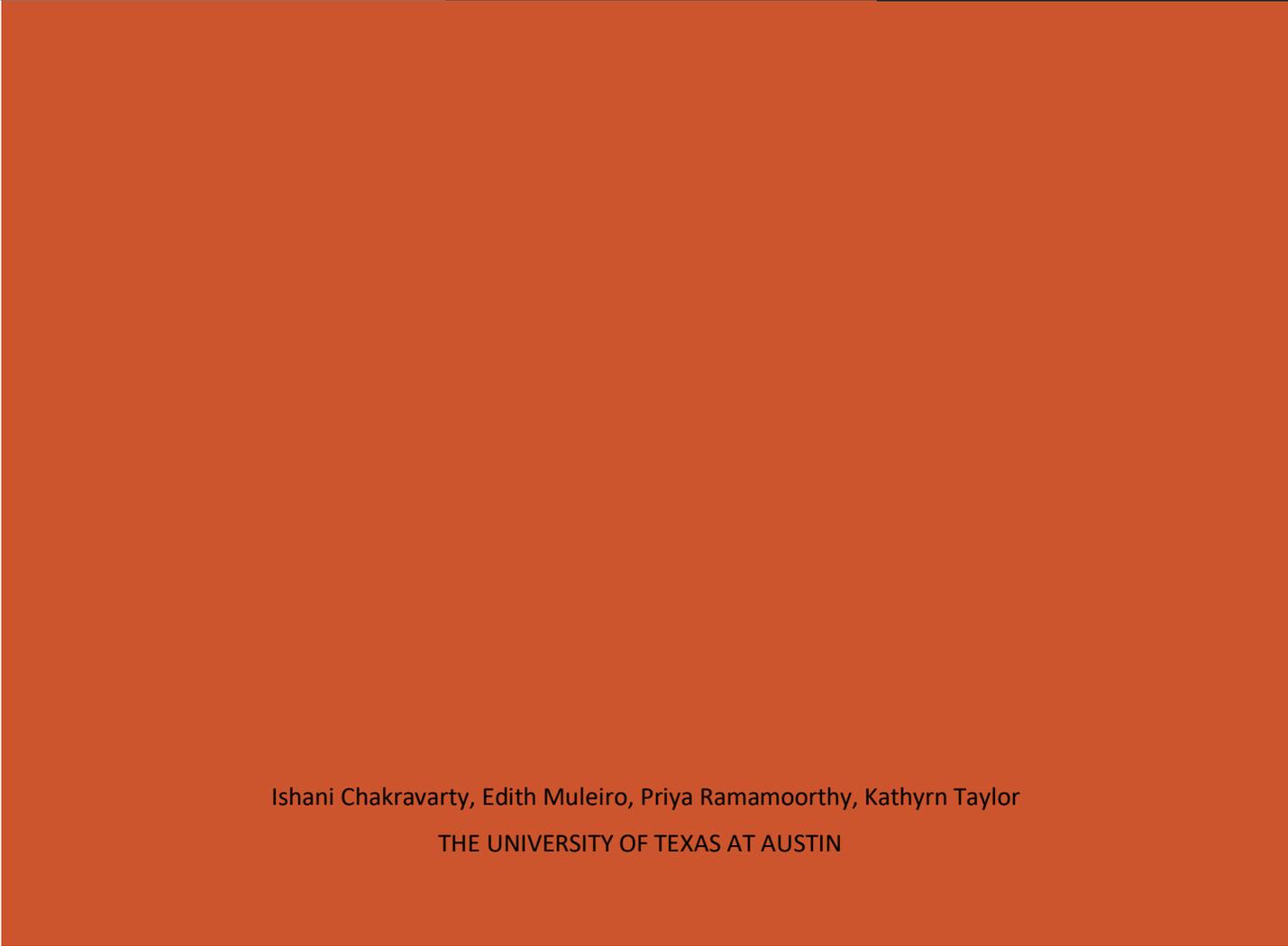
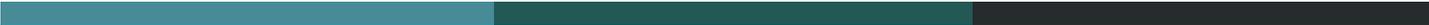




Hygiene, Empowerment, and Research for Social Impact: Project Report



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THE UNIVERSITY OF TEXAS AT AUSTIN



Executive Summary

Hygiene, Empowerment, and Research for Social Impact (HERS) has explored the creation of a value laden approach to fabricating menstrual pads based on collected preferences within a population affected by humanitarian crisis. Once collected, preferences informed the design of a menstrual pad prototype (MPP), which was created using a pad press designed by a mechanical engineering (ME) team that worked with the HERS team. The pad press used in the HERS study has been designed so that menstrual pads can be customized based on collected preferences. Additionally, the pad press has been optimized so that it is easily transported into an affected location for on-site response in a relatively short period of time.

The HERS project was informed through a multi-disciplinary perspective in response to a need expressed by the International Federation of the Red Cross and Red Crescent (IFRC) for a means of fabricating customizable menstrual pads on-site in humanitarian crises. HERS worked with the Lebanese Red Cross (LRC) to test the feasibility of producing pads with the press. Researchers also developed a preference survey which was then conducted by LRC volunteers with the target population of persons displaced from Syria living in an informal tent settlement (ITS) in Lebanon. An initial preference test and two efficacy tests were conducted to evaluate the MPP designs. Additionally, product evaluation and preference data collection was conducted in Texas with students from the University of Texas at Austin (UT) in the form of both comfort and efficacy tests.

HERS was successful in creating a menstrual pad with efficacy similar to commercial menstrual pad products. Additionally, HERS established that conducting a survey to collect menstrual product preferences can be carried out successfully in partnership with an organization where a strong relationship with participants is already present. The appropriateness of an intervention of this kind has been evaluated through HERS as well. It has been determined that further research and product development is necessary

before this process can be implemented in humanitarian crisis situations to meet the “rapid response” goal.



Acknowledgements

The execution of the Hygiene, Empowerment, and Research for Social Impact (HERS) Project is due to the collective effort and support of many individuals.

First and foremost, the research team owes an immense amount of gratitude to all participants in each phase of the project: UT Student Comfort Test, UT Student Efficacy Test, Focus Group with Refugee Services of Texas, and of course, our target community participants in Wave 1-3 Lebanese Red Cross Preference and Efficacy Surveys with Displaced Women in South Lebanon. The input of these participants molded the MPP design, from survey to survey and informed the re-design of the pad press. MPP was defined as each iteration of menstrual pad that was created for the surveys conducted in this study. At the heart of our project is the community we work with and we cannot thank our participants enough for their time and invaluable feedback.

This project would also not have been possible without the support and guidance of the International Board of Advisors, The University of Texas at Austin International Office, and the President's Award for Global Learning (PAGL). As part of the inaugural class of the PAGL Program, our project could not have come to fruition without the creation of this award and the support system that formed the award.

We would like to extend our heartfelt thanks to our partners, the International Federation of Red Cross and Red Crescent Societies (IFRC) and the Lebanese Red Cross (LRC). Thank you to the IFRC, specifically to William Carter, for suggesting the project idea and for trusting us to carry out the project and Alexandra Machado, for her advice and support. Thank you to the LRC for connecting us with displaced women and for conducting our in-country surveys. It has been a privilege to work with such a supportive and welcoming local branch. Special thanks to Jamilee El Doueihy and Farah Salem at the LRC for their faith, support, and dedication to the HERS project.

We are also deeply appreciative of Refugee Services of Texas (RST) for working with us to conduct a focus group with their clients in Austin.

Many thanks also go to the Mechanical Engineering teams (Spring 2018, Fall 2019, and Spring 2019) at The University of Texas at Austin for creating and improving iterations of the pad press, which was crucial and integral to the viability of the HERS project. We would also like to thank Patryk Radyjowski for spending his spare time to work on the pad press. Additionally, our gratitude goes out to students and faculty from Lebanese American University (LAU), to Ralph Bouez and Alfred Haddad who acted as our Mechanical Engineering team in Lebanon, and to Dr. Barbar Akle as their advisor. Our project could not have occurred in-country without the generous support of Sanita, especially Marc Kaddoum, for donating materials.

We are appreciative of AMIDEAST for providing us a workspace and specifically to Hala Kaadi, Mary Fadel, and Barbara Batlouni for their advice, hospitality, and guidance while in Lebanon.

A special shout out goes to all the amazing organizations and individuals we have also worked with at UT and here in Beirut. Thank you, Dr. Shelley Payne, for conducting a microbial analysis of the pads. To Lamia Masri at Kayany, Dr. Hiba Khodr at Al-Makan, Myriam Sfeir at the Arab Institute for Women at the Lebanese American University, and Noura Ismail at Talent Beyond Boundaries, the work your organizations do is truly inspiring and we are so grateful to have gotten to engage with these spaces while in Beirut. Our engagement with these individuals and organizations has fueled researchers' passion for the project and holistically rounded our understanding of the issue we have worked to address.

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Introduction

As the world's largest humanitarian network, the International Federation of Red Cross and Red Crescent Societies (IFRC) has extensive experience in responding to humanitarian crises worldwide. Throughout their work meeting the needs of those affected by crises, they have come to recognize the variety in menstrual hygiene needs within the communities they serve. . The need for menstrual products that meet community preferences is reflected in the experience of the IFRC as well as in a review of supporting literature (IFRC, 2018; Ray & Younis, 2018). Menstrual Hygiene Management (MHM) is an issue which must be addressed across all sectors in humanitarian response and is a driving factor that has inspired the HERS project proposal, process, and design. Supporting literature is discussed further in the overview of literature section of this report

HERS is a project that has attempted to design a process to create customizable menstrual products based on preferences. The purpose of this study was to find a solution to the need of menstrual products for people affected by humanitarian crisis, which was presented by the IFRC. The project was inspired by a collaboration between Dr. Janet Ellzey of UT Austin and William Carter of the IFRC in 2017, and then passed on to the HERS team and the LRC in the Fall of 2018. HERS was funded through the President's Award for Global Learning at UT Austin for the duration of the project from Fall 2019-Fall 2020.

The initial priorities expressed by the IFRC for the HERS project included creating a quick, on-site response to MHM needs and preferences of an affected community. As new priorities were identified for the hand-off of the project to the LRC, the HERS team evolved their approach in order to attempt to meet the needs that emerged. These priorities included the acquisition of materials from a local source, a production goal of 150 pads/hour, and a pad design based on preference surveys with the target community. Research conducted prior to in-country testing served to evaluate the MPP that would be tested with persons displaced from Syria living in the ITS in Southern

Lebanon. This research allowed the HERS team to begin to test the feasibility of meeting priorities established by the IFRC and LRC.

The HERS team is composed of members from a variety of disciplines and includes public health, textiles and apparel, social work, middle eastern studies, as well as chemical and mechanical engineering. The make-up of the team was intentional so that a holistic perspective towards MHM could be employed to conduct research with our target community. The HERS project consists of research conducted in Austin, Texas as well as in Lebanon through a partnership with the LRC. In addition to the HERS team, three different Mechanical Engineering (ME) Senior Design teams at UT Austin have designed the pad press iterations accompanying the process.

In the spring of 2019, the HERS team utilized four data collection methods: a focus group with Refugee Services of Texas, a comfort test and efficacy test of MPPs with students from the University of Texas at Austin, and a survey to assess needs and preferences of the target community conducted by the LRC. In the summer of 2019, the HERS team conducted two efficacy tests of MPPs with persons displaced from Syria and a focus group with the LRC volunteers who distributed MPPs and conducted the corresponding surveys. Documentation of the value-laden approach and the pad press was handed off to our partners at LAU, and to the LRC, with a long-term goal of integrating this pad press into a community-led MHM program in the ITS the HERS team has worked with in Southern Lebanon.

The HERS project was designed to create a process that could be replicated and integrated into humanitarian responses anywhere in the world. The data collected and feedback from research done in Lebanon served as a model to test and inform such a process to create a framework for future implementation.

HERS Team

The HERS team consists of four undergraduate students, three faculty, and one graduate student from the UT Austin. The student team consists of Priya Ramamoorthy, majoring in Public Health, Ishani Chakravarty, majoring in Chemical Engineering, Kathryn Taylor, majoring in Social Work and Edith Muleiro, majoring in Plan II and Middle Eastern Languages and Cultures. Dr. Janet Ellzey, Professor of Mechanical Engineering, faculty lead, accompanied by Dr. Katherine Polston, Professor of Textiles and Apparel, and Dr. Noel Busch-Armendariz, Professor of Social Work. Roxy Carbonell, a PhD student in the Department of Mechanical Engineering, served the team as the graduate student lead.



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Overview of Literature

Around 50% of 70.8 million forcibly displaced people worldwide, including refugees, asylum seekers, and internally displaced people, have the potential to menstruate (UNHCR, 2019). They are faced with the challenge of addressing their menstrual needs during displacement and are frequently without access to basic needs, often finding themselves reliant on International Non-Governmental Organizations (INGOs) or other groups who distribute goods that help fill this gap. However, menstrual hygiene needs of displaced persons are frequently noted to be neglected in humanitarian responses (House, Mahon, & Cavill, 2012). The development of response plans that account for the menstrual needs of people who menstruate has been explored in a variety of ways but is continually limited by financial and geographical constraints (VanLeeuwen & Torondel, 2018).

Menstrual Hygiene Management (MHM) is defined by the IFRC (2018) as a “range of actions and interventions that ensure that [people who menstruate] can privately, safely, and hygienically manage their monthly menstruation with confidence and dignity.” MHM is a multi-faceted issue which encompasses a variety of different sectors including Water, Sanitation and Hygiene (WASH), education, sexual and reproductive health, community development, labor markets and social protection (House, Mahon, & Cavill, 2012). In order to fully address the needs, any MHM intervention should include a collaboration between these sectors in order to provide a holistic response.

The review of literature carried out by HERS research to support the HERS project consistently presented three major aspects in MHM response that must be addressed to achieve comprehensive MHM response: sanitation and privacy, menstrual materials, and education (IFRC, 2018). The HERS project attempted to create an approach to address components of sanitation and privacy concerns related to menstruation. As the project evolved, opportunities for potential educational interventions have been identified and are potential avenues for continuation of the HERS project in future forms.

Sanitation and Privacy

Sanitation and privacy, as they relate to menstrual products, were noted as important factors in appropriately meeting menstrual hygiene needs. An adequate MHM response considers sanitation, privacy and user preferences (Donnelly & Muthiah, n.d.). Having a safe and hygienic location to change, dispose, wash, and/or dry menstrual products as well as their bodies is a crucial part of managing menstruation with dignity (Nawaz et al., 2006).

The environment people are in influences the ways in which they carry out their menstrual practices and is a part of the MHM response. In Informal Tent Settlements (ITS), lack of security and privacy as well as stringent social restrictions have been noted as causes that lead to confinement within tents and avoidance of latrines for people who menstruate. These examples have come up in a variety of ITS contexts, including the ITS the HERS project took place in (personal communication, July 23, 2019). In Guinea, holes were made in latrines to peek at women and it was noted that most of the gender-based violence in the ITS took place near the latrines. In Afghanistan, it was studied that women went to latrines at night because of cultural practices (Donnelly & Muthiah, n.d.). Displaced Syrian Muslim women reported changing menstrual products inside their tents using blankets and plastic sheeting as makeshift walls to create a private area instead of using the latrines in the ITS. A study from the ITS in Lebanon reported that women and girls encountered significant “challenges to finding private spaces within their shelters” as well as difficulties accessing latrines safely (Schmitt, 2017). These are just a few examples to emphasize that the nature of most ITS’ is such that latrines are often in locations that are isolated and poorly lit. Frequently, there are not enough latrines present to support the population of ITS communities, let alone adequately segregate by gender (Bastable & Russell, 2013).

The ability to maintain consistent hygienic practices related to menstruation is also a challenge. The availability of potable and clean water must be considered when exploring proposed solutions, as access is a frequent challenge (Bastable & Russell, 2013). A shortage of water and soap within ITS’ makes washing reusable menstrual

products and bathing challenging for people who menstruate (Schmitt, 2017). When components of the menstrual hygiene process, such as the place to change the pad and the place to dispose of it, are scattered within the ITS, people who menstruate are forced to conditions such as having to carry back their used pad after changing it in the latrine to their shelter to dispose of or clean it (Bastable & Russell, 2013). Public exposure of menstrual products, especially when soiled, perpetuates shame related to menstruation and can reinforce unhygienic menstrual practices (Kjellen, 2006). This can be perpetuated further when using reusable materials which have to be washed and dried due to the lack of private spaces to do so (VanLeeuwen & Torondel, 2018).

These factors which cause lack of privacy or proper disposal can lead to practices during menstruation which increase the rate of infection, such as using unclean rags or wearing a menstrual pad for too long (VanLeeuwen & Torondel, 2018). People who menstruate may be more susceptible to infections during menstruation, such as bacterial vaginosis and thrush (House, Mahon, Cavill., 2012). Access to a steady supply of menstrual pads on site can reduce the need for overextended use of menstrual products or unclean materials because of limited access to menstrual pads (VanLeeuwen & Torondel, 2018). After exploring existing literature related to MHM response in humanitarian crisis and the limitations presented within this context, the HERS team chose to focus on disposable menstrual pad fabrication and a pad press design that could fabricate a customizable product on site as an immediate response to addressing MHM needs in a community recently affected. The low maintenance nature of a disposable menstrual pad designed for one-time use addresses the immediate MHM need for menstrual materials as well as some of the privacy and health concerns. Further, the on-site production with an easy to use pad press would allow those menstruating to access the pad press for fabrication of the product as needed.

Product

MHM Product distribution is carried out either in the form of “hygiene kits,” the distribution of a designated product, or cash vouchers specifically designated for purchase of menstrual products (IFRC 2018). Hygiene kits and dignity kits include not only menstrual materials but also soap, towels, methods of disposal for the menstrual

products and underwear (Obrecht, Robinson & Alice, 2016). Distribution of a designated product may be accompanied with some aspects of a kit, as was done in the HERS project which included underwear. These materials included promote dignity and mobility of women and girls while providing for basic menstrual needs (IFRC, 2018). The products distributed for menstrual needs vary based on background, age, water supply, and economic circumstance (VanLeeuwen & Torondel, 2018).

In order to account for these differences in preferences, any distribution or kit should be preceded by a preference assessment of the population's menstrual needs (Concern Worldwide, 2018). The environment in which the individual finds themselves must be a crucial consideration in preferences, as it affects access to local markets and WASH facilities (Schmidtt, 2017). Further, each MHM product will present unique challenges and acceptability will vary from one population to another (VanLeeuwen & Torondel, 2018). Certain menstrual products cannot be broadly implemented in crisis response contexts. For example, without access to a potable water supply, reusable menstrual products are not recommended due to health concerns and the cleaning practices needed for the products (Schmidtt, 2017). It is critical to involve people who menstruate and will use the products distributed in dignity kits in this conversation and planning (House, Mahon & Cavill, 2012).

Assessing preferences also contributes to understanding of current menstrual practices based on environment (Schmidtt, 2017). Some displaced people who menstruate, such as in Lebanon where the HERS project took place, have access to local markets where individuals can purchase their own menstrual products when distribution fails to meet their needs (Salem, personal communication, 2019). However, due to financial constraints of organizations supporting displaced people and employment restrictions, access to these local menstrual products may be limited. This limitation can force people who menstruate to turn to less ideal menstrual materials which can lead to discomfort or infection (Schmidtt, 2017). The same applies to displaced people who menstruate who are not able to reach local markets.

Lack of access to markets or sufficient financial means reinforces reliance on infrequent non-food item (NFI) distributions from INGOs (House, Mahon, & Cavill, 2012). Currently, the average duration of displacement is 26 years (UNHCR, 2017). Both of these components emphasize the need for a long-term solution to menstrual needs in displaced populations.

