

Empowering Women's Health and Sustainability Through Eco Hygiene Products

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ABSTRACT: The history of disposable menstrual pads, while relatively short, has become prevalent among women due to their convenience. However, upon closer examination of their composition, disposable pads are non-biodegradable and often contain numerous chemicals, posing potential threats to women's health. As a result, there has been a growing interest in eco-friendly menstrual products from both environmental and women's health perspectives. This paper explores research and initiatives related to eco-friendly menstrual products, aiming to contribute to the development and acceptance of sustainable alternatives.

I. INTRODUCTION

Disposable menstrual pads have become an integral part of modern women's lives, providing comfort and ease during menstruation. However, beneath their convenience lies a concerning reality. These pads, primarily made from non-biodegradable materials, contribute significantly to environmental pollution. Moreover, many disposable pads contain a myriad of chemicals that have raised questions about their potential impact on women's health.

In recent years, there has been a growing interest in eco-friendly alternatives to traditional disposable pads from both an environmental protection standpoint and a focus on women's health. Researchers have begun exploring sustainable materials and manufacturing processes for producing eco-friendly menstrual pads that minimize harm to both the environment and female users.

This paper aims to delve into existing research on eco-friendly menstrual pads while also exploring potential avenues for developing sustainable alternatives. By examining the history, challenges, and innovations in this field, we seek to contribute to a broader understanding of the eco-friendly menstrual product landscape and its implications for a more sustainable and health-conscious future.

This paper aims to delve into existing research on eco-friendly menstrual pads while also exploring potential avenues for developing sustainable alternatives. By examining the environmental implications associated with traditional disposable pads and considering the potential risks posed by chemical ingredients used in these products, we can better understand the importance of pursuing eco-friendly options for feminine hygiene care.

Through this study, we hope to contribute to ongoing efforts aimed at promoting sustainable practices in menstruation management while prioritizing women's health needs. By highlighting advancements in eco-friendly pad production techniques or alternative solutions altogether, we aim to encourage further exploration into this vital area where environmental conservation intersects with female well-being.

1. The History of Disposable Menstrual Pads:

Menstrual products have long been essential to women's lives, but the history of these everyday items is a story of evolution and innovation. In 17th-century Europe, menstruation was considered taboo, leading women to craft homemade remedies like menstrual pads using natural materials such as cotton fibers, waste, oil silk, wood, wool wadding, and linen (Cummings).

By the late 19th century, however, doctors grew concerned about the practice of women bleeding into their clothes for multiple days due to potential infections and unsanitary conditions. To address this issue, the Hoosier Sanitary Belt was created. This product consisted of cellucotton bandages held together by a belt, but it failed due to its overly explicit advertising and high cost (Cummings). Consequently, many women preferred their traditional homemade remedies.

In the late 19th century, an alternative to washable napkins emerged—the sea sponge. This sponge, similar to a tampon, could be inserted into the vaginal cavity for menstrual blood absorption, offering better cleanliness and reusability after boiling it in hot water for a few minutes. For centuries, women worldwide have been accustomed to uncomfortable homemade methods for managing their menstrual health.

However, in 1888, disposable menstrual pads became commercially available, inspired by nurses who used wood pulp bandages to manage excessive bleeding during World War I (Sabrina). These pads consisted of a cotton wool rectangle with an absorbent liner and an adhesive strip at the bottom, offering innovation compared to traditional methods. Despite the undeniable health benefits and convenience of disposable pads, there were concerns about their cost and accessibility.

In the late 19th century, various inventors and companies began exploring ways to improve women's sanitary products. In 1888, Dr. Joseph Sampson Duncan patented a "sanitary napkin" made from cotton wool enclosed in gauze. However, these early attempts at disposable pads were not widely available or commercially successful.

It was not until the 1920s that disposable menstrual pads gained popularity with the introduction of Kotex by Kimberly-Clark Corporation. Kotex was initially marketed as a bandage for wounded soldiers during World War I but was later rebranded as a feminine hygiene product. These early disposable pads consisted of wood pulp held together with a gauze wrapper and secured with safety pins.

Innovations in technology and materials continued to shape the development of disposable menstrual pads over time. In the 1960s, adhesive strips were introduced, eliminating the need for safety pins and providing more secure attachment options. This made them easier to use and more comfortable for women.

