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Feminine Hygiene Products Disposal and its Implications for Climate Change

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Abstract

The disposal of feminine hygiene products (FHPs) is a serious global concern, with particular urgency in developing countries, notably Pakistan. Municipal corporations face a serious challenge due to FHPs being part of unsorted domestic waste. Also, it is compounded by the absence of or poor implementation of Municipal Solid Waste (MSW) policies. This research aims to investigate the prevailing practices of FHP disposal among women and their awareness of its environmental implication(s) in Peshawar, Khyber Pakhtunkhwa (KP), and Pakistan. Qualitative research methodology was employed; a sample of ten educated working women was purposively selected for in-depth interviews. The conceptual framework of 'period poverty' was applied to analyze the experiential knowledge of women. The study concluded that women had a variety of disposal practices influenced by their religious and socio-cultural circumstances. However, environmental concern was given the least importance due to certain limitations. FHP users, as well as concerned authorities, need to collaborate to prevent land pollution and the resulting emission of greenhouse gases (GHGs) contributing to climate change.

Keywords: Feminine Hygiene Products (FHPs), FHP's Disposal, Environmental Implications, Working Women's Concerns, Climate Change.

Introduction



Conceptual Framework

The disposal of the FHP spouses is a significant concern both at the national and international levels. These products include cloth, sanitary napkins/pads, tissue paper, homemade pads, cotton wool, tampons, menstrual cups, and other such items used during menstruation. Preferences for these products also vary between developed and underdeveloped countries (Elledge et al., 2018; Sommer et al., 2013; Kuhlmann, 2017).

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In developed countries, the choice of these products mainly depends on the user's economic resources, comfort, availability, awareness, reliability, and biodegradability (Ahmed & Yesmin, 2008).

However, in least-developed countries, it is the religion, culture, and socioeconomic conditions that determine FHP use. Notten et al., highlighted in the United Nations Environment Program (2021) report that approximately 87% of menstrual products in Europe and over 80% of them in the USA are disposed of in landfills. The plastic components present in these products can take up to 500 years to decompose fully, posing a significant threat to the ecosystem. In Pakistan, governmental and non-governmental organizations such as UNICEF, WHO, and Water Aid have been working in different regions to break the silence regarding menstruation. This silence compounds the existing silence surrounding FHPs and their associated taboos, misconceptions, and stigmatization, amplifying major health risks to women.

According to the recent statistics of the Asian Development Bank (2022), Pakistan produces"30 million metric tons of municipal solid waste (MSW) per year" with a significant portion of it consisting of FHPs (p.1). An estimated 22 metric tons of carbon dioxide were released into the air in 2018, posing a serious policy challenge. In both rural and urban areas, the lack of proper waste collection results in the indiscriminate dumping of waste in open spaces, necessitating Pakistan's vigilance to prevent land and water source contamination, as well as the emission of greenhouse gases (GHGs), to reduce its carbon footprint.

Sustainable Development Goals (SDGs) have incorporated various dimensions of FHP, its disposal, and its correlation with other essential social sector issues. In this regard, SDG goal 3, good health and well-being, goal 4, quality education, ensuring Water Sanitation and Hygiene (WASH) facilities for girls, goal 5, gender equality, goal 6, clean water and sanitation, and goal 8, decent work and economic growth have integrated these concerns. Finally, goal 13, climate action, stresses the need to increase the capacity and involvement of women in climate change. The current research carries significance because of several reasons. Firstly, climate change is not solely caused by one factor; rather, multiple factors contribute to its existence, with land pollution being one of the major problems. Secondly, exploring the concept among educated Pashtun women provides insights into the socio-cultural challenges they face as working women in FHP disposal. Thirdly, the study assesses the extent to which their knowledge enables them to be aware of sustainable practices to protect the environment. The study also posits that educated women are better positioned to advocate for and negotiate with policymakers and manufacturers for the development of biodegradable and cost-effective FHPs, not only for themselves but also for underprivileged women, thereby enhancing overall sustainability.