The HERS project arose with this context in mind by providing a low-cost, on-site way to produce disposable menstrual pads with a user-friendly compact device. In doing so, the HERS project addressed the need for a long-term solution to providing communities an avenue for meeting their menstrual needs. This in turn decreases reliance on NFIs and promotes dignity. The pad press's compact size allows it to be carried in a suitcase for on-site production as a method of quick response during humanitarian crisis anywhere in the world.

Product Design

The design and testing of the pad press to fabricate the pads spanned eighteen months (figure 1). The following two sections section illustrate the different aspects of pad press design, menstrual pad prototype (MPP) design, and testing.

Project Timeline

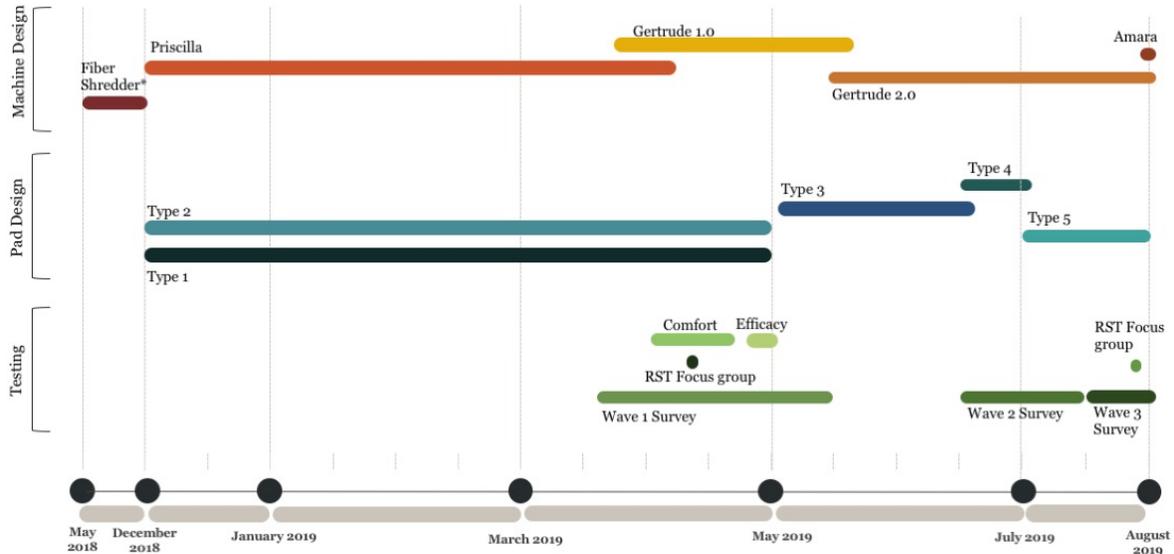


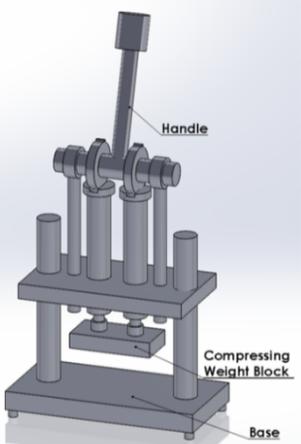
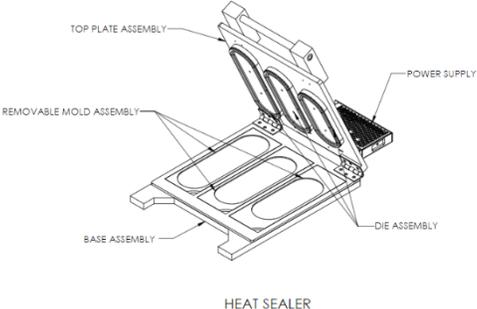
Figure 1: Timeline of the HERS project. The timeline places into context when each iteration of the pad press and pad were used and documents when testing occurred. *The Fiber Shredder iteration of the pad press was created prior to the formation of the core HERS Research Team

Pad Press Design

The pad press used to fabricate menstrual pads for this project has undergone several iterations. Each iteration has been designed by a ME design team from UT Austin and is acknowledged in this report below in table 1. Pictures and a brief description of each pad press are provided below. More information on the specific mechanics, dimensions, materials, and construction of the pad presses are provided in reports made by the respective ME teams. If you are interested in these reports, please contact

jellzey@mail.utexas.edu.

Pad Press Designs: Description and ME Teams

Timeline	Pad Press Name	Description	Pictures	Mechanical Engineering Team
May 2018-December 2018	Fiber Shredder	<p>Concept prototype of pad presses that aim to fabricate a low-cost, customizable product; focused on shredding and pressing fibers. This product was created prior to the HERS team taking on this project.</p>		Keerat Baweja, Arvind Ramachandra, Gauri Bora, Danish Tharvani.
December 2018 – April 2019	Priscilla	<p>First iteration of the current pad press design; using commercial fabrics that are cut and heat sealed to create a pad</p>		Andréa de Wied, Siddharth Kurwa, Pratik Patel, Claire Puccini

<p>Mid-April 2019- Mid-May 2019</p>	<p>Gertrude 1.0</p>	<p>Second iteration of the pad press design; using commercial fabrics that are cut and heat sealed to create a pad</p>		<p>Mauricio Chacon, Amber Chen, Pranav Kalyani, Samantha Mendez</p>
<p>Mid-May 2019 - present</p>	<p>Gertrude 2.0</p>	<p>Modified version of Gertrude 1.0; Power sources were mounted on the back of the pad press and fans were added to aid cooling</p>		<p>This iteration was modified by Patryk Radyjowski and Dr. Janet Ellzey.</p>
<p>August 2019</p>	<p>Amara قمرة</p>	<p>A modified version of Gertrude 2.0 that hides exposed wires and with a new base plate and silicon structure.</p>		<p>Ralph Bouez, Alfred Haddad (Lebanese American University) with help from Roxy Carbonell</p>

Table 1: All pad press designs created for this project are detailed in the table above. The timeframe, pad press name, description, pictures of the pad press, and the team members involved in the creation process are listed for each pad press design.

Pad Materials

Materials identified and used for menstrual pad protocol fabrication are listed below, followed by an analysis of the procurement process. Material types include the wicking layer, (PE), absorbent layer, nontechnical filler, impermeable layer and adhesive, which are shown in reference to their position in the MPP below in figure 2.

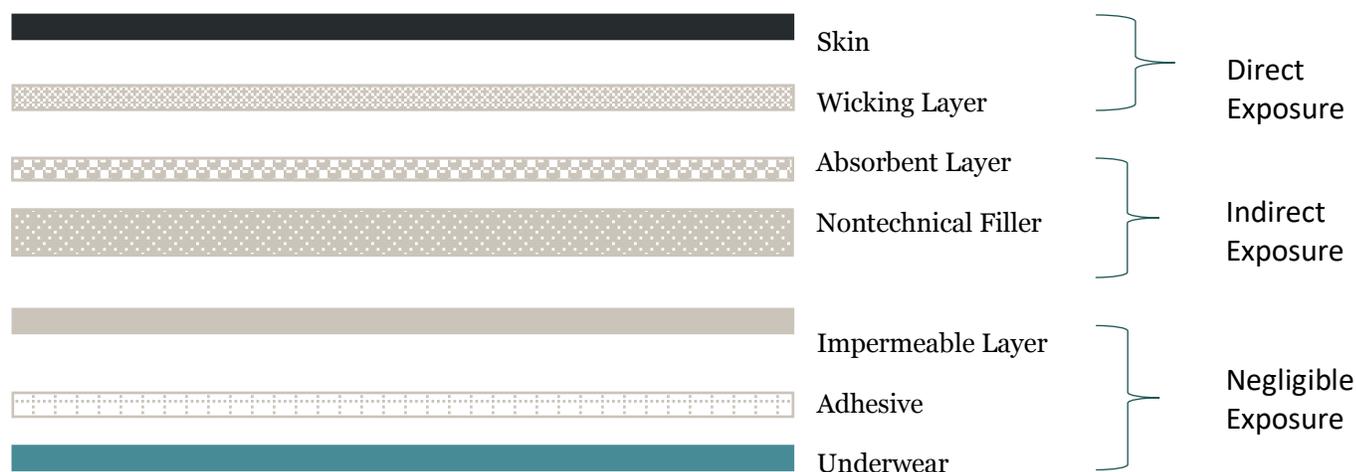


Figure 2: All of the materials that make up the pad and its relation to the person wearing it are shown in the figure above. The term “exposure” refers to skin exposure.

Wicking Layer

Hydrophobic perforated hot air non-woven: This serves as the mesh top layer of the menstrual pad prototype.

Material specifications: 24gsm, 180 mm

Through extensive procurement research, the HERS team established that this material must be sourced from manufacturers in China. An organization fabricating menstrual pads in Rwanda confirmed that they were also limited to Chinese manufacturers for this material. Sanita, a local commercial partner in Lebanon, provided a mesh layer that was non-perforated but it did not seal with either the PE layer provided by Sanita or the PE layer sourced from Alibaba when tested with the HERS pad press.

This material was sourced from Alibaba and was the only material that remained consistent through all iterations (Waves 1-3) of the menstrual pad prototypes.

Absorbent Layer

Air-laid paper with Superabsorbent Polymer (SAP): This is the absorbent layer within the menstrual pad prototype.

Several options for the absorbent layer of menstrual pad prototypes were explored in the HERS project. Options included a SAP layer sourced from Alibaba used in the comfort and efficacy tests with UT Austin students as well as a SAP layer sourced from Sanita, which was used in the Wave 2 and Wave 3 efficacy tests in Lebanon. The super-absorbent feature of SAP is such that variation should not affect product comfort or efficacy, which was supported by the efficacy tests conducted in the HERS project. Marc Kaddoum, the plant manager at Sanita, also confirmed that SAP is the best product available on the market for absorbency.

Comfort and Efficacy tests with UT Students and the Wave 1 preference survey used a menstrual pad prototype that contained a SAP layer sourced through Alibaba (type 1). This layer consists of a cellulosic paper with SAP beads impregnated in matrix.

Material Specifications: 150 gsm, 45% SAP, 68 mm

The Wave 2 efficacy test in Lebanon used a menstrual pad prototype that contained a SAP layer also sourced from Alibaba (type 2). This layer consists of a cellulosic paper with SAP beads impregnated in matrix. In this iteration, the SAP was a slightly thicker material than previous iterations.

Material Specifications: 180 gsm, 40% SAP, 70mm

Felt: This material was explored as a universal, non-technical material that could be used as an absorbent layer and found at a low cost in most areas of the world. This is felted material made from polyester.

Material Specifications: This is a generic craft fabric, with thickness ranging from 1.16 to 1.5 of an inch.

During Dr. Janet Ellzey's trip to Beirut in January 2019, felt was purchased as a potential alternative to a technical absorbent layer that could be procured locally at a low cost. Based on the felt purchased in Beirut, a similar felt was purchased from JOANN fabric store in Austin and used in the comfort and efficacy tests with UT Austin students in Spring 2019.

Results from the efficacy test with UT Austin students showed that the felt could potentially be used as effective absorbent layer. Upon arrival in Beirut, felt as an absorbent layer option was discontinued due to sanitation concerns in procurement of the material from local retailers.

A SAP layer procured in Lebanon from Sanita was used instead and was found to be the most viable option for absorbent layer in terms of efficacy and sanitation.

Material Specifications: 20g/absorption, 15 retention, 200gsm

Nontechnical Filler

Polyester Batting: This layer was used to adapt the thickness of the menstrual pad prototypes to meet the preferences of the target community. The filler served aesthetic needs and was not a component required for the efficacy of the menstrual pad prototype.

Batting used in the comfort and efficacy tests with UT Austin students was sourced from Joann's in Austin, Texas.

Material Specifications: 48", 6oz/yard

Batting used in the Wave 2 efficacy test in Lebanon was sourced from a local retailer in Beirut, Lebanon called Top Tissues. The brand name for this batting was Dacron and the material was referred to by the brand name by retailers in Top Tissues.

Material Specifications: 1 inch thick

Underwear Facing Impermeable Layer

Polyethylene (PE): The impermeable layer used for the bottom of the menstrual pad prototype. Adhesive is applied directly to this layer.

For comfort and efficacy tests with UT Austin students as well as the Wave 2 efficacy test in Lebanon, PE was sourced from Alibaba.

Material Specifications: 25 gsm, 280 mm

For the Wave 3 efficacy test in Lebanon, local commercial PE was sourced from Sanita.

Material Specifications: 26 cm, 19 microns

Adhesive

This layer attaches the menstrual pad prototypes to underwear.

For the comfort and efficacy tests with UT Austin students pressure sensitive adhesive dots were used as the menstrual pad prototype adhesive. This adhesive was sourced from Amazon [and can be found by searching “GCOA Balloon Glue...Double Sided Dots of Glue Craft Removable Adhesive Point Tape, Non-Liquid Glue.”](#)

The glue dots were arranged with two dots on each side and one dot on the top and on the bottom.

Material Specifications: 1.2 x 1.2 x 0.4 inches N/A

For the Wave 2 efficacy test in Lebanon, adhesive strips were used as the menstrual pad prototype adhesive. The adhesive strips were sourced from the UT Co-op and can also be found on Amazon by searching [“Alvin 2400-B Double Sided Tape.”](#)

The adhesive strip was placed in the middle of the menstrual pad prototype as one long strip. Feedback from Wave 2 survey determined the adhesive strip (Alvin 2400-B) was too strong and left glue residue on underwear. This was noted by a beneficiary in the Wave 2 survey and reiterated during the focus group with LRC volunteers. One of the HERS researcher’s personal experience with the menstrual pad prototype reflected the same results. This experience prompted the HERS team to obtain underwear for distribution with the Wave 3 survey to compensate for any damage that occurred from the adhesive on the menstrual pad prototype distributed for the Wave 2 survey.

Material Specifications: 5 x 5 x 1 inches

Wings

Research participants consistently reported that the middle sides of the menstrual pad prototype should be an area of focus in the configuration of adhesive on the menstrual pad prototypes. Many commercial menstrual pads have wings to support where the most movement occurs during wear. Wings were added to the menstrual pad prototype created by HERS researchers for the Wave 3 efficacy test to support this compelling evidence and preference by beneficiaries wearing the prototype.

Adhesive

Although there were many adhesive options available such as double-sided tape, glue dots, and paint-on adhesive, it was challenging to find an adhesive that was inexpensive, effective, and did not leave residue on the underwear. Consequently, different adhesive options were used in the various studies.

Lowering adhesive cost was a consistent challenge faced by HERS researchers for all iterations of the MPP. HERS researchers briefly explored the possibility of using a glue block that could be melted and applied to the impermeable layer with release paper to cover the adhesive. This option was abandoned after speaking with Sanita because this process required highly technical equipment and a speed of application that could not be attained with the equipment HERS possessed. This type of equipment was not transferrable to the compact, low-cost model of the HERS project.

Procurement

In January 2019, the HERS team began refining the HERS project's material procurement model with the guidance of Dr. Katherine Polston. Previous materials used by the fall 2018 ME team were procured through suppliers from Alibaba. In the Spring of 2019, the HERS team worked primarily with the fall 2018 ME team's main contact, Lily Li, a sales representative for Quanzhou Xingyuan Supply Chain Management Co. Lily Li continued as the HERS team's main procurement contact for all procurement materials through the summer of 2019.

Two main priorities were identified for the procurement process. The first was a low-cost price point for all materials used in the MPP, and the second was the ability to

locally source materials which was requested by the LRC. Local materials were defined by the LRC as any materials that could be acquired in Lebanon to reduce potential complications that could arise in the customs process as shipments are received in-country.

To determine if it was feasible to locally source materials, the procurement approach shifted to the local markets in Lebanon. This process included researching both commercially available technical textiles and retail fabrics. Commercial materials are technical textiles designed and produced specifically for end use as menstrual pads and hygiene products. These materials are generally produced in wholesale quantities on a scale that the HERS project approach could not meet to achieve quantities large enough to meet the minimum order. Retail fabrics consist of smaller quantities of apparel and interior fabrics which are not specifically designed or produced for the desired end use as a menstrual pad or hygiene product.

The HERS team began local material research by investigating retail fabrics used for apparel and interiors. The HERS team was able to successfully procure polyester batting from Top Tissues, an interior fabric store in the Armenian district of Beirut, Lebanon.

The HERS team then shifted their procurement approach to a local commercial partner, Sanita, to source the SAP and PE layers. Sanita agreed to give the HERS team remnants of their SAP and PE layers for free to use for the MPP research.

Ultimately, the HERS team decided to work with local commercial fabrics for all layers except for the top layer perforated mesh and the batting layers. The top layer mesh remains the same from previous testing and has been sourced from Alibaba. The batting was sourced from a local retailer, Top Tissues.

The choice to focus primarily on local commercial instead of local retail sources was made because of difficulties in sourcing fabrics that met technical, performance criteria and were available in conditions that were sterile enough to be acceptably used in a hygiene product such as a menstrual pad. Order quantities necessary for MPP

production by the HERS team align more appropriately with retail options; however, the consistent ability to re-order with local retailers was varied and unconfirmed. The process of ordering was tested and decided against due to this lack of consistency. With these limitations in mind of suitability, cleanliness and consistency, it was concluded that local retail fabrics local are not a feasible alternative to the commercial technical textiles used in previous MPP production.

Pad Design

The HERS project contained a product development component that was imperative in allowing the research goal to be met. The development of MPPs was an evolving process that changed based on pad press capabilities and target population preferences. While many different MPPs were developed and tested throughout the entirety of the project, four main MPP types were tested in the studies conducted with research participants. These four MPP types are described in detail in table 2 below. It should be noted that MPP type 4 was not tested by research participants but was included in documentation because it was the first MPP created using a mix of local retail and local commercial products in Lebanon. MPP type 5 is the same pad as MPP type 4 but has wings that were later added to this MPP when researchers discovered a way to adjust fabrication methods to accommodate this adjustment.

*All material that is “wholesale remnants, sourced” was sourced from Alibaba unless otherwise specified
 *All material that is “wholesale remnants, local” was sourced from Sanita unless otherwise specified

MPP Designs: Material Composition and Procurement

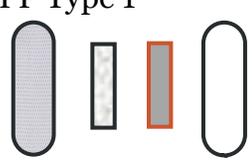
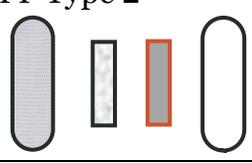
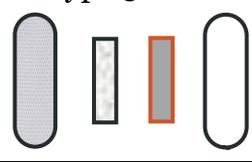
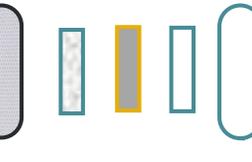
Timeline	Type and Description *from Left to Right the layers are Mesh → PE	Layers of Pad (placed from Left to Right)				
		Mesh	Absorbent Layer	Batting	Wings	PE
December 2018 – May 2019	MPP Type 1 	Wholesale remnants Sourced ●	SAP (40%), Wholesale remnants Sourced ●	½ inch thick, Retail, Sourced (Joann’s) ●	N/A	Wholesale remnants Sourced ●
December 2018 – May 2019	MPP Type 2 	Wholesale remnants Sourced ●	Felt, Wholesale remnants Sourced ●	½ inch thick, Retail, Sourced (Joann’s) ●	N/A	Wholesale remnants Sourced ●
May. 2019 – June 2019	MPP Type 3 	Wholesale remnants Sourced ●	SAP (40%), Wholesale remnants Sourced ●	1 inch thick, Retail, Sourced (Joann’s) ●	N/A	Wholesale remnants Sourced ●
June. 2019 – July 2019	MPP Type 4 	Wholesale remnants Sourced ●	SAP, Wholesale remnants, Local ●	1 inch thick, Retail, Local ●	N/A	Wholesale remnants, Local ●
July 2019- August 2019	MPP Type 5 	Wholesale remnants Sourced ●	SAP, Wholesale remnants, Local ●	1 inch thick, Retail, Local ●	PE, Wholesale remnants, Local ●	Wholesale remnants, Local ●

Table 2: The diagrams above display the materials used in each MPP and how each material was procured, and the timeframe within which each MPP was created/used. The materials are stacked from right to left when fabricating using the HERS pad press. “Wholesale remnants” are remnants of materials sourced directly from wholesale suppliers. “Retail” material was sourced from shops. “Sourced” is used to describe materials procured outside of Lebanon. “Local” was used to describe materials procured in Lebanon.