Throughout the latter half of the 20th century and into the present day, advancements in absorbent materials and manufacturing processes have led to thinner, more porous, and discreet designs for disposable menstrual pads. These improvements have aimed to enhance comfort while ensuring effective protection against leaks.

Additionally, environmental concerns surrounding single-use products have prompted efforts towards developing eco-friendly alternatives such as biodegradable or reusable cloth pads that aim to reduce waste generated by traditional disposable options.

Overall, the history of disposable menstrual pads reflects an ongoing pursuit of convenient and effective solutions that cater to women's needs during menstruation. From humble beginnings as homemade cloth alternatives to today's highly engineered products, these innovations have played a significant role in improving comfort and convenience for individuals experiencing menstruation worldwide.

II. DUAL FACES OF DISPOSABLE MENSTRUAL PADS

2a. Impact on Women's Health

Disposable menstrual pads have become a popular choice for their accessibility and convenience. However, concerns have been raised regarding the potential health effects associated with these products. One of the main issues is the lack of transparency and information provided about the ingredients used in menstrual pads. Unlike other consumer items, menstrual products are classified as medical devices by the Food and Drug Administration (FDA), which means that companies producing them are not subject to the same regulations and guidelines (Zurek). While the FDA recommends disclosing the full material composition of these products, there are no strict requirements in place. This gives manufacturers the freedom to disclose ingredients on their terms.

Most commonly used menstrual pads are made with absorbent materials such as cotton or rayon. However, even natural ingredients like conventional cotton can carry unwanted toxins. Conventional cotton is often grown alongside pesticides and undergoes bleaching processes to achieve a pristine white appearance (Ziff). Bleached materials can be found throughout the pad, including its top and bottom layers as well as the absorbent core, all in pursuit of a pure white finish.

Superabsorbent Polymers (SAPs) are another component used in menstrual pads. These polymers have high liquid-absorbing capabilities but often contain sodium polyacrylate, a nonbiodegradable synthetic material that may be tainted with acrylic acids. SAPs are typically located in the core of the pad beneath the top layer and before the bottom layer.

Fragrances are also commonly added to menstrual products to mask natural odors. However, many companies do not disclose these fragrances on their ingredient lists. These undisclosed fragrances can be positioned closer to skin contact, just after the top layer and above SAPs. Furthermore, due to limited disclosure requirements for all components used in manufacturing pads and tampons, companies may add chemicals and toxins during mass production (Ziff). This lack of transparency puts users at risk of exposure to potentially harmful substances without their knowledge.

Research has also shown that per- and poly-fluoroalkyl substances (PFAs), known as "forever chemicals," can be found in linings of period products (Amenabar). PFAs are pervasive compounds associated with various health-related problems.

These findings highlight potential risks associated with disposable menstrual pads and raise concerns about user safety. It is crucial for individuals using these products to be aware of potential health effects linked to undisclosed ingredients or harmful substances present within them.

The presence of chemicals and toxins in menstrual products can have various adverse effects on users' health, and it's essential to understand these potential risks. The listed substances, such as PFAs, can have a range of negative impacts on users' health. These can include infertility or decreased fertility, elevated blood pressure in pregnant women, hormone disruption, increased cholesterol levels, reduced vaccine effectiveness, and compromised immune system function.

As mentioned earlier, the bleaching process used in manufacturing pads can also pose health risks. This process generates a pollutant called dioxin, which has been linked to conditions such as pelvic inflammatory disease, endometriosis, and cancer within the human body (Uniyal). Exposure to bleach can cause skin irritation upon contact but can lead to more severe consequences when it enters the body. It may damage the gastrointestinal tract and potentially result in life-threatening outcomes.

The lack of full disclosure regarding product composition increases the risk of unintentionally using a product that one may be allergic to. This can result in adverse reactions like burning sensations, itching, and chafing without knowing the exact cause (Uniyal). Allergies and skin conditions vary from person to person and react differently to different materials used. Without complete knowledge of product ingredients or potential allergens present within them, consumers cannot guarantee safe usage.