Review of the Literature

The extensive literature available on FHP unpacks a variety of terminologies related to their environmental disposal. These encompass terms such as biodegradable, non-biodegradable, disposable, reusable, eco-friendly, sustainable, and so forth (Peter & Abhitha, 2021; Ghosh et al., 2020; Peberdy, et al., 2019; Elledge et al., 2018; Kaur et al., 2018). Biodegradable products use nature-based fibers that leave a minimal carbon footprint behind (Barman et al., 2017; Siddiqe, 2019). Conversely, non-biodegradable FHPs leave a lasting carbon footprint, as they do not fully decompose and emit harmful gases in landfills. The term disposable refers to a product that can be used only once; most disposable sanitary products are non-biodegradable and will remain in nature for decades to come (Barman et al., 2017).In contrast, reusable products have the peculiar characteristic of being used more than once. Although all biodegradable products are meant to be eco-friendly, unfortunately, not all of them fulfill this promise. However, sustainable product considerably reduces non-biodegradable components and utilizes bio-waste in its production, which makes it reusable and safe for the environment (Sundani et al., 2019; Natracare, 2018(b); Edraki, 2017; Weir, 2015; Always, n.d.).

The effective management of FHP disposal requires the involvement and responsibility of multiple stakeholders for instance FHP users, manufacturers, and policy makers of the country. Women in poor and underdeveloped countries commonly use cloth due to economic constraints (UNICEF, 2019; Kaur et al., 2018; Ahmed & Yesmin, 2008). Women in developed countries are completely dependent on industrial products. The social stigma associated with menstruation and FHPs, as noted by some critics, "...helped the disposable feminine hygiene industry thrive" (Spinks, 2015, p.1). The marketing strategies of companies tend to advertise more disposables than reusable to maximize profit (Peberdy, et al., 2019). The government can play a crucial role in curbing the negative impact of climate change through strict policies.

Additionally, sanitary napkins may contain chemicals and toxins that can result in genital rash, genital itching, regional body odor, discharge, and burning during urination (Peter & Abhitha, 2021). Deodorized sanitary products are also harmful to women’s health and hygiene (Kaur et al., 2018). Unfortunately, these companies take no responsibility for their environmental concerns and as the statistics, 80–90% of the clogging of pipes is because of menstrual waste and the liquid absorption characteristics of the cotton used in them (GIZ Sanitation for Millions, 2020; Tiwary, 2018; Beksinska et al., 2015; Sommer et al., 2013). A preliminary study conducted by Woo et al. (2019), quoted a national survey on disposable sanitary pads, highlighting that each nation had its standards for sanitary napkins. They are classified as quasi-drugs in South Korea and Japan, whereas in the US and Europe, they are taken as industrial products and medical supplies.

Ashley et al. (2005), showcase that the sustainability of waste management can be assessed through three components: cost, people's behavior, and environmental impact. The connection between women's awareness of producing less waste and efficiently managing the overall waste produced needs to be established (Tudu, 2020). "Menstrual waste is becoming an increasing biohazard in our environment" and the only sustainable solution is biodegradable sanitary napkins (Ghosh et al., 2020, p.125). The non-biodegradable content of sanitary napkins, especially disposables, has inundated landfills, which takes 500–800 years to decompose (Peter & Abhitha, 2021; Peberdy et al., 2019; Elledge et al., 2018; Shah, 2017). Burning FHP emits harmful gasses like carbon monoxide, adversely impacting both health as well as the environment, and contributing significantly to climate change (Nagy & Kuti, 2016).

In Pakistan, the disposal of FHPs is addressed within the broader context of WASH, often overlooking women's need for personal hygiene care products (Cooper, 2018). However, the inclusion of Menstrual Hygiene Management (MHM) in WASH programs reflects recognition that menstrual hygiene is not just a taboo topic but a gender issue deserving attention. In KP, strict cultural norms, internal displacements due to security, and natural disasters posed sanitation and hygiene challenges (Ahmad et al., 2015). Despite cultural norms, efforts were made to provide sanitation kits and information about improved hygiene and sanitation to women in need (Ahmad & Yasmin, 2008). In this scenario, considering environmental concerns is critical because tons of waste is produced, which accumulates in landfills for an indefinite period and is likely to emit greenhouse gases (GHGs), exacerbating climate change.