Fabrication Process Evaluation

In this section, the MPP fabrication process is evaluated for each pad press. Iterations on the press design are detailed in table 1 for reference. The evaluation below addresses the fabrication of MPPs using Gertrude 2.0.

The MPP fabrication process consists of a five-step process, outlined below:

1. Cutting materials needed for MPP
2. Aligning materials on pad press prior to sealing
3. Placement of a sacrificial piece of cotton over all of the materials
4. Sealing the materials by closing the pad press
5. Touching up MPPs after sealing if needed

Detailed instructions for each step of this process can be found in the pad press manual, which can be accessed by contacting Dr. Janet Ellzey at jellzey@mail.utexas.edu.

Key Vocabulary

Touchups – the process of resealing portions of the pad that were left unsealed by the initial press using the pad press (a step-by-step process is outlined below).

Batch – term used to define rounds during testing. A “batch” encompasses all steps of the fabrication process: placing materials, pressing the pads, waiting for the pads to cool, touchups. Ideally, four MPPs can be created per batch using Gertrude 2.0.

Functional MPPs – MPPs that met quality assurance (QA) standards and were considered acceptable to use for comfort and efficacy testing.

Overall Process Evaluation

The times reported below represent the time it took for one person to complete each step alone (tables 3 and 5). Data for these times was collected using Gertrude 2.0. It should be noted that the times were collected towards the end of the HERS project after researchers had extensive practice with each step of the MPP process as well as expertise developed through this practice.

Average Time to Cut Each Component to Create 1 Batch of MPPs

Step	Time to cut materials for 1 batch (4 pads)
SAP	1.6 minutes
Mesh	1.12 minutes
PE	1.76 minutes
Batting	0.64 minutes
Wings (PE cut into an 8in by 2 in rectangle)	0.56 minutes
Total Time	5.68 minutes

Table 3. Time required to cut each material for MPPs. Time was calculated to reflect the time per 1 batch = 4 MPPs.

Average Number of Functional MPPs Produced per Batch

	No. of MPPs *max is 4 MPPs per batch	No. Batches Used to Calculate the Average
Average Total No. of Functional MPPs Produced per Batch	3.17	64
Average No. of Functional MPPs Produced per Batch without touchup	1.75	64
Average No. of Functional MPPs Produced per Batch with touchup	1.31	64

Table 4. The average number of functional MPPs produced per batch. A functional MPP is defined as a MPP that meets all QA criteria and that can be used by participants in the project. The rightmost column explains how many batches and their respective times were used to calculate the average.

Average Time Per Each Step in 1 Batch

Step	Average Time Per Step	No. Batches Used to Calculate the Average
Place Materials (mesh, SAP, batting, PE, sacrificial layer)	2.14 minutes	64
Press the MPPs	50 seconds	-
Wait for MPPs to Cool	45 seconds	*this changed throughout batches but 45 seconds was the average for the last 11 batches
Touchups	7.25 minutes	32
Average Time Per Batch (Not Including Cutting)	10.81 minutes	32

Table 5. The average time it takes to complete 1 batch of MPPs from start to finish. The time per each step was recorded along with the overall time. The rightmost column explains how many batches and their respective times were used to calculate the average.

In order to maximize the efficiency of the preparation process for MPP fabrication, all materials were cut in one sitting in quantities large enough to complete the desired MPP fabrication goal for the day. Extra quantities of each material were cut to account for any discarded pads due to fabrication error. Custom Sizzix dies were used to cut the mesh and PE layers. The batting, PE for wings, and SAP was cut by hand. On average, preparing for one batch of pads was 5.68 minutes (table 3). Although the preparation process only constituted around 30% of the overall time to cut and create pads for one batch, the cutting process was at times cumbersome (figure 3). The user was required to switch from using the die and hand-cutting depending on the material. A custom Sizzix die was ordered for the SAP layer but it arrived after fabrication of MPPs for the Wave 3

survey was complete. The efficiency of cutting SAP with this die remains undetermined and should be further explored once preferences for this layer are understood and optimized in relation to the pad press’s ability to fabricate given any size adjustments in this material.

MPP Fabrication: Total Time and Time per Step (in minutes)

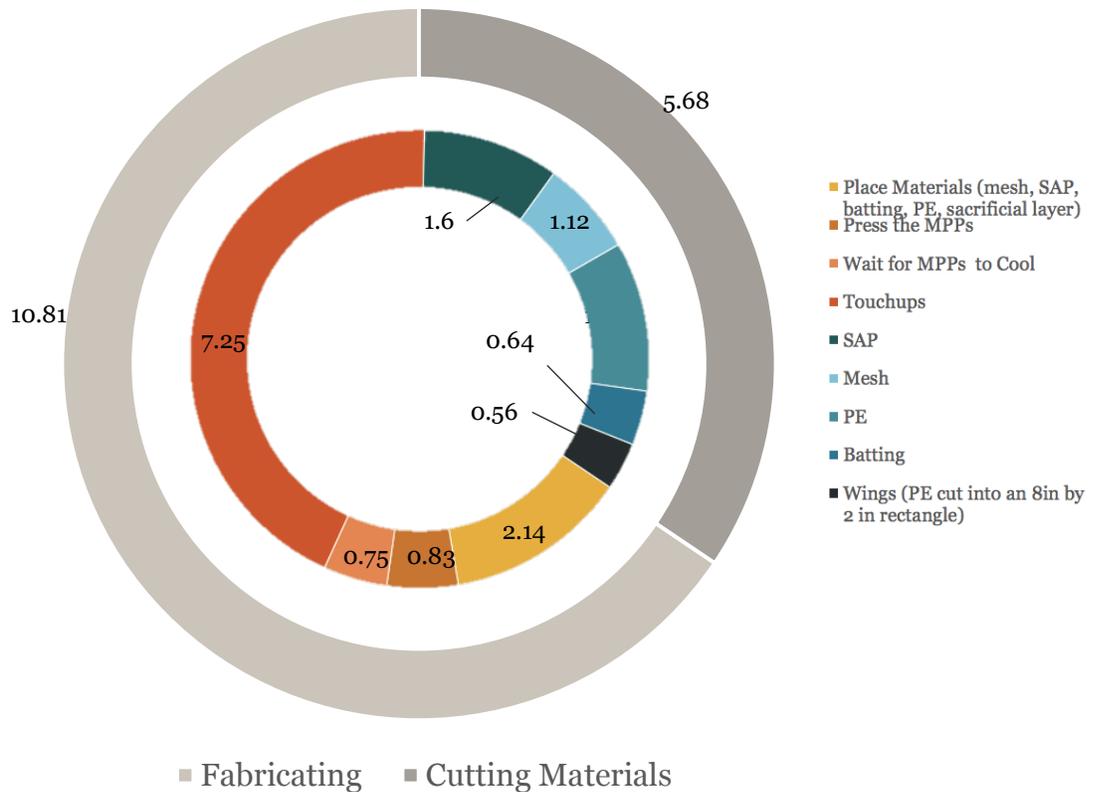


Figure 3. Total time in minutes to complete the fabrication process and the average time per each step.

The average time per batch was 10.81 minutes. On average, touchups took 7.25 minutes of the 10.81 minutes per batch (table 5). In a batch where all four elements of the pad press are turned on, a maximum of four pads can be made. HERS researchers typically found that 1-2 pads will require touchups (table 4). This means that around 67% of the time spent to fabricate 1 batch of pads was used to fix any inconsistencies in pads so that the pads met quality assurance (QA) standards. Since touchups require precision and skill, they tend to add significant time to the fabrication process. At the time of this data collection, summer 2019, HERS researchers had been working with the pad press in various forms for five months. The times presented are most likely shorter than what

would be anticipated from new trainees given the HERS researchers' collected expertise with the fabrication process.

Additionally, the average total number of functional MPPs produced per batch is 3.17. There are four pads per batch so that means 20.75% of the total pads made were not classified as usable. This is not the actual amount of material thrown away. We completed MPP QA after each completed batch and re-used the batting and SAP layer inside. Only the mesh and PE layers were thrown away. Waste calculations during MPP fabrication are explored in more detail below.

Percentage of Fabric Wasted in the Cutting Process Per Material

The waste percentages in figure 4 were calculated using the area dimensions the materials were given from the source and subtracting the size of material used to cut material with the die (for the PE and mesh) or cut out enough material for one MPP by hand (for SAP and batting). The area difference between the total material needed per MPP and the template size for each material was used to calculate the percentage. The percentage of waste will vary if the dimensions of materials from the source are altered. If the dimensions of sourced materials are altered, waste calculations must be re-calculated. Waste for batting and wings (PE) are not shown but were both 0%.



Figure 4. The percentage of waste fabric that is produced when cutting each material. Batting and wings are not shown because both had no waste.

Quality Assurance & Technical Evaluation

HERS researchers determined two main causes that contributed to the number of touch-ups and discarded MPPs. Uneven heat distribution and misalignment of materials were noted as these main causes and adjustments to future iterations of the pad press were informed using this information.

Uneven Heating



Figure 5. Picture of a pad with a hole caused by uneven heating of the wire element

Uneven heating of the wire elements required the user to press down on the pad press to accommodate a more even distribution of pressure and consequently a better seal around the MPP. When pressure was not applied to the pad press during the fabrication process an indentation was seen on the outer PE layer but the layers did not fuse together (see Figure 5). This indicated to HERS researchers that the PE layer was in contact with the heating element but that the applied heat was not strong enough to completely melt the PE to the top layer mesh material.

HERS Researchers found that there was a sensitive time window between the time that the pads could be pressed to ensure sealed edges while minimizing any burning effects. Any time past the 50 second mark caused shrinkage of the PE layer and holes along the seal line, as seen in figure 6. While shrinkage of the PE layer was harder to remedy with a touchup, researchers were able to use the touchup method to re-seal portions of the pad in order to form a continuous seal when the holes did not break the seal line or occur within the sealed portion of the pad.



Figure 6. Picture of a pad that has holes and where the PE has shrunk due to the way the pad was heated

Misalignment of Materials

A key part of the fabrication process was the placement of a sacrificial layer, a piece of T-shirt cotton, over the stacked MPP materials to protect them from direct contact with the heating elements. HERS researchers noticed that the materials tended to shift when the sacrificial layer was placed on top of them. This also happened sometimes when the user pressed down on the pad press. Since the PE oval was larger than the mesh oval, there was a slight margin of error where materials could be misaligned but a full seal around the absorbent core was still achieved. More frequently, misalignment of materials did not allow for the heating element to seal the MPP and led to large unsealed sections in the MPPs. Researchers also noted that if the wire element aligned on top of PE with batting underneath, this would cause holes in the PE. Ideally, the PE and mesh layers would be aligned such that the wire element would only encounter these layers around the edge of the MPP.

Successes

On average, 3-4 functional MPPs were produced per batch (table 4). This means that waste was generally minimal and that the pad press' production capacity was frequently functioning close to its maximum potential, a total of 4 pads per batch. It is important to note that waste production was heavily dependent on how familiar the HERS researcher was with working with the pad press. There was a learning curve in using the pad press and consequently, significantly more waste was produced in any user's first few rounds.

Suggestions for Pad Press Modifications

Future iterations of the pad press should be designed so that the user does not need to press on the pad press when fabricating. This repetitive motion puts excessive pressure on the wrist joints and could lead to occupational injuries. Additionally, the heating mechanism should be modified in order to reduce the need for touchups. Gertrude 2.0 was able to create a strong seal between the PE and mesh layers; however, this seal was not consistently created around the entire edge of the pad. If the pad press is modified to distribute heat and pressure more evenly along the entire wire element, a consistently strong seal might be created around the entire pad.



Product Testing in Austin, Texas

The HERS research consisted of several studies which are outlined below and explained in detail in further sections.

Comfort Test with UT Austin Students (4/7/19-4/21/19)	Data collection on a user's experience wearing the MPP while not being on their period. It was conducted with students from UT Austin.
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Efficacy Test with UT Austin Students (4/26/19-5/16/19)	Data collection on a user's experience wearing the MPP for day 2 and 3 of their period It was conducted with students from UT Austin.
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Focus Group with RST (4/23/19)	Focus group with resettled displaced persons at RST.
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Comfort testing with Students from the University of Texas at Austin (4/7/19 – 4/21/19)

Purpose

The purpose of this study was to evaluate the comfort of MPP Type 1 and Type 2 created using Gertrude 1.0 (tables 1 and 2). Collected data was used to inform the re-design of the MPPs.

Methodology

Sample

Students from the University of Texas at Austin that menstruate and use menstrual products were invited to participate in the comfort test through flyers and by word of mouth. Participants were not required to be menstruating when participating in the test as the study was designed to evaluate pad comfort, not efficacy. All participation was confidential and no identifiable information is shared in the research results per IRB approval. Eight participants participated in this phase of the study. Testing was conducted over two weeks from April 7th, 2019 until April 21st, 2019.

Consent and Compensation

Participants were immediately compensated \$15 USD and signed a confidentiality form upon arrival for the study in order to reassure participants that they would be compensated regardless of their feedback. Each participant was also given a confidentiality form to take home with them. Research investigators informed participants of their confidentiality and voluntary participation.

Experimental Design

A pre-post experimental design was utilized to test the comfort of two MPP designs, MPP type 1 and MPP type 2. MPP type 1 used a Super Absorbent Polymer (40% SAP) middle layer and MPP type 2 used a felt middle layer (table 2). Both MPP types were tested with the same number of participants (4 for MPP type 1 and 4 for MPP type 2).

Participants in the UT student comfort test were given a MPP and brief pre-test survey about menstrual preferences and initial appearance of the MPP. Participants were asked to go to a public bathroom near the office and attach the MPP to their underwear. Upon returning to the private office, they were asked to complete a survey about their immediate reactions to the assigned MPP. The exercise portion of the test consisted of walking on a treadmill for 30 minutes, followed by ten minutes of light aerobic activity/yoga, while wearing the MPP. The times and activities were used as general guidelines. Researchers encouraged participants to complete whatever exercise the participant felt they could comfortably engage in without causing any extra strain to themselves. After the exercise, participants were asked to complete a post-test survey. All surveys were completed on paper and participants were thanked for their participation upon completion of the comfort testing. (see tables 8 and 9 in appendix for results from this survey).

Limitations

Since participants self-selected to participate in the pre-post experiment, there is the possibility of a voluntary response bias. The small sample size also means that the opinions shared during the conversations cannot be generalized to represent the opinions of the general population, especially within their own respective cultural/ethnic groups. Furthermore, the homogeneity in age within the group limits this data's generalizability to the larger population and preferences outside a specific age range.

Results

Due to the small number of participants, it is not possible to draw broad conclusions. The results, however, indicated overall satisfaction with the MPPs except for the adhesive. This helped to guide the team in improving later versions of the pad. Survey questions gathered data on demographic, preference, and product evaluation to better understand the comfort of the MPP tested in this phase of the study.

Participant Demographics

Countries of origin included the United States, Spain, Mexico, and India. See figure 7 for more demographic information.

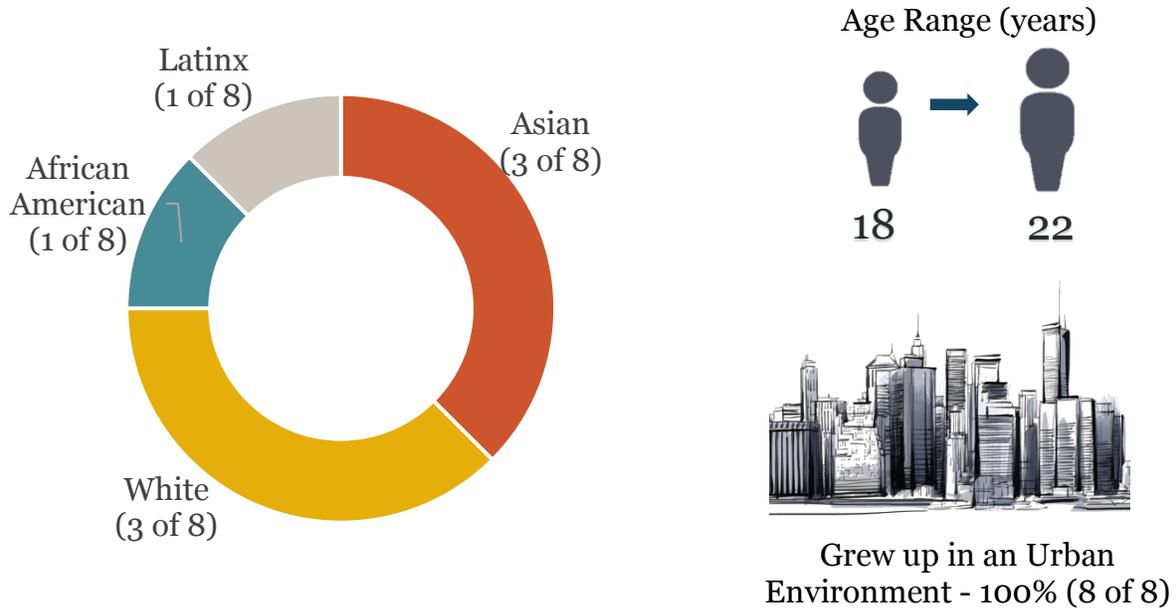


Figure 7. Demographic data collected from the UT Austin Comfort Test. Includes participant ethnicity, age range, and whether they grew up in an urban or rural environment.

Current Use

Participants were asked about the types of menstrual products they used most of the time (figure 8). Multiple selections were allowed for this question.



Figure 8. Percent of participants using a specific type of menstrual product “most of the time”.

Shape Preference

One hundred percent of participants who reported wearing either a reusable or disposable menstrual pad reported preferring a menstrual pad with an hourglass shape and wings.

Thickness Preference

Participants were asked to explain their menstrual pad preferences. Six of eight participants favored “thin” pads. Reasons for preferred thickness can broadly be categorized into personal comfort and a personal need for a certain level of absorbency. (figure 9).

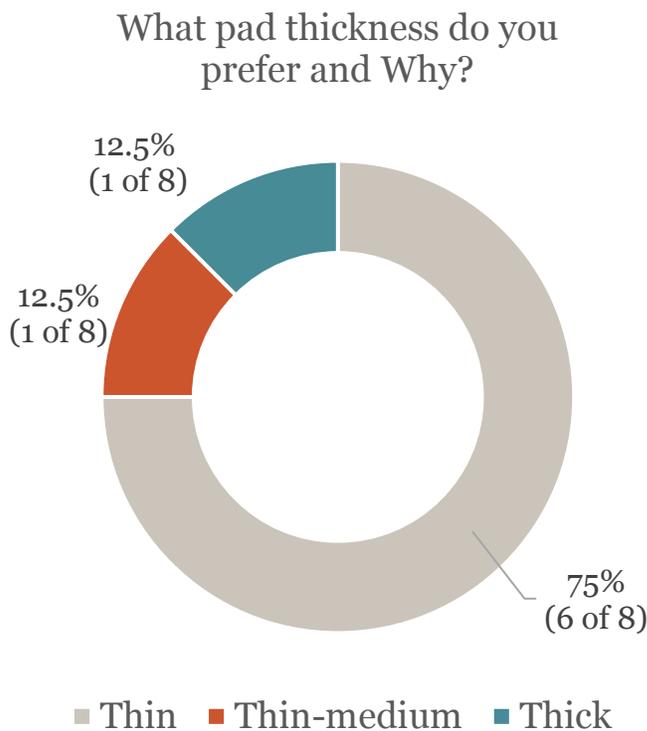


Figure 9. Data collected during comfort testing with UT Austin students in reference to their preferences for menstrual pads. Most UT Austin students preferred a “thin” menstrual pad.