Moreover, since menstrual products are designed to absorb menstrual blood near or inside the vaginal area—a highly vascularized region—they come into direct contact with skin and bodily fluids. This allows for easy absorption of harmful substances into one's body. Undisclosed fragrances commonly used in these products may contain benzyl alcohol—an ingredient often found in perfumes—which has been associated with allergic contact dermatitis (an inflammatory skin condition) as well as central nervous system depression leading to convulsions, paralysis respiratory failure (Corcoran & Ray). Benzyl alcohol has also been linked to preterm infant deaths.

Additionally, some substances found in menstrual products have been connected with serious medical conditions including cancer. Certain types of PFAs have a lifespan of about four to five years within the body—providing enough time for long-term health issues to develop according to research conducted by the U.S Centers for Disease Control and Prevention (Kluger).

In their pursuit of creating more effective and convenient products by incorporating unhealthy substances into their formulations, companies inadvertently put users' health at risk by introducing artificial components that can have detrimental effects on their well-being.



Figure 1, (Product Breakdown)

2b. Impact on the Global Environment

Disposable menstrual pads have undoubtedly become a staple in women's lives, but the environmental consequences of their widespread use are often overlooked. In the United States alone, sales of menstrual pads have reached approximately \$2.8 billion (Department of Epidemiology and Biostatistics). Disposable pads are favored for their comfort, cleanliness, and affordability compared to other options (TruEarth). However, the mass production of these pads has resulted in significant environmental waste.

The majority of disposable pads are made from plastic materials, with approximately 90% of a single pad consisting of plastic components (Aisle). The top layer typically consists of plastic woven sheets, while the absorbent layer contains polyacrylate gels (also made from plastic). The back layer is composed of a plastic covering, and even the wrappers and packaging contribute to this reliance on plastic. Unfortunately, plastics are not truly biodegradable and can take anywhere from 500 to 800 years to break down (TruEarth). Furthermore, the production process for disposable pads requires substantial amounts of energy, water, and other resources. It is estimated that during her lifetime usage alone, a single woman generates around 28,000 pounds of waste from disposable pads (TruEarth). This staggering amount further emphasizes the environmental impact caused by these products.

Plastic pollution poses significant threats to various ecosystems such as oceans, soil, forests, and landfills. The harmful effects extend beyond our immediate surroundings; they endanger countless organisms that rely on these environments for survival. It may be difficult to fathom that a disposable pad discarded into your trash can harm organisms thriving miles away in distant oceans. However hard it may be to imagine this reality exists.

In conclusion, while disposable menstrual pads offer undeniable convenience and comfort, it's imperative that we acknowledge and address their adverse environmental effects. The extensive use of non-biodegradable plastic components and the resource-intensive production process has made these products a significant contributor to environmental pollution and degradation. Exploring alternative options or adopting more sustainable practices can help mitigate this harm and preserve our planet's delicate ecosystems for future generations.

FEMALE SANITARY PRODUCTS

FEATURES	REUSABLE PAD 	DISPOSABLE PAD 	TAMPON 	MENSTRUAL CUP 
Reusable	✓	✗	✗	✓
Wear Time	3-6 HOURS	3-6 HOURS	UP TO 8 HOURS	6-12 HOURS
Health Risks (for user + environment)	!	!!!	!!	!!
Amount needed for a single cycle	2-5	10-20	10-20	1
Learning Costs	MEDIUM	LOW	HIGH	HIGH
Estimated cost of products for a year	\$5	\$30-100	\$60-90	\$1-8

Figure 2, (Comparison Chart)

III. Ecopads (DIY) Menstrual Pads - Based on cloth menstrual pads

3a. Pros and cons

With increasing awareness of the damages caused by single-use disposable menstrual pads came the rise of reusable cloth pads. Although these were designed for a better, healthier alternative there are both pros and cons. To begin with the pros, cloth pads are without a doubt an eco-friendly alternative; they provide less waste