Research Methodology

A qualitative research methodology was used to conduct this study and data was collected from ten educated working women aged between 35 and 55. All of them were settled in urban areas and represented diverse rural geographies of KP, such as Charsadda, Karak, Kohat, Chitral, and Swabi. The participants were by profession, doctors, teachers, lawyers, government officers, and NGO workers. This research investigates how educated women decide on the selection and disposal of FHPs and what is their level of awareness regarding the environmental impact of these practices in Khyber Pakhtunkhwa, Pakistan. All the participants were purposefully selected, and to gather diverse opinions, participants were further categorized into segregated and mixed-gender work environments. The empirical data was gathered through an in-depth interview method, which was analyzed thematically using a conceptual framework of 'period poverty'. This term refers to the issues surrounding menstruation, including inadequate access to menstrual products, lack of information and proper facilities about menstruation, stigma, and shame associated with it. The interviews were conducted in March and April 2023. The semi-structured interview guide was used to collect data and

purposive and snowball sampling techniques of the non-probability method were used to approach the sample as respondents belong to diverse professional fields (Creswell, 2013). The themes were derived from slight indications perceived during the interview guide and later on preliminary and second-stage analysis was used to analyze how major arguments and discussions come up. Anonymity and confidentiality are maintained throughout the research, because many respondents shared information with an assurance that their names would not be shared at any form.

Research Findings and Discussion

The empirical research data is thematically organized into broad themes to facilitate a better understanding of the various aspects presented as follows.

a) Cultural barrier about menstruation and women's choice of FHP

The study results indicate that in the past, discussing menstruation among women was often considered taboo, hindering its normalization as a natural aspect of women's biology. The relationship between mothers and daughters was characterized by a significant degree of formality and reservation. Neither the mother nor the daughter attempted to break this barrier of formality, as the societal notions of shame discourage such actions. Most of the research participants shared that at the onset of menarche, they tried to hide it from their mothers because of the fear of their negative reaction and punishment.

> *"In the past, people used to have large families, which are why mothers were always busy doing household chores. However, the lack of communication, I had with my mother, left me feeling depressed in the few years after menarche"*

Most of the participants narrated their experiences that despite their reticent culture, the instructions given were predominantly labeled as "moral." It was strongly observed that every participant took a deep sigh followed by at least one of these statements: "Oh! I was extremely scared of my mother "," nervous and depressed, and "I didn't know what to do with my body". A few participants also discussed that the given instructions made them feel guiltier, fearful, and anxious about their bodies. According to Tiwary (2018), "menstruation as a topic is hidden deep inside the cabinet of culture and beliefs: out of sight and unmentioned" (p. 377).

> *"The feeling of shame was so intense that all of a sudden I was "napak" (unclean, dirty) and not allowed to pray and touch the Quran, which was overemphasized otherwise".*

On the contrary, a few participants also highlighted that:

> *"I was so scared to let people know about it; many times, I faked prayers and remained hungry during the month of Ramadan (fasting) just because of the fear inculcated in me"*

The hushed-down approach to menstruation with the overstressed notion of "hayadaar" (ideal morality) deeply troubled women. Spinks (2015) asserts that the lack of open conversation about periods makes it difficult for people to strategize about sustainable solutions to protect the environment. It was also found that not only the discussion inside the house was hushed, but at an institutional level it was also secretively handled.

> *"During my early years in the hostel, I vividly recall that the school used to include the cost of FHPs under the label of 'medicines' in my fee bill. My father was quite alarmed upon seeing the bill and wondered what might be wrong with me. My mother later explained the situation".*

The data identified that the majority of the participants had no choice of FHP selection because of the economy and lack of information and communication. Except for one, all of them used cloth or cotton wrapped in cloth. Menstruation was like a woman's dirty secret which made its disposal difficult in many ways.

b) Women practices of FHP's disposal: A social construct

The research data reflected that instruction about FHP's disposal was based on cultural perceptions. However, their current practices have changed considerably compared to their early years due to changes in geographical location, exposure, economic stability, and work requirements. The body language of all the participants was tense while discussing menstruation retrospectively, for them it was overwhelmed with embarrassing memories and experiences.

> *"Every girl in my village used clothes and reused them many times. I don't feel like recalling it because hiding clothes was an extremely stressful thing to do, fear of it being seen kept me under immense anxiety. Burying the cloth was the common way of disposing of which used to be nerve-wracking"*

Using cloth as an FHP is a common practice, particularly in the rural areas of underdeveloped countries including Pakistan. The Pashtun cultural restrictions and religiosity in the province of KPK further exacerbate the FHP disposal for women.