Reasons for “thin”:

“do not want it to feel like a diaper”

“less bulky, easier to change throughout the day, more comfortable.”

Reasons for “thick” and “thin-medium”:

“to ensure that it doesn’t fail”

“if [the menstrual pad] was too thin it is easier to bleed through.”

Supporting Quotes

When participants were asked what size, shape, and thickness a menstrual pad that they designed would be, a variety of answers were provided. In the word cloud (figure 10), the size of the word increases with increasing frequency of the word among the responses of the eight-member sample group.



Figure 10. Word cloud created using data collected from comfort testing with UT Austin students in reference to what their design of a menstrual pad would be in terms of size, shape, and thickness.

Menstrual Pad Prototype (MPP)

Participants were also asked a series of questions about the MPP provided to them by the research investigators. Participants were asked to mark quality issues on the template provided in the survey and were given space to comment if they felt inclined to do so. Two of the eight participants wrote comments for this pre-test survey question:

“The stickers on the side didn’t quite fit on my underwear”
“A few burn marks, the adhesive sticky parts felt a little weak”

Prior to starting the exercise portion, and after wearing the MPP, participants were asked about the perceived comfort and perceived efficacy of the MPP. The responses have been categorized below into general thematic areas (table 6). Seven of eight participants responded to this question.

Durability	Comfort
<p><i>“By just first impression, it seems very easy to use and put on. It does seem like it will tear easily, but that’s just by looking at it.”</i></p>	<p><i>“one of the most comfortable pads...felt very soft and plush as opposed to the usual restrictive feel I get from other pads.”</i></p>

<p><i>“a little wear on the sides...may be due to the softness of the material”</i></p> <p><i>“The pad cotton felt a little weak”</i></p>	<p><i>“it’s a little long but I was surprised and how it feels flushed against my skin making it very discrete and so far great.”</i></p>
Adhesive	Absorbency
<p><i>“The top and the bottom stickers are actually so nice, they stick a lot more than the normal tampons, but the ones on the side sort of fold over and stick to the underside of my shorts. The pad seems a little thin but is super comfortable”</i></p>	<p><i>“I would worry about leakage.”</i></p> <p><i>“Seems less absorbent than ones I’ve used”</i></p>

Table 6. Feedback on the MPP types 1 and 2 from participants in the UT Austin comfort test. The feedback is categorized into themes and comments from participants are organized under their respective theme.

Post-test, participants were asked about if any changes in the MPP occurred. Of the eight participants, 50% (two of four) in both experimental groups, MPP type 1 and MPP type 2, reported “bunching” and/or “creasing” during the comfort testing (figure 11).

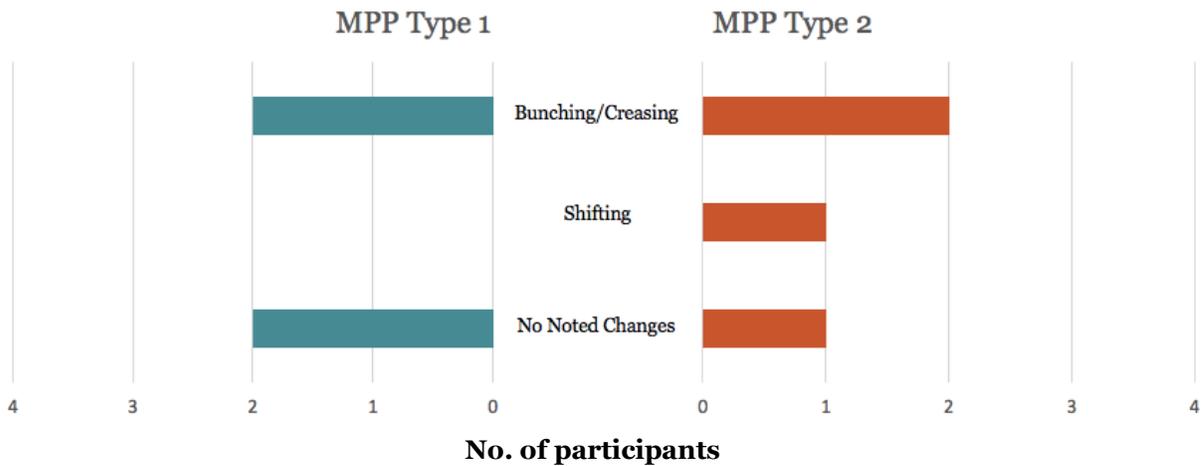


Figure 3. Data collected on MPP types 1 and 2 and is based upon the qualitative comments made by participants. The above categories were defined by researchers based on repetitive phrases seen in the data.

In the post-test survey, participants were also asked to evaluate their initial awareness of the MPP for the first one to two minutes during the exercise portion, their initial discomfort, and whether the MPP remained in place for the duration of the exercise (figure 12). Relatively similar results were seen between the two experimental groups.

Initial Perception of MPP Type 1 and Type 2 During Exercise Test

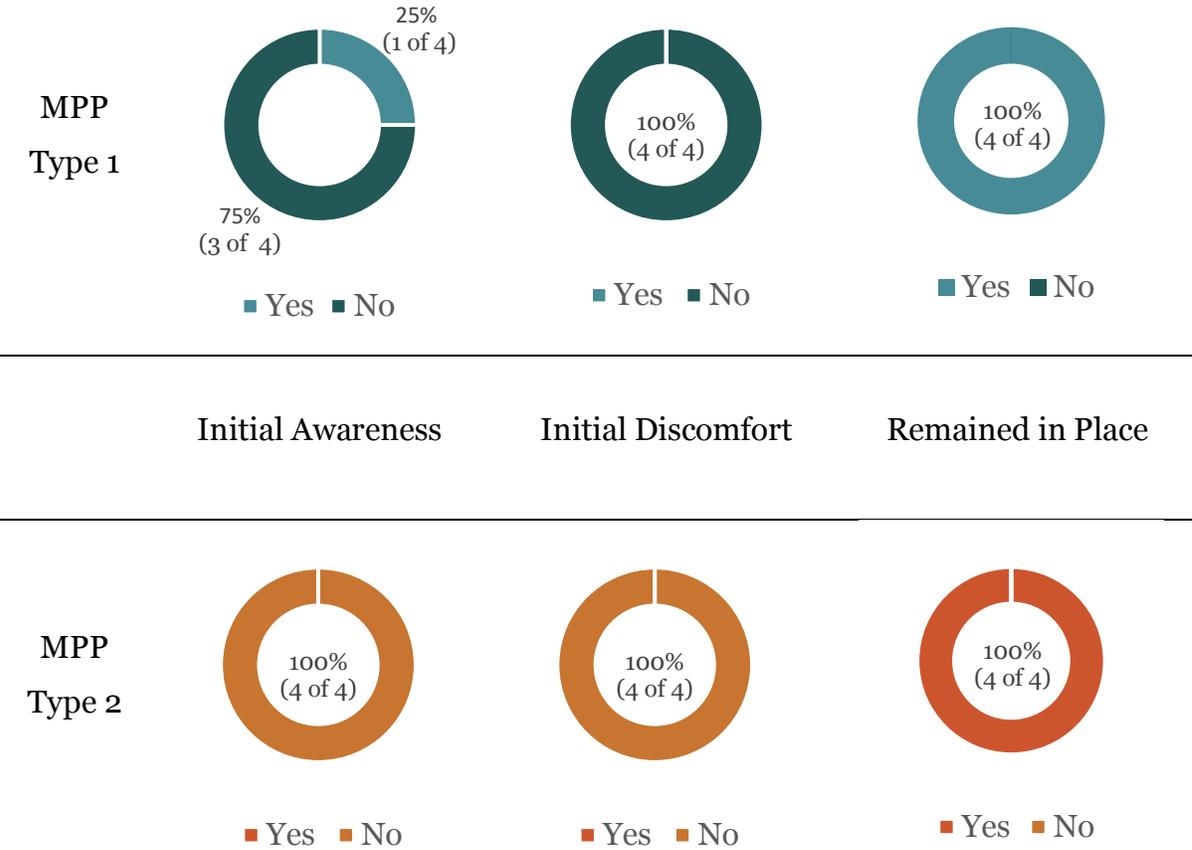


Figure 12. Data collected about the initial reactions to pad types 1 and 2 by participants.

Discussion and Conclusion

From this section, we were able to test an initial perception of the pads from a relatively neutral sample of participants. Participants did not have a deep investment in the project or thorough understanding of the situation faced by our population group in Lebanon. This approach allowed us to collect a product-based assessment of comfort.

Within the eight-person sample group, there appeared to be a strong preference for thinner pads. An interesting note that two participants made in their pre-test evaluations was that they appreciated the softness of the MPP. HERS Researchers noted the softness of MPPs compared to commercial menstrual pad brands with stiffer cores that are found in the US. Major problems about the pad design prior to testing appeared to focus on durability of the MPP and about the adhesive. Participants were concerned about the slight “wear” on the edges of the MPP and that it could “tear”. The “wear” seen on the MPP’s edges was most likely a by-product of the fabrication process. During the fabrication process, tears in the PE layer, which is most directly exposed to the wire elements, routinely occur due to the heat used to seal the materials together. While the “wear” does not compromise the efficacy of the product, this comment may inform us that psychologically, users may hesitate to try out the MPP because of a low perceived efficacy based on visual aspects of the pad. In terms of adhesive, the adhesive placement did not work for all participants which highlights an important consideration in that users will have different body types. On average, there didn’t appear to be a significant difference between performance of the type 1 and type 2 MPPs. This means that either type, MPP type 1 which uses an SAP absorbent core, and MPP type 2, which uses a felt absorbent, could be a viable menstrual pad design for the end-users to wear.

The results of the UT Student comfort test suggested that the adhesive pattern needed to be modified and that more care might need to be directed towards the aesthetic appearance of the pad. The overall acceptability of the MPPs used in this study suggested to the team that the baseline version of the pad could be used for distribution during the in-country Survey.

Efficacy testing with Students from the University of Texas at Austin (4/26/19 - 5/16/19)

Purpose

The purpose of this portion of research was to assess the efficacy of the MPPs, specifically MPP type 1 and MPP type 2 (table 2) created using Gertrude 1.0 (table 1). These were the same MPPs used in the comfort test with UT Austin students. The information compiled through this study was used to re-design MPPs for future studies within the HERS project.

Methodology

Sample

All participants were required to be between the ages of 18 to 50 years old, must have experienced a menstrual period, and must not have been pregnant at the time of the research. This study's sample size was eight students (n=8). The sample was small and relatively homogenous due to relative interests and make-up of the UT student community. All of the participants were close in age and none were representative of the team's target population group in Lebanon. Participants were invited to participate in the study through flyers created by the HERS research team and word of mouth. The study was approved by the IRB and followed necessary protocol. All participation was confidential and there are no identifiable markers in the research results. This study was conducted from 04/26/19 – 05/16/19.

Consent and Compensation

Participants were given \$20 cash compensation upon arrival to the study. Immediately after, a HERS researcher discussed the consent form given to each participant which ensured that all participation in the study was voluntary and the participant could withdraw from the study at any time without losing compensation. Once the participant's signature on the consent form was obtained, each participant was given a confidentiality form to take home with them. Participants were then handed the MPPs to be worn for the study. When the participant returned with a completed post-test

survey, they were given the remaining portion of their compensation, \$20 cash. In total, participants in this study were compensated \$40 cash for their participation.

Experimental Design

The study used a pre- and post-test experimental design to test MPP type 1 and MPP type 2. The difference between the two types was that MPP type 1 had a Super Absorbent Polymer (40%) as the absorbent layer, while MPP type 2 used felt as an absorbent layer. Five participants tested MPP type 1 while three participants tested MPP type 2.

Participants were given MPPs to complete a pre-test survey that informed HERS researchers of initial MPP aesthetic feedback and personal menstrual preferences. The pre-test was conducted in a private conference room reserved by HERS researchers. Participants were then given eight MPPs of the same type in a large plastic bag (Ziploc) to take with them to use during their next menstrual period. Participants were requested to come back to HERS researchers with a completed posttest survey evaluating their experience with the MPPs they tested. Both pre-test and post-test surveys were completed on paper and participants were thanked for their participation. (See table 10 in appendix for full report of survey results).

Limitations

The study had only eight participants, five participants tested MPP type 1 and 3 participants tested MPP type 2. The limited size of the sample and nature of menstrual periods limited researchers' ability to gather comprehensive understanding of the MPPs' efficacy with a large sample population. The homogeneity in age and physical environment also limits investigators ability to extrapolate and emulate the preferences of the general population, and even less so our target population. Furthermore, there is a possibility of voluntary response bias because participants self-selected to participate in this efficacy test. Additionally, not all participants used menstrual pads as their regular menstrual product, which makes their feedback hard to compare to commercial menstrual pads for product design purposes and feedback. Each participant was

provided eight MPPs, however, none of the participants tried all eight of the MPPs provided to them and researchers did not ask participants about the length of time participants wore each MPP or their flow on the day they wore the pad. This limited researchers’ ability to comprehensively understand the MPP’s efficacy. The HERS project timeline also provided a limitation due to the nature of menstrual cycles.

Results

The results from this study are described in the sections that follow and divided into categories. Overall the results from this efficacy test indicated that the main concern with both MPP types was with the MPP adhesive. The same adhesive and configuration was used for both MPP types. The data collected in this study helped guide future iterations of the MPP and pad press.

Current Use

Participants were asked about their average menstrual flow. The answer choice options for this question were Medium, Heavy, and Other. For MPP type 1, the participant that selected Other wrote, that the menstrual flow “Starts heavy and becomes medium” while for the participant that marked other and tested MPP type 2 wrote in “Have endometriosis so lot of tissue flow.” Full results for participant responses to this question are shown in figures 13 and 14, separated into two graphics to isolate responses by the MPP type worn by participants.

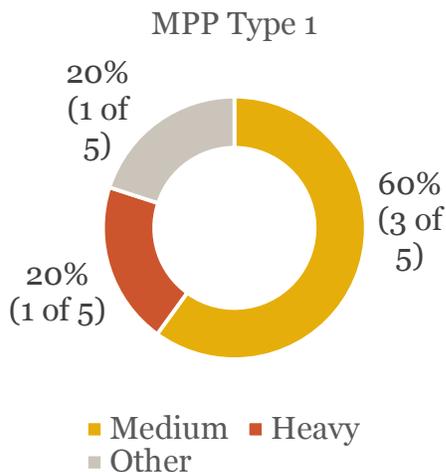


Figure 13. Data collected about the menstrual flow characteristics of participants who tried MPP type 1.

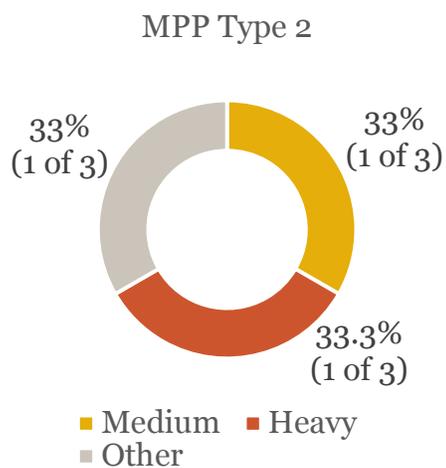


Figure 14. Data collected about the menstrual flow characteristics of participants who tried MPP type 2.

The question about menstrual flow was followed up by a question that asked about what type of menstrual product the participant usually wore. Apart from one participant, all participants regularly used disposable pads. Some participants used other menstrual products as well, such as menstrual cups and tampons. The question also asked for the brand of the product if the participant usually used disposable menstrual pads.

Participants reported using Always, Kotex, or “cheapest available pad.”

The question was asked to better understand the preferences of the participants.

Knowing the brand name of the menstrual pads worn by participants also allowed for HERS researchers to compare the MPPs made by the HERS team to the products worn and preferred by participants.

Pre-test Initial Observations

Participants were asked to rate the MPPs they were given for multiple qualities using a scale of 1 for “Very Poor” to 5 for “Very Good.” The mean rating value per quality per MPP type was calculated using the data collected. Seen in figure 15 below, the main concern with quality held by participants was the feasibility of applying the MPP to their underwear.

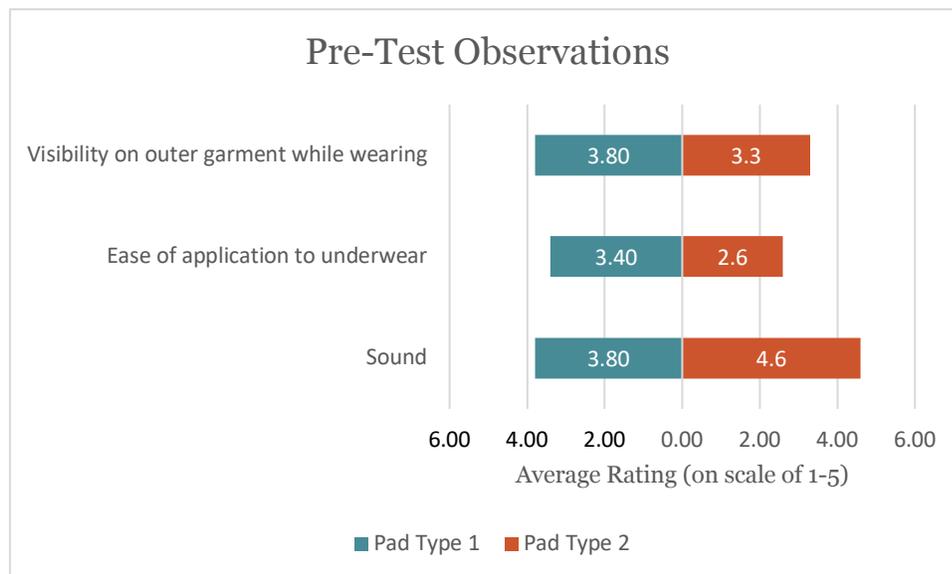


Figure 15. Data collected about the initial impressions of MPP type 1 and MPP type 2 by participants.

Comfort

All eight participants reported that the MPPs they tested were comfortable and provided additional comments about the comfort of the MPP when asked to describe further.

These comments are categorized by MPP type and listed below in table 7.

MPP Type 1	MPP Type 2
<i>“Pad was as comfortable as regular disposable pad”</i>	“Did not feel pad at all except while being active”
<i>“Very soft and very comfortable”</i>	“It was more comfortable than other pads worn and stayed in place while walking to class and moving furniture”
<i>Very comfortable but got misplaced throughout day”</i>	
<i>“Liked how thin and soft pad was as well how much it absorbed, was not aware of pad being there except when running or working out”</i>	“Whole adhesive came off when removing adhesive paper, but sizing was good”
<i>“Pad stayed in place but did not do any vigorous activities”</i>	

Table 4. Qualitative data collected from participants in regard to the comfort of MPP type 1 and MPP type 2.

The main issue expressed by some of the participants was an issue with the adhesive on the MPP. The adhesive reportedly did not hold the pad in place, especially while participants were active. Participants also reported that the adhesive was difficult to navigate when applying the MPP to the underwear.