and are produced in a more environmentally friendly manner. Unlike disposable pads which are packaged, wrapped, and made with materials such as plastic which is as mentioned before not biodegradable, cloth pads serve multiple uses which cut down on waste produced after each use and purchase. Not only are they eco-friendlier, but they are also friendlier for the human body. As disposable pads are often mixed with toxins to enhance their appearance and performance, cloth pads have less room for chemicals to enter. Since they are most commonly made from natural fibers and raw materials they provide no harm to the body, unless allergic to them, this is an advantage over disposable pads. They are comfortable and budget-friendly as well. Although the initial few purchases might feel pricey, one cloth pad goes a long way. If used correctly it can be used for over a year, unlike disposable pads that last about 6 hours. However, there are downsides. On one hand, disposable pads are more convenient as you throw them away after one use. On the other hand, in order to correctly use cloth pads you have to wash them after each use and care for them to keep them sanitary and safe (Avni). You also need to make your own Eco-Pad, which can be a struggle. Although the process is mostly sewing and cutting, some people do not enjoy crafts and prefer to buy what is already made. However, by building your own you have an idea of what exactly is going in it, an advantage you don't have when purchasing disposable pads. This might be time and energy-consuming in comparison to single-use pads. However, this doesn't mean you should skip over washing and caring for your cloth pad as unclean cloth pad usage can cause health issues. So although they are better for the environment, they are only better for the human body as well if used correctly with the right care. This causes cloth pads to have both pros and cons.

3b. Methods of production

How to make a reusable pad

Parts

- a. Outer layer
- b. Inner layer
- c. Cotton flannel (core)
- d. Snap button

Materials needed

1. Sewing machine or needles
2. Fabric scissors
3. Sewing pins
4. Pencils
5. Thread

Directions

1. Place the core cotton flannel on the center of the back side of the inner layer.
2. Pin down the core cotton flannel with sewing pins (one across the top, the middle, and one across the bottom as well).
3. Sew alongside the core's perimeter leaving about 5mm from the edge.
4. Lay the outer side of both the inner and outer layer and pin it down so it lines up with each other.
5. Sew alongside the perimeter about 5mm from the edge of the two layers leaving an opening to flip it inside out.
6. Trim the excess fabric on the perimeter if needed.
7. Flip it inside out.
8. Press and straighten out with iron.
9. Sew the opening shut.
10. Add snap buttons on the end of each wing.

How to wash

1. Until the blood is no longer visible, run under cold flowing water.
2. In a bowl (which can be a sink), fill it with enough cold water to submerge the pad.
3. Add a pump of detergent into the water and leave it for about 6-8 hours.
4. After this, you can either rinse with your hands under cold water or place it in a washing machine.
5. Do not put it in a dryer, but place it somewhere with sufficient sunlight to dry.
6. After a few hours stretch the drying pad to prevent wrinkles and shrinkage.

IV. Education through Eco Pads

4a. Eco-friendly menstrual pad education (targeting adults, libraries etc)

When a woman begins menstruating, she will require approximately 12,000 menstrual pads throughout her lifetime, covering around 3,000 days of menstruation over roughly 40 years. Conventional disposable pads, which can take over 100 years to decompose, pose significant environmental concerns when disposed of improperly.

Upon examining the composition of menstrual pads, it has been found that the majority of them contain a substance called "polymeric absorbent material." This substance has the capability to absorb hundreds of times its own volume in water and comes into contact with the skin. During menstruation, there is a high likelihood that these chemical substances can come into contact with the uterus or the vaginal interior, potentially leading to menstrual discomfort and other health issues. The increased humidity and temperature in the female reproductive area during menstruation create an environment conducive to bacterial growth. Disposable pads, which lack proper ventilation, can cause skin irritation. This irritation can escalate into conditions such as vaginitis, itching, and unpleasant odors.

Using cotton menstrual pads can provide protection for the uterus against potential risks associated with disposable pads. Many individuals have reported experiencing reduced or even absent menstrual pain when using cotton pads. By opting for cotton menstrual pads instead of disposable ones, women have an opportunity to mitigate environmental impact while potentially safeguarding their health and well-being during menstruation.

MyTwoCents, NPO, recently organized a Reusable Pad Workshop at Peaceful Adult Medical Day Care to raise awareness among adults. Although most of the attendees were not experiencing menstruation due to menopause or biological factors, we organized this workshop to ensure that adults are informed about this important issue. During the workshop, the residents of Peaceful Adult Day Care voluntarily participated and learned how to hand-sew their own reusable pads. These pads were provided for their personal use in managing urinary incontinence or for distribution to younger individuals.