> *"I used to burn it in my backyard after hiding it under a pile of dry leaves. Often my hands got burnt and a few times my eyebrows and front hair were all gone because of the high flame. I don't do it anymore, I just throw it"*

A participant who lived in a hostel narrated that:

> *"We had separate cubicles (toilets) for menstruating girls to throw waste in specific bins, but we were extremely embraced to use them even in girls only environment"*

A participant coordinating twelve girls' schools in different districts discussed a serious problem faced at the institutional level about FHP's disposal

> *"Every day we face the problem of blockage of the sewage system in schools due to menstrual waste, and sanitary workers complain time and again about it. I have given instructions to students and staff many times "Urging them not to flush, but all in vain. Principals do not support my idea of sending a letter to parents about it because they consider it culturally inappropriate. This ongoing problem has reminded me [of the need] for a sustainable solution to FHP disposal"*

According to Peter and Abhitha (2021), women have many ways to dispose of menstrual waste, for instance, by burning, burying, washing to reuse, flushing it in the toilet, throwing it in a dustbin, and discarding it into rivers. However, most of the participants had an early experience of using cloth pads because of the unavailability and un-affordability of industrial sanitary napkins. With time, women's choice of FHP changed from reusable to disposable drastically because of various reasons. A few shared that they moved to hostels from their villages for studies or jobs, it was really hard to maintain reusable, so they switched to disposables. Others said that in the past they could not afford to buy sanitary napkins, but affordability is no longer an issue. Most importantly, all of them agreed that convenience is the most important factor due to which they have reusable to disposable.

c) Determinants of FHP disposal practices

Religious and cultural discourses played a pivotal role in shaping the ideology governing the disposal practices of FHPs. The discourse of religion is strictly associated with the notion of "*gunnah*" (sin) which establishes submission, and thus cannot be altered. A participant explained that in my childhood, we were told that:

> *"God sends his wrath on those women who do not take care of their FHP"*

Similarly, a participant recalled her mother's statement to pour water into the soil after washing menstrual cloth, so that it would be absorbed. This practice was believed to prevent *Jinn* from seeing it, as it was thought that its exposure would lead to women's infertility. The same concept is also mentioned by Roxburgh et al., (2020) in their research conducted in Malawi explaining that due to the fear of *ufiti* (witchcraft), women

choose to burn or dispose of it discreetly, fearing a myth that links open exposure to infertility. Different ways of disposing of FHPs depend upon the cultural and religious narratives present in the area. Myths and fears, including concerns about black magic, have led women to adopt environmentally harmful practices due to anxiety (Umeora & Egwuatu, 2008; Golub, 1992; Stepanich, 1992). However; it was evident through findings that none of the research participants were aware of the authentic (reference-based) Islamic teaching related to FHP disposal.

The discourse of culture considers menstruation a taboo topic that creates challenges for women irrespective of their educational or geographical background. However, the social determinants that were once applicable have undergone significant changes due to evolving circumstances in both rural and urban areas. The previous practice narrated by the participants characterized by silence and fear surrounding women's biology has transitioned into a phase of normalization. Research findings highlighted that families particularly mothers as well as schools are comparatively sensitive towards minimizing potential embarrassment.

> *"The present generation is living in the age of the internet where information is readily available. Also, many companies are manufacturing sanitary napkins and are advertising them with different brand names and ensuring their widespread availability"*

Kent and Allen (1994) stated that familiarity is a key feature when a range of products is available, influencing people to opt for a brand and remain loyal to it. However, a contrasting opinion challenged the above-mentioned opinion, suggesting that despite the widespread availability of commercial items, a sense of shame and stigma continue to be associated with it.

> *"Indeed, FHPs are now available everywhere, but the brown paper conspiracy has always annoyed and discouraged me. In every grocery or drug store, you are required to conceal FHP in a brown paper bag; they are scanned at the counter while still inside the bag. This always made me feel like buying an illegal drug!"*

The combination of accessibility and awareness through advertisements has facilitated conversations, discussions, and awareness about these products. Weir (2015) discusses how media advertising being a powerful tool, disseminates information and helps women in making decisions. However, these advertisers tend to promote disposable products more than reusable ones which have a direct impact on the environment.

d) Working Women's concerns and Environmental implications of FHP disposal

All of the working women considered menstruation as a natural bodily function, but they were also mindful of the socially constructed beliefs surrounding menstruation. They unanimously agreed that they use sanitary napkins for numerous key reasons such as the product's reliability, convenience, easy maintenance, and disposability. The FHP's selection of working women also depends upon their workplace requirements, where they have to spend prolonged hours. The absence of basic facilities at the workplace has also influenced FHP's disposal practices. The majority of working women revealed that their office lacked separate toilets for women, and if one was available, it lacked disposal waste bins. As a consequence, many participants admitted that they properly wrapped their used FHP and placed them inside their bags to dispose of them at home.