Post-test Observations

Participants were asked to rate the MPP they were given for multiple qualities using a Likert scale of 1 for “Very Poor” to 5 for “Very Good” (figure 16). The mean rating value per quality per MPP type was calculated using all of the data collected from participants

which can be found in table 10 in the appendix of this report. The definition used for fuzzing was “tangled fiber ends that protrude from the surface of a yarn or fabric.” The one given for pilling was “bunches or balls of tangled fibers which are held to the surface of a fabric by one or more fibers.” Photos were given of both to provide further guidance.

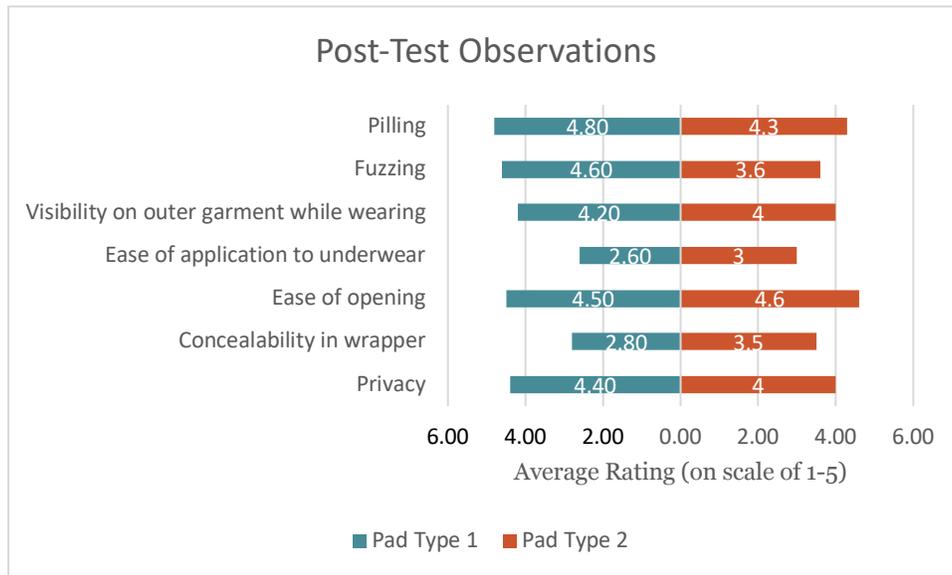


Figure 16. Data collected about MPP type 1 and MPP type 2 from our likert scale, which asked questions related to post-test observations. Full results for this part of the survey can be found in appendix table 10.

For these questions, ease of application to underwear and concealability in wrapper stood out as areas of focus for MPP design alterations.

Discussion and Conclusion

This portion of the research gave a better understanding of the MPPs efficacy as a product designed to be used as a menstrual pad. It was found that MPP type 1 and MPP type 2 both worked as a menstrual pad. Participants reported concern with the adhesive of the MPPs interfering with the efficacy of the MPP’s absorption due to shifting of the MPP. This was typically exacerbated with activity. Additionally, some participants struggled with applying the MPP to their underwear. They reported that they had to carefully remove the top paper layer above the adhesive and sometimes this caused the entire adhesive dot to come off the pad, rendering it ineffective for application to underwear.

Participants reported that the pad was comfortable, and some added that it was as good as or better than the commercial pad they typically wore. It did not seem that there was a significant difference at any point between the two MPP types, suggesting that the SAP and felt were interchangeable for end-users. This information led HERS researchers to continue exploring felt options for the absorbent layer of the MPP in Lebanon. The main modification made in future MPPs was the adhesive.

Focus Group with Resettled Refugees in Partnership with Refugee Services of Texas (RST) (4/13/19)

Purpose

The purpose of the focus group with resettled refugee women in partnership with Refugee Services of Texas (RST) was to collect menstrual product preferences and practices from resettled refugees in the United States who have experienced displacement from their country of origin. Results from the focus group helped inform the MPP re-design and established relationships between the HERS team and the local resettled refugee population. As part of the PAGL initiative, researchers are asked to explore avenues in which their project can benefit the local community. The researchers' relationship with RST has been explored as an avenue for the HERS project to benefit the local resettled refugee population. The focus group helped inform the HERS researchers' understanding of how menstrual practices change during times of transition or displacement. The focus group also served as an opportunity to introduce the MPP created by HERS researchers to a group who had no prior knowledge of the project and to witness responses that helped direct future fabrication and design.

Methods

Research participant demographics

This phase of the study used a sample consisting of seven resettled refugees. Participants in a regularly scheduled group with RST self-selected to join the informal focus group. Participants came from the Democratic Republic of the Congo (n=1), Iran (n=1), Afghanistan (n=1), Myanmar (n=3), Morocco (n=1) and were between the ages of 28 and 51 years old. Only one participant reported living in an ITS before being resettled in the United States. The length of time spent in the US after resettlement ranged from four months to twenty-two years. All participants were resettled in the Austin, Texas area in the US.

Consent and Compensation

Each participant was given \$25 USD as compensation for their time and input. The only criteria for these participants was that they were eighteen years or older and have previous experience with menstrual products. In accordance with IRB protocol, participants were first given their compensation and then asked to sign compensation tracking and consent forms. Conversations during the focus group were audio recorded with participant permission and notes were taken during discussions. All data collected was de-identified and securely stored.

Experimental Design

Participants in this focus group were given an eight-question questionnaire to complete with the help of an interpreter. The questionnaire aimed to assess participants' menstrual product preferences. A full report of results from the questionnaire can be seen in table 11 in appendix. Another aim of this study was to gather impressions of the MPPs made with the HERS pad press (Priscilla). A commercial pad (Always brand) and tampon (Playtex brand) were passed around the table to the participants so that they could compare the three types of menstrual products. An organic conversation evolved as participants discussed the MPPs given to the group. Participants spontaneously decided to compare the absorbency of the MPPs to that of the commercial products using a bottle of Gatorade that was on the table. Important takeaways from this conversation are highlighted below.

Limitations

Since participants self-selected to participate in the focus group, this creates the possibility of a voluntary response bias. The small sample size also means that opinions shared during the conversations cannot be generalized to represent the preferences of participants own respective cultural/ethnic groups. Three interpreters were present for the focus group to help translate the questionnaire as well as questions asked during the focus group. Three languages were translated during the focus group, which limited the number of questions that could be asked by researchers in the short period of time available for the focus group. The Burmese interpreter was responsible for interpreting

for two participants at once as well, which may have contributed to a merging of the information communicated. Translation may have affected how questions were received, especially when questions were complex and more difficult to interpret. Furthermore, the questionnaire used to ask women about their previous menstrual practices used the word “camp” which was loosely defined and reported as confusing by participants. Not all participants lived in an informal settlement or refugee camp prior to arriving in the US. This made generalizing any of the stated menstrual practices during crisis responses situations to the primary target population, Syrian refugees in Southern Lebanon, difficult. Additionally, the time since displacement ranged from less than one year to more than twenty-two years. Some questions asked participants to remember their menstrual product and practice preferences before they were displaced and this large range may have opened up answers to recall bias.

Results

Focus Group Discussion Highlights

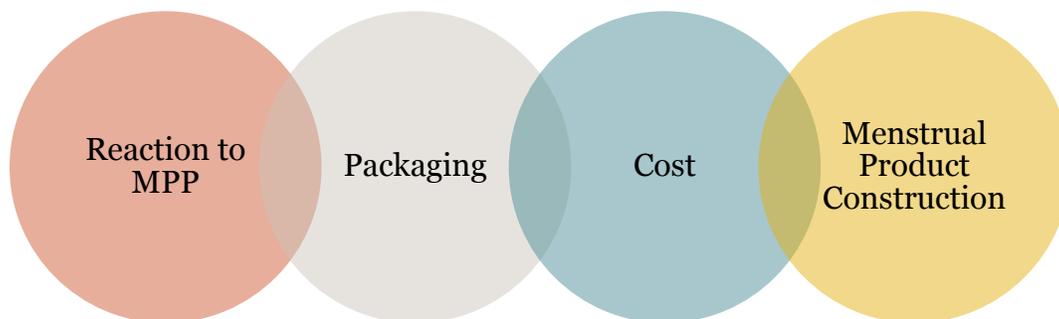


Figure 17. The main areas of discussion in the focus group with displaced persons resettled in Austin, Texas.

The participants reported that leakage and excess wetness were challenges they have faced with menstrual products that they used in their countries of origin. During the spontaneous experimentation with the products provided during the conversation, one participant reported the follow.

These pads (made by the HERS team) felt dry compared to the commercial pads and tampons.

Participants requested and were given the opportunity to test the menstrual products with researchers present using Gatorade. These informal experiments changed the participants' initial reactions to the MPPS. Another major concern held by all participants was the way in which the menstrual pads were packaged.

One participant reported hiding their unused disposable pads in a black plastic bag between clothes in the participant's dresser in their country of origin. This participant reported that they did this because they felt embarrassed for their extended family (which lived with them) to see their pads. When asked whether this was still the case after resettlement, the participant reported that they are no longer embarrassed, and they store their menstrual pads openly in their bathroom at home now that they only live with their partner and children.

All participants reported that they would prefer the disposable menstrual pads to be packaged discretely in a material that could be repurposed to wrap used pads for disposal. This reported preference was also linked to a desire for it not to be obvious that the product in the packaging was used for menstruation.

Some participants mentioned using a storage box as an alternative storage solution to plastic packaging.

Another important note that was mentioned by participants in reference to their preferred menstrual product was about the cost of menstrual products.

Cost was a concern for some participants, and all participants reported that tampons were more expensive in their country of origin.

The design of menstrual products, especially menstrual pads, made a difference in the participants' experience using the product in their country of origin.

One participant used disposable pads without wings in their country of origin and that the pads leaked and ruined their clothes.

Another participant reported that their menstrual pads at home were much thicker than the products brought to the focus group and gestured with their hands to a thickness of around two inches. This participant reported that even though the pads were very thick, they still felt wet when used and leakage was still a present challenge.

Discussion

Conversations from the focus group were key to informing product re-design. While some participants emphasized price as the most important factor when choosing a menstrual pad, other participants looked at a combination of comfort and price with comfort being the priority. This information highlighted the importance of carrying out preference surveys to inform the design of the HERS MPP. Focus group participants suggested that they were used to thicker menstrual pads which encouraged a modification of the existing MPP to include polyester quilt batting in addition to the SAP paper. During the focus group, the women carried out a test of the MPP's absorbency by pouring liquids on the pads and pulling them apart to examine the materials. This hands-on and self-driven test of the MPP helped participants achieve a positive perception of the MPP's efficacy, countering initial skepticism. While most participants were used to thicker pads, after witnessing the efficacy of the thin absorbent layer (40% SAP), the women were more open to potentially using a thinner pad. This information guided researchers to create a video re-creating the Gatorade efficacy test with colored water. Researchers then instructed LRC volunteers to show this video to participants in the Wave 2 Efficacy Test with Syrian Refugees in Southern Lebanon to ease any skepticism of the MPP.

The participants were very engaged in learning about the materials used to create the pads, how the HERS pad press worked, and how the entire project concept could be

applied to help their countries of origin. Hearing the ideas and stories of these participants was inspiring and provided researchers with another avenue to integrate this group in their efforts to bring the HERS project back to both the Austin, Texas community and across the state.



Preference and Efficacy Testing with Displaced Persons in partnership with the Lebanese Red Cross (4/24/19-8/20/19)

Purpose

This phase of the HERS project was implemented in partnership with trained LRC staff and volunteers over the course of four and a half months. The following three surveys were conducted with the purpose of evaluating menstrual preferences and testing MPPs with a population currently experiencing displacement: Wave 1, Wave 2, Wave 3. Each survey Wave focused on different aspects of menstrual product design and MPP effectiveness, but the overall goal was to assess whether the preferences of a community can be collected and responded to appropriately. Surveys attempted to combine frameworks across various disciplines in order to holistically understand the needs and preferences of forcibly displaced people who menstruate. The results of each Wave informed MPP re-design for the next Wave. A focus group was also conducted with LRC volunteers and staff to better understand survey methods and as an opportunity for HERS researchers to learn from their partners' expertise. All studies mentioned in the table below are described in the following sections in chronological order. Immediately below is a description of the methodology and sample that was used across all three survey Waves.

Wave 1 (4/24/19)	Needs-based analysis that aimed to evaluate menstrual product preferences among Syrian refugees in Southern Lebanon.
Wave 2 (6/16/19)	Efficacy test that aimed to evaluate reactions and effectiveness of MPP Type 3 with Syrian refugees in Southern Lebanon through MPP distribution and a follow up survey.

Focus Group with LRC Volunteers (7/23/19)	This focus group was an opportunity for HERS researchers to interact with and learn from the LRC volunteers and staff who conducted the Wave 1-3 surveys.
Wave 3 (7/16/19)	Efficacy test that aimed to evaluate reactions and effectiveness of MPP type 5 with Syrian refugees in Southern Lebanon through MPP distribution and a follow up survey.

Overall Survey Methods

Sample

HERS researchers worked with residents in an ITS in Saida, Lebanon, a city in the South of the country. This ITS hosted an unfinished permanent structure which was occupied by a group of two hundred Syrian families. According to current Lebanese law, no official structures are allowed in Lebanon for Syrian refugees ([UNHCR, 2014](#)). This legal reality limits the ability to install adequate plumbing, sewage systems and any other permanent structures linked to country-wide systems. More details about the ITS can be found in the focus group with LRC volunteers section of this report. A discussion of the limitations presented by MHM challenges such as those presented by the conditions of this ITS are discussed in the overview of literature section of this report.

Waves 1-3 were conducted with 32-33 displaced women living in the aforementioned ITS. The sample participants in these studies remained relatively stable across all three Waves, however when attrition occurred, new participants were found to fill any empty places which caused a slight fluctuation in sample size and minor changes to composition. Participants were invited to participate by the LRC volunteers at random. In order to participate, participants were required to be between the ages of eighteen to fifty years old and must have experienced a menstrual period. Any participants who were younger than eighteen were excluded from the results. All participation was

confidential and no identifiable information is shared in the research results per IRB approval.

Consent and Compensation

Participants were asked by LRC volunteers to sign an IRB approved informed consent form and were assured of the confidentiality of their participation. Survey participants were not monetarily compensated for their participation. This decision was made in alignment with the LRC based on LRC protocol, in which compensation was deemed inappropriate.

Experimental Design

All surveys were conducted by LRC volunteers who had established relationships with the community. HERS researchers did not interact with the community in person. Data was collected through the LRC's GIS system on a tablet used by LRC volunteers who went door to door surveying participants in the ITS.

The Wave 1 survey, a needs and preference analysis, comprised of a mix of quantitative and qualitative questions. Surveys were carried by LRC volunteers over the course of a few days. Participants were also shown physical samples of MPP type 1 and type 2 to evaluate as part of the survey. The type 1 and type 2 MPPs were created using Priscilla.

For the Wave 2 and 3 efficacy tests, the effectiveness of the MPP type 4 and type 5 respectively were analyzed. MPP type 4 and MPP type 5 were created using Gertrude 2.0. The Wave 2 MPPs were distributed on 7/16/19. Participants were asked to wear the MPP during day 2 and 3 of their period and to remember their experience when using the MPPs. Four weeks later LRC volunteers went back to the community to carry out the Wave 2 survey which was designed to collect information about participant's experience wearing the MPPs. This four-week gap was established intentionally by researchers to account for menstrual cycle length variability so that participants would have a higher likelihood of trying the MPPs during their menstrual cycle. The day that the Wave 2 survey was conducted, 8/16/19, was the same day that the Wave 3 MPPs were

distributed. Similar to Wave 2, four weeks later, LRC volunteers returned to the community to conduct the Wave 3 survey.

Only three Waves were conducted due to time constraints of the HERS project and the nature of a twenty-eight-day menstrual cycle. See the appendix for full versions of the survey questions and results for each Wave.

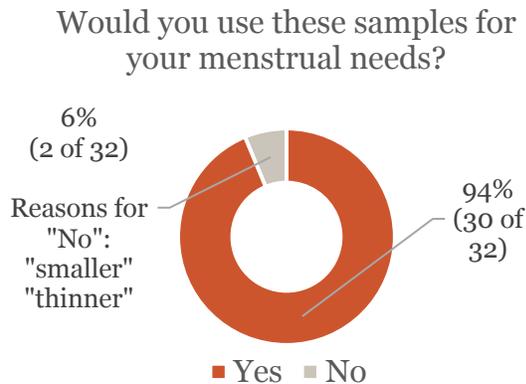
Translation

A partner at the LRC translated each of the surveys created by researchers for Waves 1-3 into Arabic for the survey conduction. Survey results were translated by a partner at the LRC into English and sent back to the HERS team for analysis. The raw data was analyzed by the HERS team and can be found in the following sections.

Wave 1 - Preference Test with Displaced Syrian Women in Informal Settlement in Southern Lebanon (4/24/19)

Results

Initial Perception



When asked what the participants thought the samples (MPPs) shown to them were for, 95% of participants reported that the prototype looked like it was designed for “menstruation” or “is a sanitary pad.” Almost all participants (94%) said they would use the MPPs shown to them. Those who said no described it as being “too small” or “thin” (figure 18).

Figure 18. Data collected during the Wave 1 Pre-Preference Survey in reference to their interest in trying the pad prototype.

Thickness

When asked if the MPP looked like what they have used, 59% of participants reported no, and cited the size, thickness, shape, and packaging as reasons. Preferences for thickness can be seen figure 19. The thickness of the MPP shown to participants in this study was notably thinner than the preferences stated in the Wave 1 survey. Adapting to this feedback, for the Wave 2 MPP, researchers made the pads slightly thicker by doubling the batting layer of the MPP. Most participants used disposable

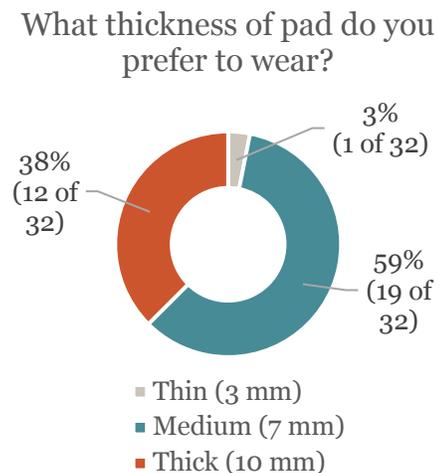


Figure 19. Data collected during the Wave 1 Pre-Preference Survey in reference to the preferred thickness of a pad.

“Private” brand menstrual pads which HERS researchers used informally to compare to our MPPs in the MPP re-design process.

Wings/Cost

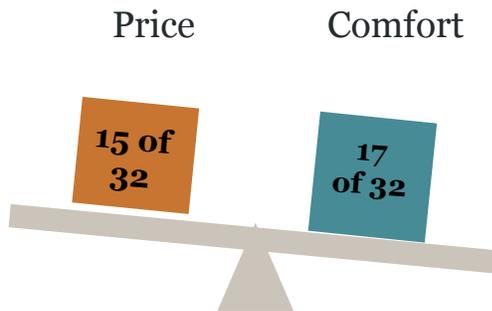


Figure 20. Number of participants that chose comfort and price respectively as their most important consideration when purchasing pads. Data from the Wave 1 Survey.

Participants were asked to evaluate what their most important consideration was when buying menstrual pads through a multiple-choice question. Answer choices included “price”, “comfort”, “a product that can be washed and used again”, and “other”. Fifty-three percent of participants stated that comfort was their primary consideration (figure 20).

A preference for wings was consistent within the sample, with twenty-seven out of the thirty-two women (84.4%) requesting wings. Participants were asked to compare two menstrual pads with the exact same materials and cost in order to eliminate these confounding variables as a reason for picking one menstrual pad over the other (figure 21).