In our ongoing efforts to promote awareness about the environmental impact of disposable sanitary pads, targeting adults has become a crucial aspect of MyTwoCents organization's mission. By organizing workshops where adults can learn how to create reusable pads while also gaining insights into the consequences of using disposable products, we aim to eliminate any stigma surrounding reusable pads. It is essential to educate adults about the hygienic, clean, and environmentally friendly nature of reusable pads in order to normalize their usage. To reach a wider audience and achieve our goals, we plan on publishing articles in adult-oriented newspapers and creating YouTube videos. Through these initiatives, MyTwoCents Foundation hopes to engage an entire demographic that can potentially contribute towards our goal of promoting sustainable menstrual hygiene practices through reusable pad usage.

4b. Targeting adolescents - menstrual pad and sexual education

During the Hoboken Earth Day Festival, the MyTwoCents group entered our booth fully aware that introducing reusable pads would generate curiosity among customers. Surrounded by other booths selling macarons, stuffed animals, and vintage clothing, we understood that our nonprofit organization aimed to promote an idea rather than focus on sales of our abundant reusable pads. Our primary objective was to educate the festival attendees.

Throughout our interactions with the numerous people who approached our booth, it became evident that most had never encountered or considered using a reusable pad. This presented a golden opportunity for our group to provide valuable education. We explained why transitioning to reusable pads could benefit both the user and the environment, and each customer left our booth with a deeper understanding than when they initially approached us. Education and awareness have become increasingly vital aspects of menstrual hygiene.

Education and awareness play an increasingly crucial role in menstrual hygiene. Startling statistics support the importance of this education. For instance, a study by Dasgupta found that 32.5% of 160 adolescent women were unaware of menstruation until they experienced it for the first time. Additionally, this same percentage did not receive any information about their menstrual cycle from their mother, relatives, or friends. This reliance on intimate relationships to provide menstrual hygiene education is not only unsafe but also deeply concerning. It is imperative that every adolescent woman has access to comprehensive awareness about their body and ways to protect themselves. This highlights the importance of targeting adolescents in sexual education programs where discussions can spark insights. My Two Cents is committed to continuing these conversations in order to empower individuals with knowledge about their bodies and foster a culture of informed decision-making regarding menstrual hygiene practices.

4c. Targeting female students – Eco Pad Education at the Library

For female students, their understanding of menstruation and menstrual pads is often limited to what they have learned from their mothers or the internet. This education has predominantly centered on the usage of

disposable menstrual pads and managing situations involving menstrual blood stains on clothing. However, they have expressed a notable lack of comprehensive information regarding medical aspects, public awareness, and everyday practicalities related to menstruation and menstrual pads.

Many individuals believe that menstruation should be approached not only as an individual concern but also from the perspective of women's overall health. They advocate for the inclusion of education about menstruation and its practical aspects in public education curricula.

When introducing students to sewing for the first time, considerable time is dedicated to teaching them essential skills such as threading a needle, tying knots, using scissors safely, and sewing on buttons.

Ideas for education and awareness:

Figure 3, (Booklet Mockup)



Figure 4, (Booklet Mockup)



Figure 5, (Online Community)



V. Conduct the survey

5a. Summary of Research

In summarizing our survey conducted during the Earth Day Event in Hoboken, where the My2Cents Foundation had the privilege to participate, we gathered responses from twenty-eight customers. The majority of survey respondents were females aged between thirty and forty. It was evident that most respondents had not been previously informed about reusable menstruation pads, nor were they aware of their benefits. However, a significant number expressed willingness to use or recommend them.

A common trend emerged when examining the reasons behind both positive and negative responses. Those who voted "Yes" cited the health benefits for humans and the positive environmental impact as their main motivations. On the other hand, participants who voted "No" expressed concerns about the inconvenience and discomfort associated with reusable pads. The reasons supporting a "Yes" vote tended to focus on long-term advantages, while those opposing leaned towards a lack of willingness and energy to make the change.

Additionally, we asked participants about other environmentally friendly activities they engage in. Most respondents mentioned practices such as recycling, walking instead of driving and utilizing reusable bags instead of single-use plastics. These findings highlight individuals' commitment to preserving the environment through various actions beyond menstrual hygiene.

Overall, our survey shed light on the limited awareness surrounding reusable menstruation pads among event attendees while revealing an openness towards adopting these sustainable alternatives once properly informed about their benefits.