> *"I have to spend the whole day in a hospital, wearing a white lab coat. I know it is women's biology, but in a male-dominated environment, it is about my respect too".*

A university professor said that:

> *"Being part of a conservative society, I was watchful of the color of my dress; I usually wore darker colors even in the summer to avoid any embarrassing situation".*

A professor working in a girl's college stated that:

> *"We have waste bins everywhere and female sanitary staff cleans it. This is not proper disposal that someone takes it and throws it in the dumpster. I wonder why the college administration never thought about any sustainable disposal of FHP"*

The majority of the participants candidly shared that they had never thought about menstrual waste from an environmental perspective. Throughout their lives, their primary concern every month had been "to get rid of the dirt before someone could notice it". According to Borowski (2011) and Weir (2015), the existing literature does not support any connection between women choosing or discontinuing a product because of its environmental implications.

> *"Until 2010, I merely thought of menstrual waste as apparent dirt instead of a serious pollutant that could affect the local flora and fauna. Considering the advancement in technology, I still wonder why pads are not designed to be flushed"*

According to the UNEP (2021) report, "disposable menstrual products can contain up to 90% plastic, which largely ends up in landfills". In India, biodegradable sanitary napkins using banana fiber have been successful, and contain no plastic, ensuring easy decomposition. Besides, bamboo, water hyacinth, cotton, and jute fiber pads are also currently in production as a long-lasting sustainable solution (Ghosh, et al., 2020, Kaur et al., 2017). The ingredients used in regular commercial FHPs cause serious health issues among women, and their non-decomposition makes them an environmental hazard (Tudu, 2020).

> *"I have never heard of or seen incinerators in my 5-year Ph.D. stay in the US, and in a country like Pakistan, it is a creative luxury. I always remember throwing it in the dustbin, rest I have never bothered to know where the sweeper threw it and what happened to it further"*

A female doctor who had spent time in Saudi Arabia shared that:

> *"In almost every public toilet, a rectangular box was built in the wall (a very aesthetic one), which made me think that it was an incinerator, but it turned out to be a fancy menstrual waste bin"*

The use of incinerators can help solve environmental concerns, and reduce the burden on solid waste management along with women's problem of FHP disposal (Elawati, 2012; Pillitteri, 2011; Kjellen, 2011). Research claims that every decent workplace should meet the essential requirements to address the concerns of period poverty otherwise; it will negatively affect women's economic empowerment (Tull, 2019). All of the participants acknowledge the need, as educated women, to consider shifting to a better eco-friendly version of FHPs. However, they expressed apprehensions about its reliability and efficiency. An NGO worker said:

> *"The only eco-friendly alternative is to use a cloth pad; however, I am sorry I cannot use it. Due to prolonged traveling, it is neither reliable nor comfortable for me. We have no policy of waste segregation in our country, Water and Sanitation Services Peshawar (WSSP) is responsible for it. As a user, I am unable to play a role in it".*

According to Hawkins et al. (2018), working women mostly wrap and throw without guilt or remorse. A participant mentioned using a menstrual cup not because it was environmentally friendly, but simply because it was a new product and she wanted to try it. Peter and Abhitha (2021) discuss in their research that menstrual cups are made up of medical-grade silicone rubbers. These cups can be worn for up to 6-10 hours, require less water for washing compared to any other reusable product, and most importantly, they can be used for 10 years (Beksinska, et al., 2015). A female lawyer shared her inability to switch her practice.

> *"In a patriarchal society like ours; you cannot be conscious of the environment when your dignity is at stake. How can I make my FHP choice eco-friendly when neither disposable pads nor waste disposal systems are efficient or under my control? The availability of biodegradable should be a priority to protect the environment, but in its absence, educated women should not be blamed".*

The onus for environmental sensitization and awareness should not be the responsibility of women only; instead, companies producing sanitary napkins should be held equally accountable for prioritizing disposable over reusable for profit maximization (Peberdy et al., 2019; Shrivastava, 1995).

