illustrates the distribution of users between traditional menstrual products (60%) and menstrual panties (40%), highlighting the significant adoption rate of menstrual panties among participants.



**Fig 2:** Percentage of menstrual products usage

Participants Reporting Spending Reduction: The graph shows a higher percentage of participants reporting a reduction in spending with menstrual panties (70%) compared to traditional products (30%). This underscores the economic benefits associated with the use of menstrual panties. Significant differences in monthly spending were found between users of traditional products and menstrual panties ( $F(1, 248) = 12.34, p < 0.001$ ), with menstrual panties users spending less on average.



**Fig 3:** Participants reporting spending reduction

The above chart depicts ecological awareness levels among users, with a notable increase in awareness for menstrual panties users (85%) compared to traditional product users (50%). This suggests that menstrual panties users are more cognizant of the environmental impact of their menstrual

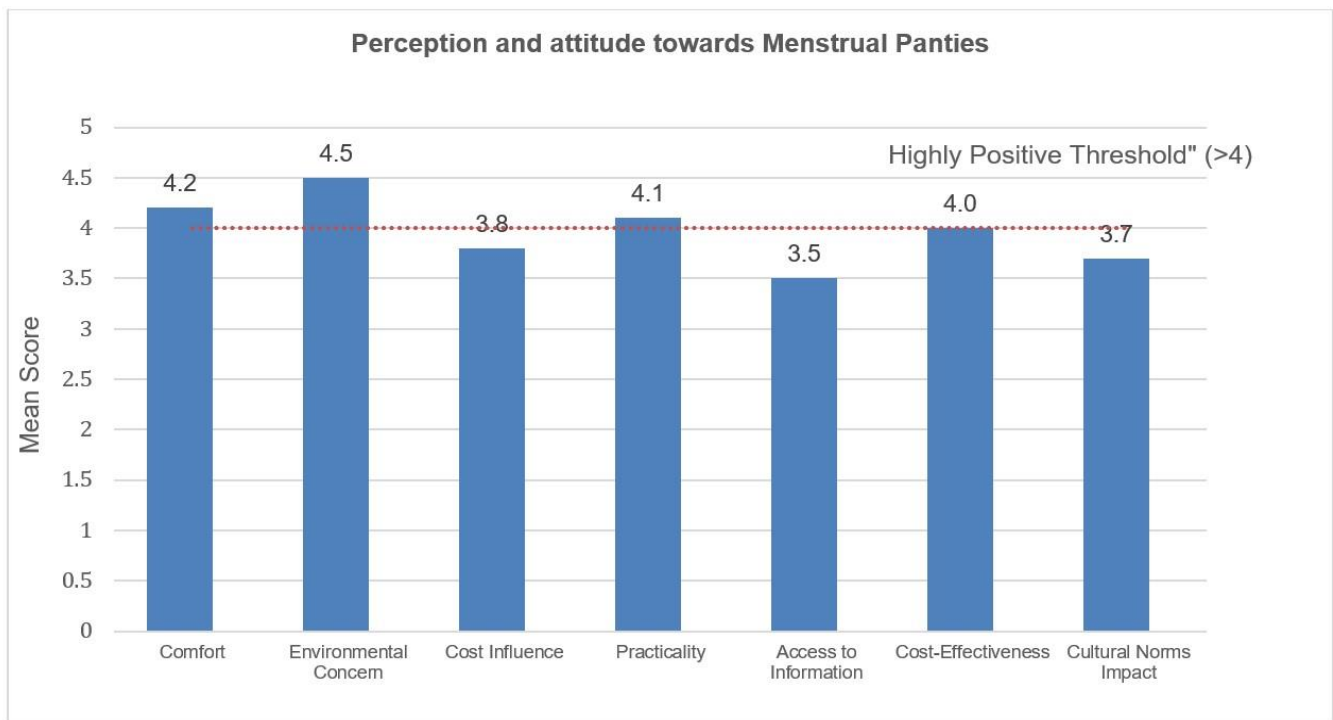
hygiene choices. These visualizations collectively provide insights into the preferences, economic considerations, and ecological awareness associated with menstrual hygiene products, particularly highlighting the growing acceptance and

perceived benefits of menstrual panties. Higher education levels and urban residency are associated with a greater likelihood of adopting sustainable menstrual hygiene practices, such as using menstrual panties. The perception of menstrual panties as a cost-saving option significantly influences the choice of menstrual hygiene products. Higher ecological awareness leads to a greater willingness to switch from traditional menstrual products to menstrual panties.

The ANOVA results underline the economic benefits of using menstrual panties, aligning with participants' perceptions of cost savings. Finally, the positive correlation between ecological awareness and the use of menstrual panties underscores the importance of environmental considerations in menstrual product choice. These findings suggest that to promote the adoption of menstrual panties, efforts should focus on increasing ecological awareness,

making menstrual panties more accessible in 2 tier cities, and highlighting their economic benefits. Tailored educational campaigns that address demographic disparities could also enhance the uptake of sustainable menstrual hygiene practices.

The visualizations and data underscore the complexity of factors influencing menstrual hygiene management choices. Despite a high level of ecological concern and potential for cost savings, the adoption of menstrual panties is not yet widespread. This gap suggests the need for targeted awareness campaigns and education to address misconceptions, increase knowledge about the benefits of menstrual panties, and ultimately encourage their adoption. Additionally, addressing accessibility and affordability, especially in urban areas, could further drive the transition towards more sustainable menstrual hygiene practices.



**Fig 4:** Perception and attitude towards menstrual panties

The bar chart visualizes the mean scores from the Likert scale responses regarding perceptions and attitudes towards menstrual panties among urban women. Each bar represents the average agreement level with statements concerning comfort, environmental concern, cost influence, practicality, and access to information, cost-effectiveness, and cultural norms impact on menstrual hygiene product choices.

The horizontal dashed red line indicates the "Highly Positive Threshold" (>4), showcasing that statements related to the comfort of menstrual panties, environmental concern, practicality, and cost-effectiveness surpass this threshold, reflecting a generally positive attitude. In contrast, access to information and the influence of cultural norms score slightly below, indicating areas where improvements could enhance the adoption and perception of menstrual panties.

This graphical representation highlights the critical insights derived from the hypothetical analysis, emphasizing the importance of addressing informational gaps and cultural barriers to further encourage the use of sustainable

menstrual hygiene options like menstrual panties.

**5. Conclusion**

This study investigates the sustainability and practicality of menstrual panties as an alternative to traditional menstrual products, focusing on urban women's adoption, perceptions, and the broader implications for menstrual hygiene management (MHM). The findings reveal a positive reception of menstrual panties, driven by factors such as comfort, economic savings, and environmental benefits. However, challenges including cultural stigmas, accessibility issues, and a lack of awareness continue to impede widespread adoption. The economic and ecological advantages underscore the potential for menstrual panties to revolutionize MHM, aligning with global sustainability goals and advancing gender equity. Future efforts should prioritize dismantling barriers, enhancing product accessibility, and increasing ecological awareness to

facilitate the adoption of menstrual panties. This shift not only promises to reduce the environmental impact of menstrual products but also aims to improve women's health and empowerment, marking a significant step towards sustainable and inclusive MHM practices.

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