5b. How we take that research and use it toward our goal

In our survey participant's answers to the question "What are your worries or concerns if you are not willing to use reusable pads?" the top concern was inconvenience. It's undeniable that reusable pads do call for more steps than a disposable pad does. Disposable pads were created in the first place for the convenience of its users. The concept of being able to dispose of a pad after it was used was revolutionary for women who spent time washing every cloth they used. So, how are we going to convince these women that reusable pads can be as convenient as disposable pads? It's not! Our goal at My2Cents isn't to make women use reusable pads for convenience. In fact, we want to encourage women to switch to reusable pads for the environment. Sacrificing the easy action of disposing of 2-4 pads a day can impact the health of the environment substantially. We aim to push women to understand that they have a responsibility to themselves as well as the Earth. Another main concern

our survey participants had with reusable pads was discomfort. Reusable pads are, in fact, much more comfortable than disposable ones. They are lined with fabrics that are not irritable to skin and they use much more absorbent and soft materials to ensure the comfort of their users. This prejudice against reusable pads proves the importance of awareness. Being aware of the benefits of reusable pads can help to encourage more to make the switch.

In our survey, when participants were asked about their concerns regarding the use of reusable pads, the primary issue that emerged was inconvenience. It is undeniable that reusable pads require more steps compared to disposable pads. Disposable pads were initially created for the convenience of users, offering a revolutionary solution for women who previously had to spend time washing cloth alternatives. So, how do we persuade these women that reusable pads can offer a level of convenience comparable to disposable ones? The reality is, that we may not be able to achieve that goal.

Our mission at My2Cents isn't centered on convincing women to use reusable pads for the sake of convenience. Instead, we are committed to motivating women to make the switch for the benefit of the environment. While it may seem inconvenient at first glance to sacrifice the ease of disposing of 2-4 pads per day, this small change can have a substantial impact on environmental health. We strive to empower women by helping them recognize their responsibility towards themselves and the Earth.

Another significant concern expressed by our survey participants regarding reusable pads was discomfort. Contrary to this belief, reusable pads are often much more comfortable than their disposable counterparts. They are lined with skin-friendly fabrics and utilize absorbent and soft materials designed for user comfort. These misconceptions about reusable pads underscore the importance of raising awareness. By increasing awareness about the benefits of using reusable pads, we can inspire more individuals to make this eco-friendly switch.

Ultimately, at My2Cents, our mission revolves around promoting awareness and understanding among women about both environmental responsibility and personal well-being when it comes to menstrual hygiene choices

Survey Participants' demographics

Total 28 Participants

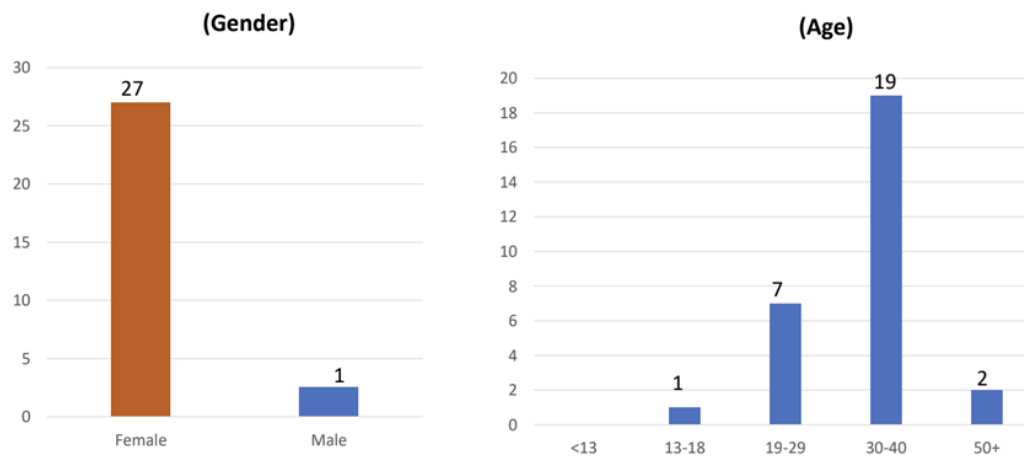


Figure 6, (Survey)

Have you heard about the positives of reusable menstruation pads?