Discussion

The current study is an attempt to initiate an academic discussion about the need and importance of biodegradable materials in protecting our environment and mitigating climate change. The governance concerning solid waste management policies needs to have women's perspectives so that stigmatization about FHPs can be minimized and a sustainable policy measure can be implemented. A better policy recommendation is not plausible if issues are being hushed down and labeled as culturally inapproachable. It is evident that affordability is a crucial element in acquiring these industrial products, but convenience drives their widespread use. The conceptual understanding of period poverty is used to emphasize that women, due to poverty, face difficulty in accessing FHPs, and associated sanitation needs, leading to a serious impact on their social well-being. The current research takes this definition further and argues that period poverty is not just about the economy, but also includes a lack of information and awareness, particularly regarding sustainable disposal in the absence of biodegradable products. In the provincial capital of KP, menstrual waste is treated as part of unsorted domestic waste, along with glass, plastic, paper, and tin. Water and Sanitation Services Peshawar (WSSP) is responsible for waste collection, but there is a serious need for attention to waste segregation and sorting to combat irreparable damage to the environment.

All the participants unanimously agreed that they dispose of FHP in waste bins, without any environmental concerns. When this domestic waste is thrown into nearby dumpsters (a common practice in Pakistan)it becomes accessible to animals, birds, and scavengers, often children, who tear open bags and start collecting items (first stage sorting) such as tin, paper, cardboard, that can be sold at the recycling shops. As a consequence, sanitary napkins are left exposed near the dumpsters along with other waste material. Some individuals consider this situation religiously inappropriate, and others find it socially embarrassing, but nobody cares about is environment. However, only a few individuals considered its environmental implications and demanded better disposal facilities.

The findings revealed that working women neither adhere strictly to conventional approaches, Islamic teachings, nor cultural restrictions in their waste disposal practices. The overall waste disposal mechanism requires reforms, but unfortunately, the government's lack of seriousness in managing solid waste is contributing to climate change. Consequently, holding educated women responsible for the inappropriate and environmentally damaging) disposal of FHP would not be justified because they lack alternative disposal means. Their sensitivity towards effective disposal would only entail changing their use of FHP, which, according to the literature, includes the use of menstrual cups. Importantly, the assumption that educated women will take on more environmental responsibility is only possible when the system is in place and tailored to the needs of the women. The relationship between FHP disposal and soil pollution may appear distant and contradictory, but its interconnectedness cannot be disputed or overlooked. Manufacturing and marketing companies prioritize absorption over biodegradability in FHPs, with none claiming to offer a biodegradable option, even in advertisements. Furthermore, the packaging does not provide any information about the raw material used or suitable methods of disposal. The experiential knowledge of women leads to the conclusion that until our society minimizes social and religious stigmatization related to menstruation, it will be difficult to discuss its sustainable disposal.

Conclusion

The study findings conclude that FHP's selection and disposal are social constructs that have gone through various transitional phases. This transition depends on the economy, education level, exposure, and accessibility of the products. The educated women, instead of viewing menstruation as a burden of religious and cultural instructions, have started perceiving it as a natural part of women's anatomy, moving from a narrative of morality to rationality. Additionally, women’s economic stability and fewer constraints on mobility have provided them access to improved hygiene products. The selected sample of working-educated women can contribute instrumentally in giving policy inputs beyond cultural stigmatization to solve the problem sustainably. The current study suggests that governmental institutions should implement strict policy guidelines for manufacturers of FHPs to produce biodegradable and economical products. This step is essential for promoting better hygiene and sustainability, addressing the urgent need of the hour. Viewing solid waste solely as a matter of cleanliness represents a narrow perspective that should be replaced with a focus on the broader discourse of climate change. Women should be encouraged and made aware of the use of eco-friendly FHPs such as menstrual cups, due to their reusable nature as opposed to disposable options (Kjellén et al., 2012). By adopting these eco-friendly practices, land pollution can be minimized, paving the way for mitigating climate change by reducing the carbon footprint. The lack of support and awareness regarding environmental protection, particularly concerning solid waste management, exacerbates climate issues rather than mitigating them.

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