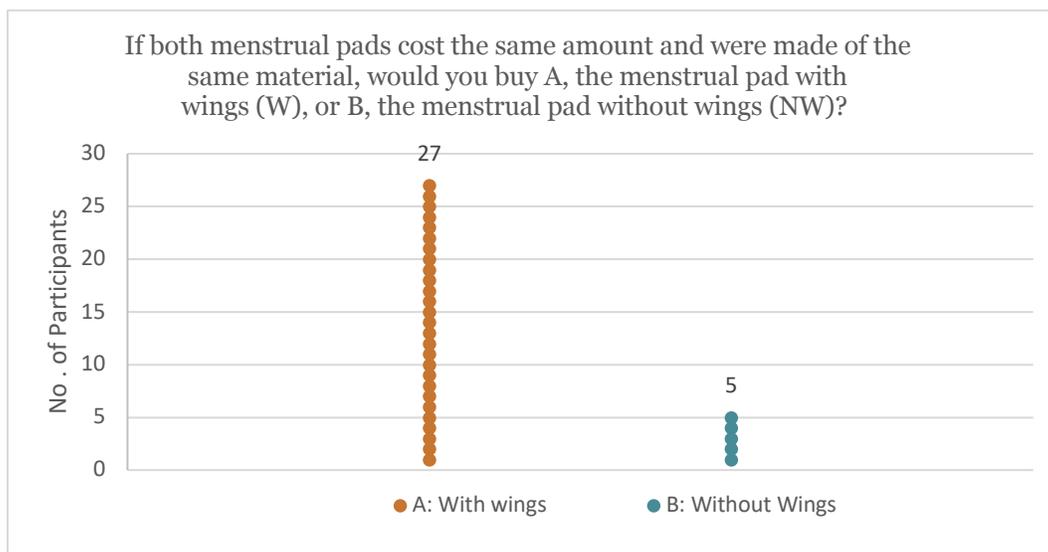


Figure 21. Preference of wings from the Wave 1 Survey.

Interest in Menstrual Pad Fabrication

When asked, most participants (64%) reported that they were not interested in fabricating menstrual pads themselves or that they “maybe” would be (12%). The question was altered in the Wave 2 survey based on a recommendation by partners at the LRC, who suggested that the lack of interest may have been attributed to the phrasing and translation of the question

Limitations

Since the Wave 1 survey was only a preference analysis, participant perception of the MPP could only be formed based on visual evaluation of the product. Additionally, the nature of the translation of the survey was not reviewed by HERS researchers or any third party therefore it is possible that there were differences in question structure that may have affected how the participants answered questions and how it was interpreted by HERS researchers. The structure and nature of the HERS project as a partnership where HERS researchers did not conduct research in person with research participants may have influenced how results were interpreted as well.

Discussion

One of the most important findings from this study was that the comfort and design of a menstrual pad was a slightly more important consideration than price for these participants when buying menstrual pads. The participants were willing to pay more money for a menstrual pad that had features such as wings. Both thickness and wings were consistently identified as a preference within this sample community. Although researchers could not appropriately respond to thickness concerns due to the structure of Gertrude 2.0, Wave 2 results led researchers to create a MPP with wings for Wave 3 survey. Results from the study illuminated potential misunderstanding of questions due to the complexity of the way the question was asked and then translated. This was taken into account and informed adjustments made to the Wave 2 survey. Through the survey, HERS researchers were able to learn more about the menstrual practices of their sample population during displacement, such as information about the disposal of menstrual pads and where participants bought menstrual pads. Additionally, the background

information collected, such as year of displacement and year of arrival to Lebanon, helped put these figures into context.

Wave 2 - Efficacy Test with Syrian Refugees in Southern Lebanon (6/16/19)

Results

Overall, HERS researchers were able to determine that participants were willing to try the MPPs (type 4) distributed to participants. Feedback from the efficacy test showed that participants would be interested in using the MPP, with almost 70% choosing “probably would use,” “would use,” or “definitely would use” this MPP. Participants’ willingness to wear the MPPs distributed for the Wave 2 study were further explored in terms of use on a Likert scale as well as length of time willing to wear the MPP. Results from these questions are displayed below in figures 22 and 23.

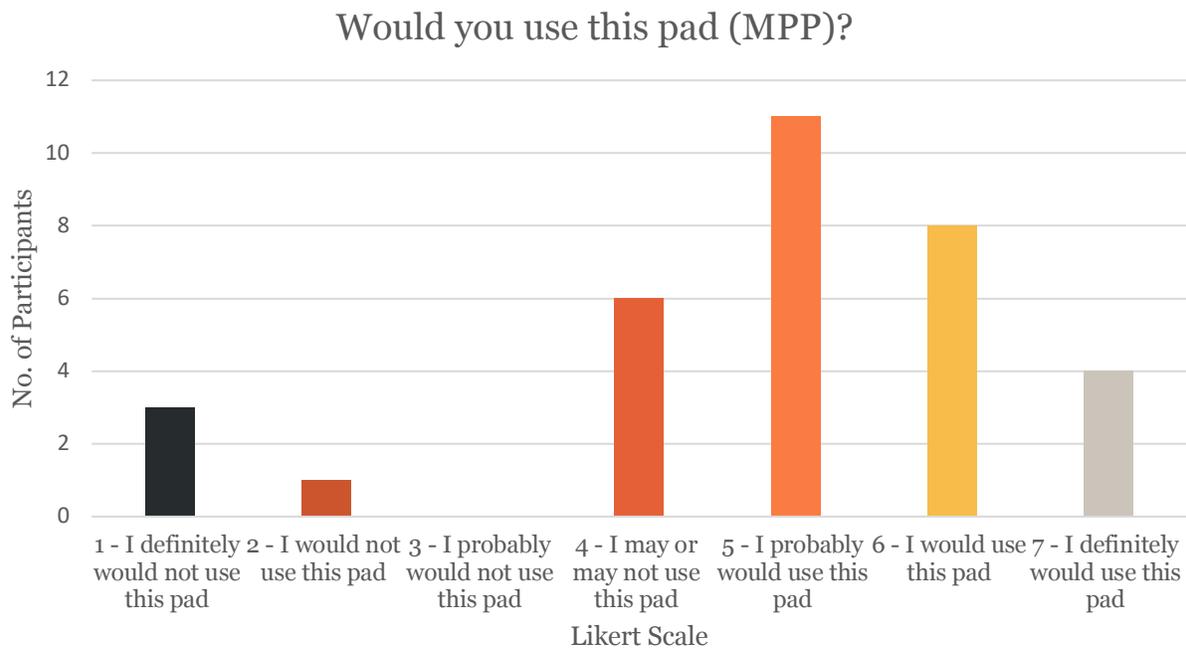


Figure 22. Reported likelihood of participants to use the pad collected during the Wave 2 Efficacy Survey. Most participants reported that “[they] would probably use this pad.”

When asked how long participants would be willing to wear the MPP upon their arrival in Lebanon after initial displacement, 57% said they would use it always.

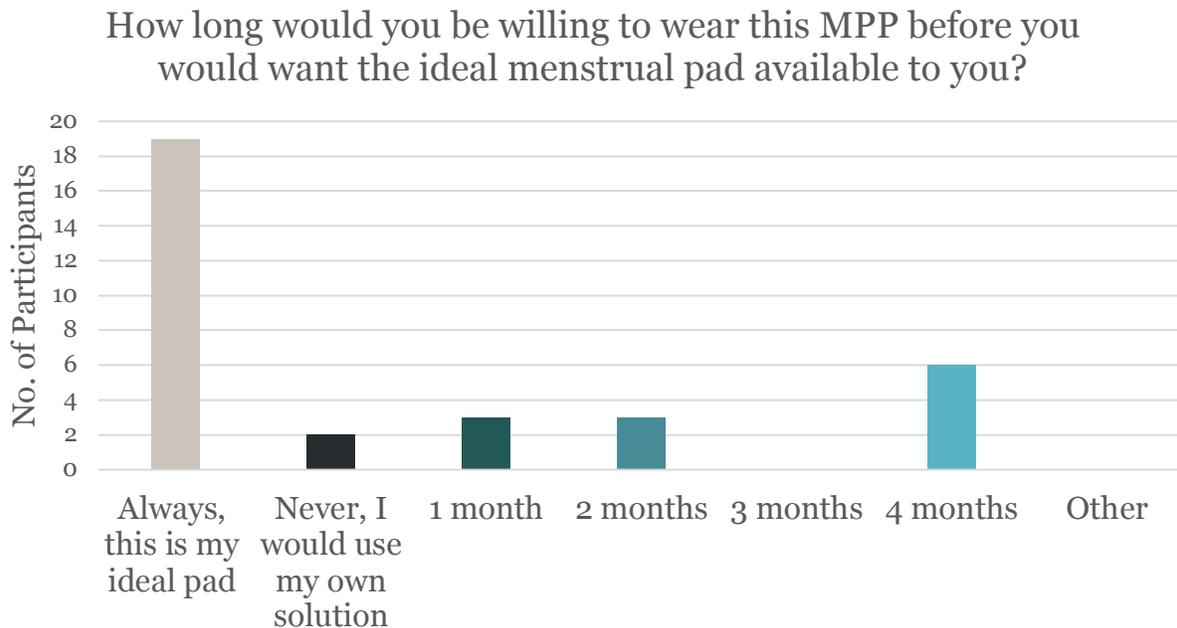


Figure 23. Wave 2 Efficacy Test data collected created a window of tolerance model and suggested that the HERS MPP could be tolerated indefinitely by most participants as their “ideal pad.”

Seventy-eight percent of participants said the MPP was comfortable, however, concerns regarding the efficacy of the MPP in terms of leakage, composition, and preference for more absorbent material was repeatedly stated (figure 24). A specific comment that appeared repeatedly in the survey results was “it is not fixed,” which researchers understand to be a reference to the previous study in which participants noted the MPP not having wings as something that needed to be “fixed.” The middle right and left section were repeatedly stated as problem areas on the MPP that either allowed for leakage or shifted during wear.

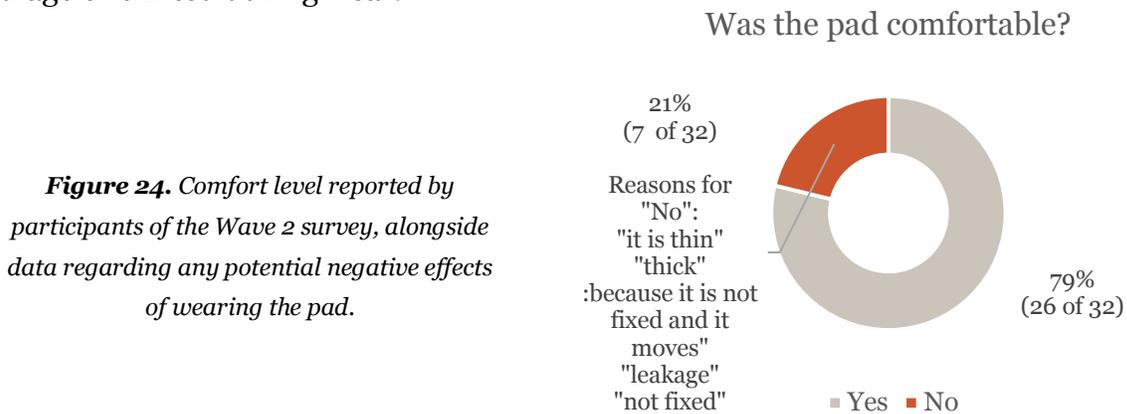


Figure 24. Comfort level reported by participants of the Wave 2 survey, alongside data regarding any potential negative effects of wearing the pad.

Wave 1 to Wave 2 Comparisons

The thickness of a menstrual pad appeared to be a personal preference that showed comparatively different results between the Wave 1 and Wave 2 preference questions about thickness. There was a near 50/50 split on whether the MPP was thick enough in the Wave 2 survey, which used pad type 4, a considerably thicker pad than pad type 1 which was shown to participants in the Wave 1 survey (figure 25).

There was a significant change in the results of the question regarding women who would be interested in being taught the fabrication process to lead in their community between the Wave 1 and Wave 2 surveys with 84% reporting yes in the Wave 2 survey versus 21.9% in the Wave 1 survey.

Limitations

Surveys were carried out collectively in one visit in order to respect LRC volunteers' time. Due to the timeline and nature of menstrual cycles, participants could potentially have used the MPPs during the first week, which would leave them susceptible to memory recall bias when asked survey questions about the MPP's efficacy three weeks later. In this iteration, translated questions were looked over by both the HERS researchers and LRC partners, but the nature of translation and simplification of questions by LRC volunteers for better understanding by participants may have influenced the interpretation of the question and response by participants. Due to timeline constraints faced by the HERS project, only five MPPs were passed out to each participant, limiting both the length of time participants were able to evaluate MPPs as well as the number participants that could be engaged given the limitations of the

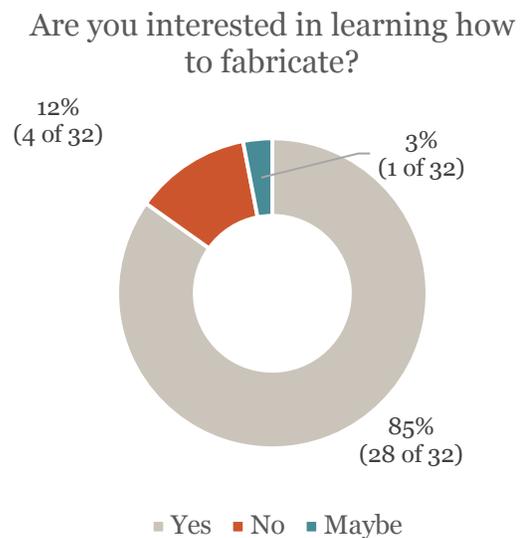


Figure 25. Data collected suggesting most survey participants are interested in learning the fabrication and continuing the project.

fabrication process for MPPs. From Wave 1 to Wave 2, the participant pool changed slightly due to movement within the ITS. This may have affected participants understanding of the project and therefore responses by participants based on familiarity with the study.

Discussion

One of the most important findings in this study was that participants appeared to be interested in fabricating MPPs using the pad press created by the HERS team to meet their community's MHM needs. The evidence of interest in project ownership by participants gave researchers a foundation for the continued implementation of the HERS project model. A question added to the Wave 2 survey regarding how long participants would be willing to wear the MPP upon their arrival illuminated that the implementation of this project could be used as a long-term solution, supported by nineteen participants who responded that they would "always" use the MPP. This question was added specifically to provide context to the IFRC on the window of tolerance for a quick-response disposable menstrual pad as an immediate solution before a long-term solution would be needed.

Overall, the MPP used in the Wave 2 study proved to be effective and acceptable to participants. The repeated statement of "it is not fixed" throughout the survey highlights an important consideration in responding to menstrual pad preferences evaluated from the Wave 1 survey. Since participants were asked their preference in the Wave 1 survey, it could be inferred that an expectation for these preferences, specifically the addition of wings, to be implemented was not met in the MPP given to participants in Wave 2. HERS researchers used this information to inform the redesign of the Wave 3 survey to account for survey fatigue as a result of repetitive questions assessing preferences without tangible response to preferences given. It was noted that further clarification of the purpose of the study would be beneficial in future surveys.

Focus Group with LRC Volunteers in Saida, Lebanon (7/23/19)

Purpose

The purpose of hosting a focus group with LRC volunteers was to help inform researchers on the menstrual pad distribution and survey conduction process since researchers did not interact face to face with the Syrian survey participants. The focus group also helped researchers understand the relationship between the volunteers and the research participants to support the HERS goal of establishing a value-laden process that listens to client needs.

Methods

Participant Demographics

Participants in this focus group were invited to participate based on their engagement with the HERS research project through the distribution of MPPs and survey conduction. There were six participants in the focus group: four LRC volunteers and two LRC employees. Focus group participants were involved in the Disaster Management Unit, Soft and Hard WASH, and Basic Assistance (BA) programs and have been involved with the LRC within a range of three months to over three years. All participants identified as female, which was noted by the participants in this focus group as an important factor in conducting surveys related to menstruation. Additionally, it was noted that the volunteers primarily worked with children in the ITS on projects related to hygiene promotion. Each volunteer was able to share valuable insight and feedback to the researchers which was informed by their program expertise and experience.

Consent and Compensation

Participants first signed an IRB approved informed consent form assures confidentiality. Focus group members were not monetarily compensated for their participation. This decision was made in alignment with the LRC, in which the

participants operate on a volunteer and employee basis. Monetary compensation was deemed inappropriate.

Focus Group Structure

The focus group conversation was led by researchers. Participants were asked to review and sign an informed consent form before the conversation began. Once consent forms were collected, each member of the focus group introduced their position within the organization or HERS project.

The HERS research team then showed the focus group participants a video of the pad fabrication process as some focus group participants had never been formally introduced to the HERS project. The conversation structure was largely designed to have an organic flow and to mirror a conversation. Researchers also prepared a list of questions to guide the conversation when needed, which are listed below:

1. When thinking about crisis response and your experience volunteering with the LRC, what do you think about the HERS project?
2. What were the participants' initial responses to the menstrual pad or videos of the menstrual pad during distribution?
3. Based on your experience, do you think it would be feasible to implement a survey process such as the one you have helped with for the HERS project where no previous relationship existed between the volunteers and survey participants? How long did it take for you to establish a relationship with women in this community?
4. Were any questions harder for you to ask about than others? Which ones? Why? Was it hard to open this conversation with women?
5. Where did you conduct the surveys? Was it difficult to find a space to talk privately with women? Were men ever present during the survey?
6. Do you have any suggestions based on your expertise for ways to improve this approach?

Additional questions were asked by HERS researchers to understand answers given by focus group participants when appropriate.

Results

The conversation elicited information that the HERS researchers have divided into six sections which are elaborated below (figure 26). Throughout the conversation, the participants in the Wave 1 LRC Preference test and Wave 2 Efficacy test were referred to as beneficiaries by LRC volunteers and employees. This language has been preserved in the discussion that follows.

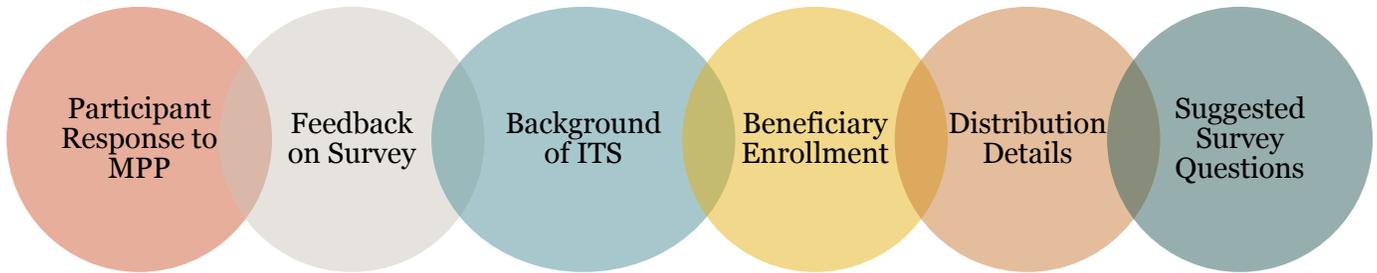


Figure 26. Main areas of discussion in the focus group with LRC volunteers in Saida, Lebanon.

Participant Response to Pads

Overall, focus group participants reported that the beneficiaries received the pads “*in a good way.*” The beneficiaries were open to receiving the menstrual pads being distributed for the study and volunteers reported that they were not shy about their participation in this research. Beneficiaries reportedly shared with other members of the ITS that they were participating in the study and their participation sparked conversation as others checked in with the beneficiaries about their participation.

Beneficiaries reported that the menstrual pads given to them should be more “*compressed.*” This was inferred to mean that the entirety of the pad should be filled in so that the pad’s thickness was consistent from bottom to top and from side to side. Beneficiaries also reported that the pads folded due to humidity, which increased the likelihood of leakage for the Wave 2 pads which did not have wings.