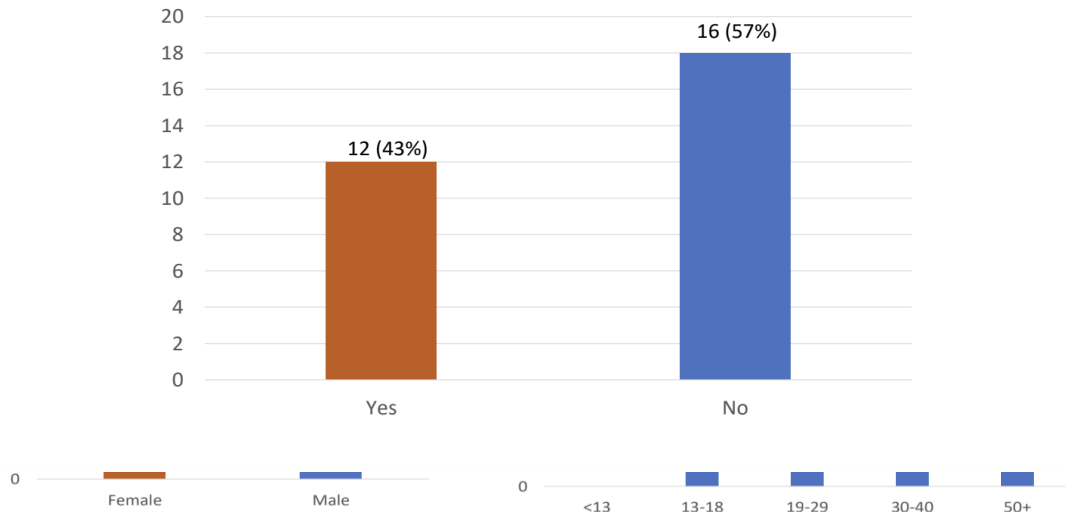


Figure 7, (Survey)

Would you be willing to use (or recommend) reusable pads?

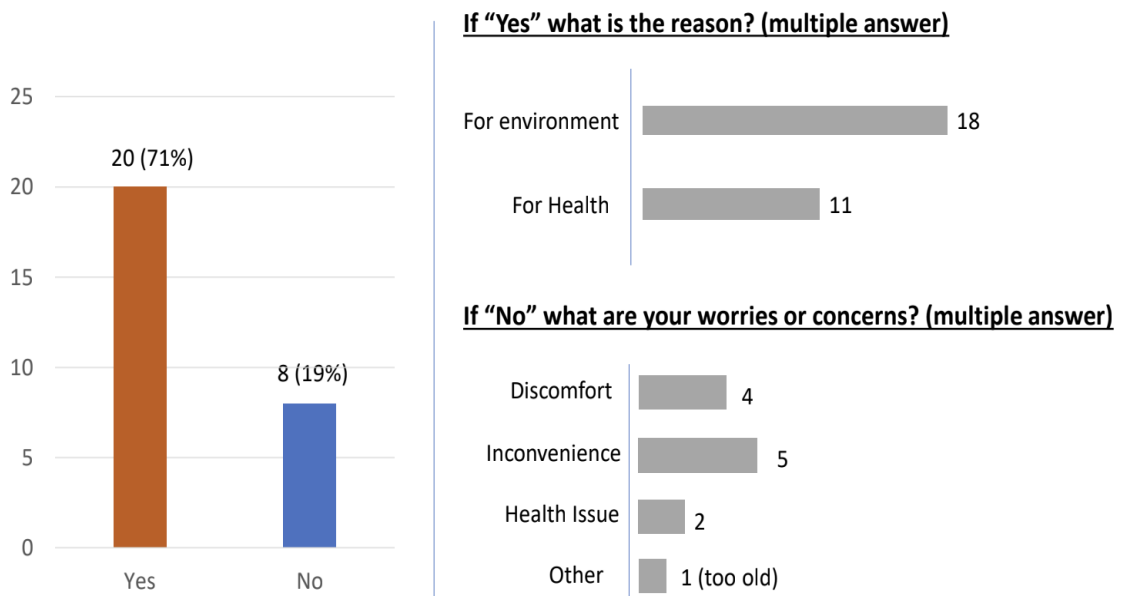


Figure 8, (Survey)

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