Longer pads were suggested by beneficiaries, especially those who had intrauterine devices (IUDs) and multiple children. The length of the pad was suggested to provide more coverage and protection for beneficiaries with heavier menstrual flows.

Focus group participants informed researchers that some beneficiaries reported wearing the MPP for an entire day. Some beneficiaries reported wearing the MPPs until they had worn all five and then used their usual menstrual product while others used their own menstrual product first and then used the distributed MPPs.

Upon distribution of the Wave 3 MPPs, beneficiaries were reportedly excited to try the new pads and glad to see that wings had been added.

Beneficiaries expressed concern about the adhesive on the Wave 2 pads and reported that residue from the adhesive glue was left on their underwear. Beneficiaries also reported that the adhesive configuration on the Wave 2 pads did not adequately account for the areas where they experienced leakage, which was predominantly around the middle sides of the pads.

Feedback on Survey

The four LRC volunteers and 2 LRC employees met for five to ten minutes to go over the entire survey before conducting the surveys in the ITS with beneficiaries and reported that this was plenty of time to carry out the surveys.

Focus group participants reported that the survey had “*too many questions*” and that many of the questions were “*repetitive.*” The participants further reported that they sometimes skipped questions because the answer to the question was obvious based on the beneficiaries’ previous answer. An example was provided: “*if someone says [the pad]’s comfy that probably means they will buy/use it.*”

Focus group participants reported that it took between ten and fifteen minutes to carry out the Wave 2 survey, depending on the answers provided by the beneficiary. However, surveys took less time as they conducted them, especially for the focus group participant who also conducted the preference survey in March.

Focus group participants reported that there were no questions that the beneficiaries did not understand, and that they simplified questions when speaking with beneficiaries to avoid any confusion.

Background on Informal Tent Settlement Structure

The ITS that the beneficiaries live in is reportedly an abandoned building structure that is not fully finished. The structure is one of the oldest ITS in Lebanon and some of the beneficiaries have been in the ITS since it was designated as such. It is a four-story permanent structure that is in a U-shape and was reported to look like a hospital by focus group participants.

The ITS reportedly has electricity, water, and basic plumbing but is not on a municipal sewage system because of its informal status. The drainage for waste is basic and done using cinder blocks that separates solid waste from liquid waste into a drainage ditch on site.

Focus group participants reported that there are washing machines present in the ITS and that beneficiaries will share these amenities with one another.

When asked about the structure of the toilets in this ITS, it was reported by focus group participants that there are six toilet stalls on each floor that are shared by the floor in a “*dormitory style*.” A follow up question was asked to the focus group participants (who all identified as female) in regard to their personal comfort with the idea of changing their menstrual products in the toilet configuration in the ITS. All focus group participants reported that they would

not feel comfortable changing their menstrual products in these circumstances but that the beneficiaries “*do it because they do not have a choice.*”

It was reported that around 200 families live in this ITS, all whom are from Syria. Focus group participants reported that they have witnessed marriages within the camps, babies being born, and a changing and growing population due to these factors. Focus group participants also reported that it was common for more than one family to live together.

Focus group participants reported that the population within the ITS changes during seasonal migration for agricultural work in the Beqaa or Saida.

Focus group participants reported that there is a school that conducts supplemental classes for children and sewing classes for adults in the basement of the building. This school is reported to be conducted by an organization called SB Overseas.

Beneficiary Enrollment

LRC volunteers reportedly enrolled beneficiaries in research by visiting each floor of the ITS structure and enrolling nine to ten participants per floor. Beneficiaries were easily enrolled and reportedly happy to participate because “*everything free is good.*”

Focus group participants reported that the beneficiaries enrolled in the study without even knowing what the study was and that this is a theme in distribution in humanitarian responses.

LRC volunteers reported that they had not had as much direct contact with the beneficiaries in the study because they had worked more directly with their children.

Focus group participants reported that beneficiaries felt comfortable with the LRC volunteers because they respect the organization and the volunteers were all female-identified.

Beneficiaries were reportedly engaged mostly one on one by volunteers, although sometimes two volunteers were present. Men were asked to leave so that the survey could be conducted in private.

Distribution Details

Focus group participants reported that there was one beneficiary that was not present in the Wave 2 survey and could not be found when the Wave 2 survey was conducted.

LRC volunteers reported that they recruited four new beneficiaries for the Wave 3 survey because the previous beneficiaries could not be found.

LRC volunteers reported that when underwear provided by the HERS team were distributed along with Wave 3 MPPs, eight participants did not receive underwear because there was not enough underwear available in their sizes. Some beneficiaries reportedly took multiple pairs of underwear while others took just one pair.

Suggested Survey Questions for Wave 3

Focus group participants suggested the following questions be included in the Wave 3 survey:

- How many times do you change the pad in a day and is this due to cleanliness, not enough materials, or something else?
- More questions about the beneficiaries use of the menstrual pads and practices.
- Focus groups with the beneficiaries were also suggested.

Discussion

This focus group was crucial in informing researchers of the details of the ITS and conditions necessary to conduct research about menstruation in humanitarian crisis response. The information collected as a result of this focus group discussion allowed for researchers to adjust the Wave 3 survey in response to the feedback provided by focus group participants. A more complete understanding of the methods used to conduct this research, the conditions of the ITS and demographics of beneficiaries engaged in this process provided a better understanding for the conditions required to carry out the response proposed by the HERS research team. The focus group also informed researchers of the importance of engaging with partners in research, particularly when researchers cannot be present for face to face survey conduction. The conversation in the focus group discussion helped researchers contextualize survey answers and preferences collected from participants that could not be collected purely through a formal survey.

Limitations

This focus group was the first interaction that the HERS researchers had with the LRC volunteers who conducted the Wave 1 and Wave 2 surveys. The limited interaction and time elapsed between the survey conduction date and the focus group limits the amount of information relayed to researchers since information may have been lost. The complexity of the questions asked in the survey may have affected translation and communication to the beneficiaries. Additionally, volunteers who helped to conduct the preference survey in March were not present for this focus group so this study process was largely unexplored in this focus group. While all focus group participants spoke English, their primary language was Arabic and some questions were answered and explored first in Arabic and then translated to researchers, leaving room for missed nuance in the information provided by the focus group participants. Since the focus group was conducted near the end of the researchers' stay in Lebanon, it was not possible to implement all of the focus group suggestions into the research process.

Wave 3 - Efficacy Test with Syrian Refugees in Southern Lebanon (8/16/19)

Results

All thirty-five participants reported participation in the Wave 2 Survey therefore questions 1.1-1.6 were skipped (see Appendix for full survey and for raw data). The Wave 3 survey was a shortened version of the Wave 2 survey with added questions to assess pad usage and to gain feedback about the adhesive. MPP Type 5 was used during this distribution and participants were asked to solely evaluate this type in their survey responses.

Menstrual Pad Usage

Participants were asked how many pads they normally wore during a twenty-four-hour period in order to identify and quantify how many menstrual products they might need for one cycle. On average, participants wore 3.67 pads per day.

Questions 3.1 and 3.9 were similar. Questions 3.1 asked how many MPPs of the five MPPs did participants use in a 24-hour window. Question 3.9 asked how many of the five MPPs did participants use in total. Participants were asked to try out the MPP for two days of their period. An interesting finding occurred in question 3.1, the average number of pad usage was 3.75 pads per day and for question 3.9, the average number of pads used in total was 4.68 pads. In comparing how many MPPs were used per day during this phase of the study, and how many pads participants normally wear per day, there appears to be a minimal difference (figure 27.) Five pads were given to each participant with the intent that they would be used for two days, but it appears that the participants on average prefer to use three to four pads per day.

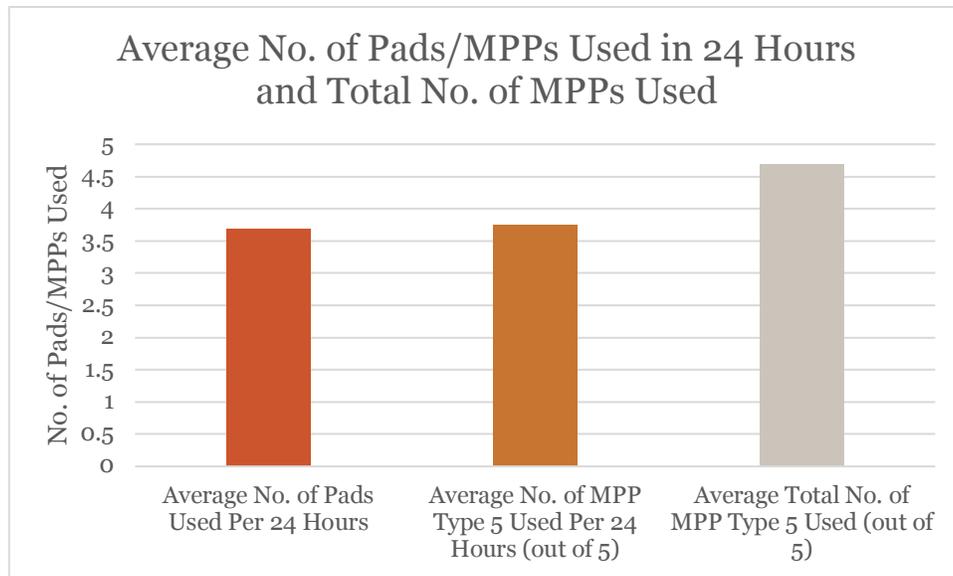


Figure 27. The average number of pads participants normally use in 24 hours versus the average no of Typ5 MPPs used in 24 hours. This is compared with the total number of pads that participants reported they used over the duration of the Wave 3 experiment. Participants in the Wave 3 experiment were asked to wear the 5 given pads over the course of two days of their period.

A follow up question was asked for question 3.9 to determine why participants did not use all the Type 5 MPPs that they were given. Three participants responded with two comments about the MPP Type 5 “not [being] comfortable”, one comment about leakage, and one comment that the MPP “did not last long.”

MPP Type 5 Evaluation

For the Wave 3 survey, researchers added a question to explicitly ask whether participants encountered problems with the adhesive. For the Type 5 MPP, this was a four-dot configuration, one on each wing, one on the top, and one on the bottom. Of the total participants, 14% (5 of 35) reported problems. Three of the five stated that the MPP Type 5 adhesive was “not fixed/not fixable”, one reported that the “[MPP] did not remain in place” and one participant suggested that the “[MPP] needs more glue.”

In order to better categorize the types of problems participants were experiencing with the MPP, the researchers provided categories in addition to the previous option of marking the problem location and just writing in the problem: leakage, folding on edges,

material ripping, and other. Participants could check multiple problems. Nineteen of the thirty-five participants did not report any problems for these questions (figures 28 and 29.)

Where on the MPP did you experience problems?

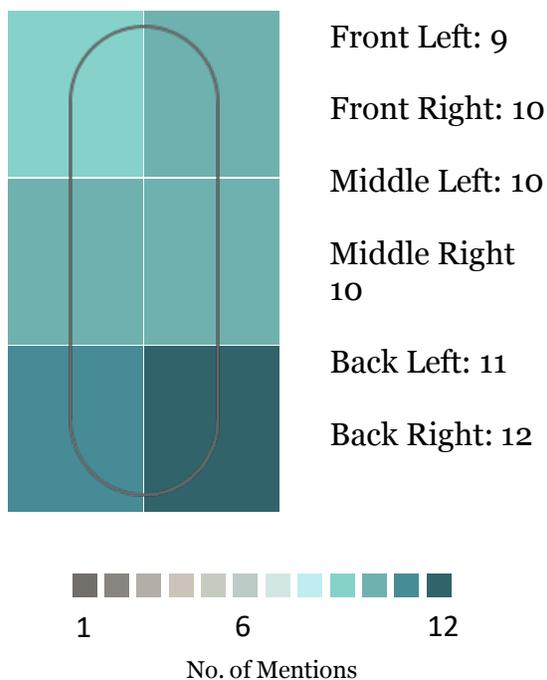


Figure 28. The number of times each area of the MPP was mentioned as having a problem. 16 of 35 participants responded to this question. Multiple areas could be checked.

Types of Problems

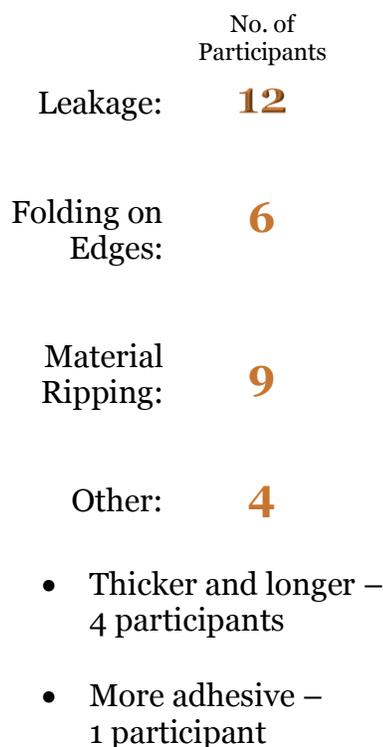


Figure 29. The number of times participants selected a certain type of problem. Multiple areas could be checked. 16 of 35 participants responded to this question.

Participants were also asked to compare the MPP Type 5 pad with their usual menstrual pad in order to evaluate the potential market price of the MPPs if, in the future, they would be fabricated by a cottage industry. Most participants, 45% (16 of 35), reported that they would be willing to pay the same amount for the MPP in its current form as they do for their normal pads. Slightly less, 34% (12 of 35) stated that would only buy the MPP if it cost less than their current pad.

Wave 2 - Wave 3 Comparisons

For the Wave 3 survey, 80% of participants (28 of 35) said that MPP Type 5 was comfortable. Of the three participants that stated that the MPP was not comfortable, two commented that it was “not fixed” and one would like a “larger size.” This is a slight increase from comments about the Wave 2 survey, which used MPP Type 4, where 79% (26 of 32) reported that the MPP was comfortable (figures 30 and 31).

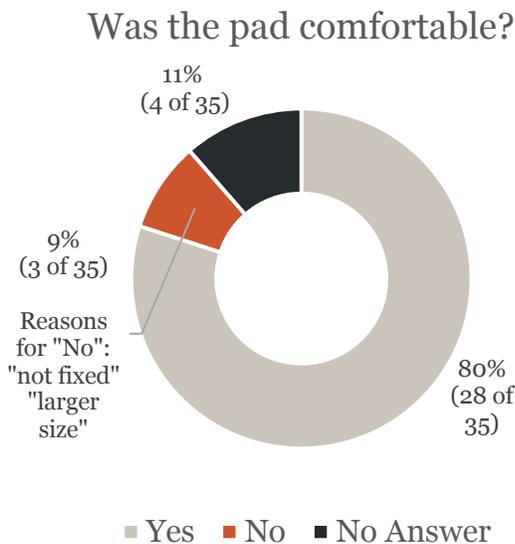


Figure 30. The percentage of participants that reported that the MPP Type 5 pad used in Wave 3 was comfortable.

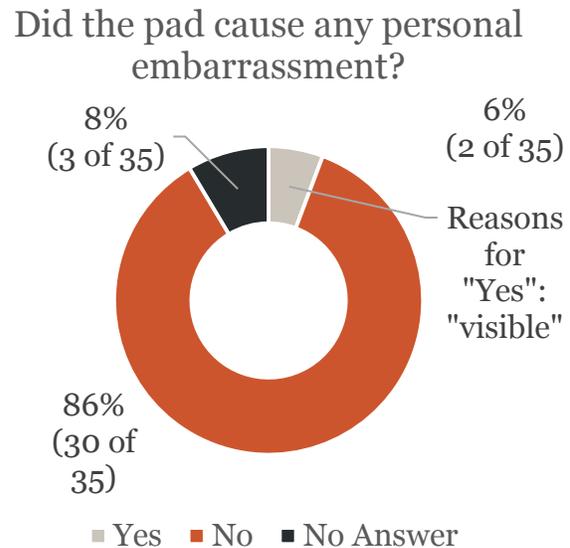


Figure 31. The percentage of participants that reported that the MPP Type 5 pad used in Wave 3 was comfortable.

The significant decrease in participants who reported the MPP being “not fixed” when asked if the MPP remained in place during activities supports the changes made between MPP Type 4 and MPP Type 5, inferred by HERS researchers to be the addition of wings. From Wave 2 to Wave 3 those who answered no or “not fixed” decreased by about half, from around 21% (7 of 33) to 11% (4 of 35). A weaker and smaller configuration of adhesive was used in MPP Type 5, therefore from the researchers’ perspective, the change in adhesive is less likely to influence the significant drop in the number of participants that did not feel the pad had been “fixed.”

Like in Wave 2, in Wave 3, participants were again asked to assess how long people were willing to wear the MPP with the idea that the MPP might not fit all their preferences.

Wave 2 Question: “How long would you be willing to wear this pad before you would want the ideal menstrual pad available to you?”

Wave 3 Question: “If these menstrual pads were distributed to you for free, how long would you be willing to wear this menstrual pad before looking for something else?”

In the Wave 3 survey, the question was re-worded to mention that the pad would be distributed for free. This was an intentional change aimed at more directly implying that the pad would be distributed in a crisis setting by an NGO such as the Red Cross. This change was also made because specifically for the Syria refugee community in Lebanon, people have been living in Lebanese ITSs for many years. In Wave 3, most participants, 77% (27 of 35) reported that they would always use MPP Type 5 (figure 32). This was a 27% increase from Wave 2 responses where nineteen of thirty-two stated that they would always use MPP Type 4.

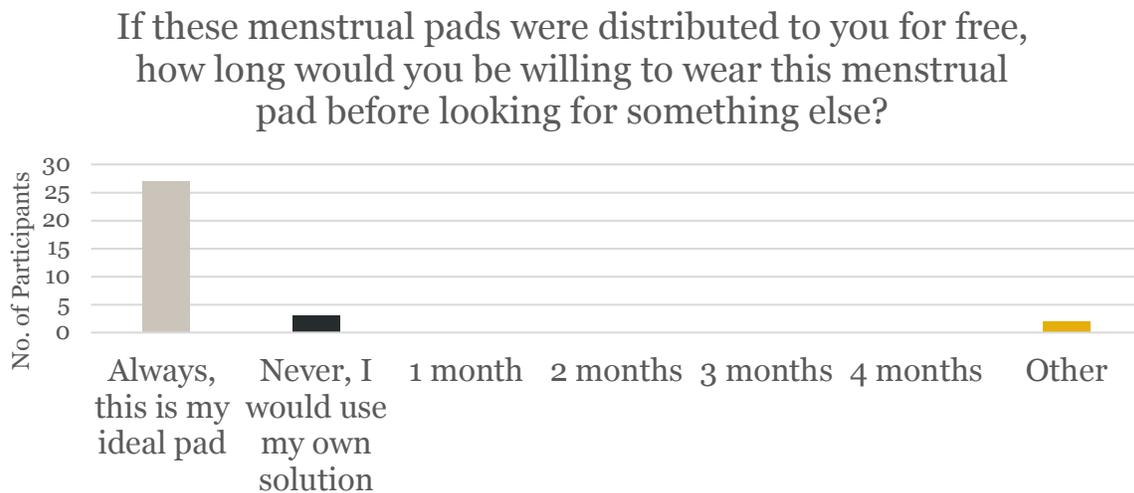


Figure 32: Data is used to establish a tolerance window for how long participants would be willing to wear MPP Type 5 if given the product for free.

Responses to the question about whether participants would be willing to learn how to make pads remained relatively the same from Wave 2 to Wave 3. In response to feedback from the LRC volunteers in the focus group, researchers clarified in the Wave 3 version that the pad press would be in the building where participants lived. A video

that documented the fabrication process was also shown prior to LRC volunteers asking this question. For Wave 3, 86% (30 of 35) participants responded that they would be interested in comparison to 85% from Wave 2 (figure 33).

Are you interested in learning how to fabricate?

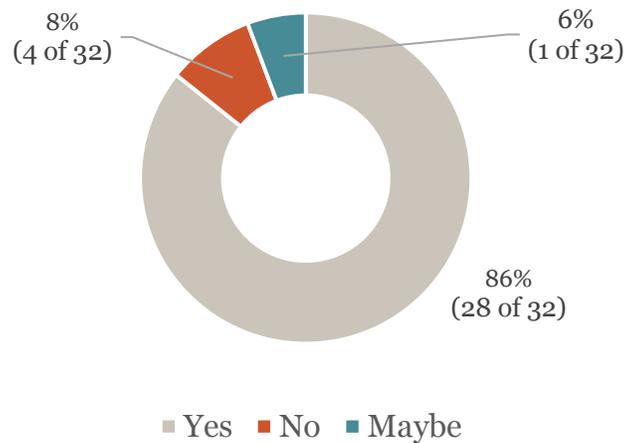


Figure 33: Data collected on the participants' interest in fabricating pads and continuing the project.

Limitations

In addition to all other limitations listed above, the HERS Research team left Lebanon shortly after the Type 5 MPPs were handed off to the LRC; therefore, researchers were slightly less accessible for any clarifying questions prior to conduction of the survey.

Discussion

The Wave 3 survey was modified to be shorter in response to feedback from the focus group with LRC volunteers. Questions 1.1-1.6 were answered conditionally and designed for participants that did not participate in the Wave 2 survey. After exclusion of participation of minors, the sample size for Wave 2 was 32 but for Wave 3 was 35. No participants answered questions 1.1-1.6 for the Wave 3 survey which suggests that new participants might have been added for Wave 3 but did not answer these questions. Additionally, the researchers did not attempt to link people across Waves 2 and 3 for this reason.

The results of question 3.1 and question 3.9 suggest that 5 pads were not enough to support the participants' menstrual product needs and that including more pads when distributing menstrual products should be explored.

The increase in number of participants that stated that they would always use the MPP pad as opposed to looking for a more ideal option also supports that the design of MPP Type 5 can be considered an improvement over the design of MPP Type 4. Since the results suggest that the Type 5 MPP, which has wings, is an improvement over the Type 4 MPP, which does not have wings, future iterations of the pad press should consider a modification to fit the need for wings by spacing out the elements differently.

The fact that the percentage of women interested in being engaged with this project remained stable is a positive sign. The HERS researchers were not present during survey conduction so it is difficult to determine if the video modified the opinions of participants. From an educational stance, the researchers' hope is that a visual representation of the process allows viewers to more quickly understand what the MPP production process requires.



Future Considerations

As of Fall 2019, the HERS team has passed off the project to the UT and LAU design teams to continue implementation and research of the project. Below please find suggestions for future research and improvement of the pads and the fabrication process.

Educational Resources

All MHM interventions should be accompanied by educational resources (IFRC 2018). Including community members in the development and distribution of educational resources leads to a more robust MHM response which engages the participants throughout each step of the intervention. For this reason, HERS recommends providing educational resources alongside distribution of MPPs and instruction on pad press use. This can be carried out in the form of pamphlets, direct conversations between volunteers and participants, or through community centers among other ways.

Focus Groups

The HERS team was able to carry out one focus group in-country with the LRC volunteers. This focus group served as a tool to analyze and understand the on-site implementation of the project, specifically the process of conducting surveys on pad preferences within the ITS. The field perspective of the volunteers provided invaluable insight on the nuances that presented themselves in this process. HERS recommends that future teams carry out focus groups with the volunteers before the first distribution, as well as throughout the duration of the project, in order to avoid misunderstandings in the questions and to build stronger communication within partners.

Preference Assessment

The HERS team used surveys during Wave 1 to assess menstrual product preferences and during Waves 2-3 to capture feedback about the distributed MPPs. Due to time constraints in the project timeline as well as the learning curve present among the team

in terms of familiarity with survey development, the HERS team did not carry out sufficient preliminary research. The surveys were instead adapted during the project according to feedback from the previous results with guidance from faculty. This lack of background knowledge was a shortcoming of the HERS project which can be improved in future iterations with further research. This may include re-examining the preference survey used or researching alternative methods. In addition, the HERS team recommends considering translation of the questions while creating them rather than after. This would mitigate challenges that arose due to the complex nature of the original questions chosen and subtle nuances that were difficult to translate. Future researchers may also want to compare or model the preference surveys based on needs assessment surveys currently utilized by their partner NGO, if applicable.

Pad Press Adaptations

Future iterations of the pad press should allow for the addition of wings to the MPP. The HERS team data from the Waves conducted in-country consistently showed a preference for wings. The HERS team recommends that these additions be made alongside considerations of accessibility in order to ensure that the pad press can be used by anyone who wishes to participate, including people with disabilities.

In-Community Implementation/Quick Response Implementation

For the purposes of the Lebanon in-country implementation, HERS focused on researching ways of implementing the project in an established community. This decision was made due to the background of the community with which HERS worked. Future iterations should continue to explore this option, while also further researching ways of implementing it as a quick-response tool in humanitarian crises. Both projects are viable and can inform each other.

MHM Kits

The HERS team was able to provide underwear towards the end of the project to accompany distribution of the MPP. It is recommended that this be included in future distributions, in the case that the MPPs cause damage to the participants' underwear.

Additional items should be included whenever needed as the project develops. In the future, it is recommended that the HERS project be tested as part of existing MHM kits.

Location

Whenever possible, teams researching the project should assess the ITS or location where the project will take place prior or alongside any adaptations to the MPP or pad press. By doing so, efforts can be made to arrange for proper disposal of the MPP. Further, the pad press design and training will change based on the location in which the pad press is stored.

Community Engagement

The location chosen for the pad press can also serve as a community center, adding benefit to the project. The idea of a “Third Space” (Diaz & Butler, 2016) for the pad press was explored by HERS and would benefit from future research. This project has potential to serve as an important community and social tool to support displaced communities.

Translation

Specific attention should be paid to the translation of any resources distributed to the community. These efforts can be supported by the before mentioned focus groups and strong communication between partners. Having members on the team who have a working knowledge of the target language should be prioritized whenever possible.

Target Population

Throughout the HERS project and report, special attention has been paid to ensure that the issue of menstrual product availability and acquisition during humanitarian crisis extends to people who menstruate. The intentional focus on people who menstruate instead of women was done to encourage exploration of those who are not female

¹ Third Spaces, an idea introduced by sociologist Ray Oldenburg, serve to foster community, civil society, and establish a sense of place.

identifying and might be missed in a female-focused menstruation campaign. It is suggested that future research should explore whether such a gap exists and intentional language and approaches should be taken to prevent the creation of such a gap in care.

Appendix

Comfort Test with Students from the University of Texas at Austin - PART ONE		
Survey Question	Descriptive Statistics	
	SAP	Felt
Age	Range: 20-22	Range: 18-21
Country of Origin		
India		1 of 2
Mexico	1 of 4	
Spain	1 of 4	
United States	2 of 4	1 of 2
Did you grow up in an urban or rural environment?		
Urban	4 of 4	4 of 4
Rural	0 of 4	0 of 4
Cultural Identity, as you define yourself (i.e. black or African American, Asian, Latinx, white, Native American, etc.)		
African American		1 of 4
Asian		2 of 4
Asian American		1 of 4
Latinx	1 of 4	
White	3 of 4	

Which of the following menstrual products do you use most of the time?		
Disposable Pads	1 of 4	3 of 4
Tampons	1 of 4	
Disposable Pads, Tampons	2 of 4	1 of 4
If you use disposable and/or reusable pads, what shape do you prefer? Refer to diagram below.		
Hourglass with wings	4 of 4	4 of 4
What thickness of pad do you prefer for average wear? Why do you prefer that pad thickness? Describe in space below.		
Light	1 of 4 “Less bulky, not usually necessary to use a thicker one”	
Thin	2 of 4	3 of 4

	<p>“Less bulky...absorbs at the level I need”</p> <p>“Lighter...doesn’t feel like you’re wearing a diaper”</p>	<p>“feels comfy and feels like it is not there”</p> <p>“my period tends to be light”</p> <p>“easier to change throughout the day”</p>
Thick	<p>1 of 4</p> <p>“to ensure that it doesn’t fail”</p>	
Thin-medium		<p>1 of 4</p> <p>“I like them to be relatively thin because if it’s too thick, it feels like a diaper, but if they’re too thin it’s easy to bleed through”</p>
If you could design a pad, what size, shape, and thickness would it be? Describe in space below.		
	<p>“light, with wings”</p> <p>“With medium to thick thickness (participant drew a image of a pad with wings)”</p> <p>“Slightly hourglass and a little longer/wider in the back (drew</p>	<p>“Long, hourglass, and thin/regular. The Always flexfoam pad is perfect for me.”</p> <p>“Hourglass with wings, thin”</p> <p>“-thin - longer in bulk than front - hourglass</p>

	a diagram of the pad with wings)” “Thin, absorbent, no scent, flexible. Long enough to account for movement (but not as long as night pad)”	(Drew image of the pad with wings in an hourglass shape)” “Thin, lightly scented, smaller”
Please describe the undergarments you are wearing during this study so that we can understand the compatibility of our prototype pad with your clothing. (i.e. shorts with bikini underwear)		
“bikini underwear”	4 of 4	2 of 3
“full seated underwear”		1 of 3
Are you currently menstruating?		
Yes	1 of 4	
No	3 of 4	4 of 4
Mark any quality issues on the template below. If there are none, circle		

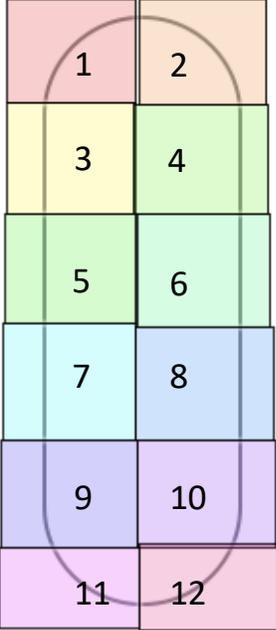
	“The stickers on the side didn’t quite fit on my underwear”	“A few burn marks, the adhesive sticky parts felt a little weak”
None	2 of 3	2 of 3
Sound when moving, sitting, etc. (scale 1-5) 1 = Very Poor 2 = Poor 3 = Neutral 4 = Good 5 = Very Good	Average: 5 Very Good: 4 of 4	Average: 4.8 Very Good: 3 of 4 Good: 1 of 4
Concealability in Wrapper (scale 1-5) 1 = Very Poor 2 = Poor 3 = Neutral 4 = Good 5 = Very Good	Average: 4.75 Very Good: 4 of 4	Average: 4.25 Very Good: 2 of 4 Good: 1 of 4 Neutral: 1 of 4
Ease of Opening (scale 1-5) 1 = Very Poor 2 = Poor 3 = Neutral 4 = Good 5 = Very Good	Average: 5 Very Good: 4 of 4	Average: 5 Very Good: 4 of 4
Ease of Application to Underwear (scale 1-5) 1 = Very Poor	Average: 5 Very Good: 4 of 4	Average: 4.75 Very Good: 3 of 4

<p>2 = Poor 3 = Neutral 4 = Good 5 = Very Good</p>		<p>Good: 1 of 4</p>
<p>Visibility on under garments while wearing (scale 1-5) 1 = Very Poor 2 = Poor 3 = Neutral 4 = Good 5 = Very Good</p>	<p>Average: 4.75 Very Good: 3 of 4 Good: 1 of 4</p>	<p>Average: 5 Very Good: 4 of 4</p>
<p>Absorbency (if currently menstruating) (scale 1-5) 1 = Very Poor 2 = Poor 3 = Neutral 4 = Good 5 = Very Good</p>	<p>Average: 3 Neutral: 1 of 1</p>	
<p>Please use space provided to note any additional observations or concerns you have about the prototype.</p>	<p>“Seems less absorbent than ones I've used” “The top and the bottom stickers are actually so nice, they stick a lot more than the normal tampons, but the ones on the side sort of fold over</p>	<p>“By just first impression, it seems very easy to use and put on. It does seem like it will tear easily, but that's just by looking at it.” “I would worry about leakage. (Noted that for ease of opening</p>

	<p>and stick to the underside of my shorts. The pad seems a little thin but is super comfortable”</p> <p>“it’s a little long but I was surprised and how it feels flushed against my skin making it very discrete and so far great.”</p>	<p>she was referring to tape, and that there was no visibility.)”</p> <p>“last one should be n/a on absorbency (not on period). This was seriously one of the most comfortable pads I’ve ever worn. It felt very soft and plush as opposed to the usual restrictive feel I get from other pads. There was a little wear on the sides which I think may be due to the softness of the material, but I would definitely not mind because of how great it feels.</p> <p>“The pad cotton felt a little weak”</p>
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Table 8. The table above contains de-identified data collected from our comfort test with UT Austin students. The question, answers, and comments related to answers are shown in the table.

Comfort Test with Students from the University of Texas - PART TWO

Survey Question	Descriptive Statistics	
	SAP	Felt
<p>Where on the prototype did changes in properties occur?</p>		
	<p>Region 1: 1 of 4 Region 2: 0 of 4 Region 3: 2 of 4 Region 4: 1 of 4 Region 5: 4 of 4 Region 6: 2 of 4 Region 7: 4 of 4 Region 8: 2 of 4 Region 9: 2 of 4 Region 10: 2 of 4 Region 11: 1 of 4 Region 12: 0 of 4</p>	<p>Region 1: 1 of 4 Region 2: 0 of 4 Region 3: 1 of 4 Region 4: 0 of 4 Region 5: 1 of 4 Region 6: 0 of 4 Region 7: 1 of 4 Region 8: 1 of 4 Region 9: 2 of 4 Region 10: 1 of 4 Region 11: 1 of 4 Region 12: 1 of 4</p>
<p>What type of changes occurred?</p>	<p>“Left edge didn't adhere, top lining was a little loose, so the lining inside shifted place a</p>	<p>“Left front area shifted to the left, creasing on bottom”</p>

	<p>little. one side didn't adhere because it went a little farther than the edge of the underwear”</p> <p>“slightly folded”</p> <p>“creasing”</p> <p>“the edges were a little wide for my body so they ended up folding downward but it wasn't a bother”</p>	“just a little bunching up”
For the initial 1-2 minutes, were you aware of the prototype?		
Yes	1 of 4	
No	3 of 4	4 of 4
Did you experience any initial discomfort?		
No	4 of 4	4 of 4
Did the prototype remain in place?		
Yes	4 of 4	4 of 4
For the duration of the treadmill or elliptical experience,		

<p>did the prototype shift placement, bunch up, or experience any other change in properties?</p>		
	<p>“No, it remained in place the entire time”</p> <p>“Only bunched up a little bit on the sides (the side stickers stuck to the side of the pad)”</p> <p>“I didn't feel it at all, but after removing it I saw that it had bunched and creased a little”</p> <p>“it stayed in place the whole time, I did not feel any change in terms of prototype. Extra notes: i personally avoid pads during physical exercise because I can't feel them and they aren't accepted by my body, but I can honestly say that this prototype was very comfortable and I even forgot I was wearing!”</p>	<p>“the prototype did shift to the left a bit as I was walking on the treadmill but i did not feel the pad while walking”</p> <p>“Nope”</p> <p>“It bunched up a little...Also when I took it off it detached from my underwear.”</p> <p>“It bunched up a little but besides that it felt in place + fitted”</p>
<p>Fuzzing (scale 1 -5) 1 = Very Severe Fuzzing</p>	<p>Average: 5</p>	<p>Average: 4.5</p>

2 = Severe Fuzzing 3 = Moderate Fuzzing 4 = Slight Fuzzing 5 = No Fuzzing	No Fuzzing: 4 of 4	No Fuzzing: 2 of 4 Slight Fuzzing: 2 of 4
Piling (scale 1-5) 1 = Very Severe Piling 2 = Severe Piling 3 = Moderate Piling 4 = Slight Piling 5 = No Piling	Average: 5 No Piling: 4 of 4	Average: 4.75 No Piling: 3 of 4 Slight Piling: 1 of 4

Table 9. The table above contains de-identified data collected from our comfort test with UT Austin students. The question, answers, and comments related to answers are shown in the table. Specifically, this table focuses on the portion of the survey that evaluated pad type 1 and pad type 2.

Efficacy Test with Students from the University of Texas at Austin		
Survey Question	Descriptive Statistics (Mean and Fraction)	
	SAP (Pad Type 1)	Felt (Pad Type 2)
Sound (Scale 1-5) 1 = Very Poor 2 = Poor 3 = Neutral 4 = Good 5 = Very Good	Average: 3.8 Neutral: 2 of 5 Good: 2 of 5 Very good: 1 of 5	Average: 4.6 Good: 1 of 3 Very good: 2 of 3
Ease of application to underwear (Scale 1-5) 1 = Very Poor	Average: 3.4	Average: 2.6

2 = Poor 3 = Neutral 4 = Good 5 = Very Good	Neutral: 3 of 5 Good: 2 of 5	Poor: 1 of 3 Neutral: 2 of 3
Visibility on outer garment while wearing (Scale 1-5) 1 = Very Poor 2 = Poor 3 = Neutral 4 = Good 5 = Very Good	Average: 3.8 Neutral: 2 of 5 Good: 2 of 5 Very good: 1 of 5	Average: 3.3 Poor: 1 of 3 Neutral: 1 of 3 Very good: 1 of 3
“Please use space provided to note any additional observations or concerns you have about the pad.”		
Concerned about adhesive	3 of 4	1 of 3
Concerned about absorbency	1 of 4	1 of 3
Concerned about thinness		1 of 3
“How would you characterize your period flow.”		
Medium	3 of 5	1 of 3
Heavy	1 of 5	1 of 3

Other	1 of 5 “Starts heavy and becomes medium”	1 of 3 “Have endometriosis so a lot of tissue flow”
“Which of the following menstrual products do you use <u>most</u> of the time?”		
Disposable Pads	5 of 5	2 of 3
Always	4 of 5	1 of 2
Kotex or Cheapest available pad	1 of 5	1 of 2
Tampons	3 of 5	0 of 3
Menstrual Cup	2 of 5	1 of 3
<p>“How long was your menstrual cycle?”</p> <p>Note: this question is most likely misinterpreted due to failure to understand the term “menstrual cycle”</p>	<p>With misinterpretation Average: 10</p> <p>Without misinterpretation Average: 5.5</p>	Average: 4.6
“How many days did you use the pads?”	Average: 2.8	Average: 2.6
2	2 of 5	1 of 3
3	2 of 5	2 of 3
4	1 of 5	

“How many pads did you use in total?”	Average: 4.6	Average: 6
3	1 of 5	
4	1 of 5	1 of 3
5	2 of 5	
6	1 of 5	1 of 3
8		1 of 3
“While wearing, were you aware of the pad?”		
Yes	1 of 5	2 of 3
No	2 of 5	1 of 3
“Did you experience any initial discomfort?”		
Yes	0 of 5	0 of 3
No	5 of 5	3 of 3
“Did the product remain in place during various activities? (Explain which activities if not)”		
Yes	2 of 4	1 of 3
No	2 of 4 Adhesive did not hold to underwear when sleeping Pad went off the panty line after a few hours	2 of 3 While running or walking dogs Pad moved side to side

<p>“How comfortable was the pad? Please describe in the place below.”</p>		
<p>Not comfortable</p>	<p>0 of 5</p>	<p>0 of 3</p>
<p>Comfortable</p>	<p>5 of 5</p> <p>Of these:</p> <p>1 of 5 Pad was as comfortable as regular disposable pad</p> <p>1 of 5 Very soft and very comfortable</p> <p>1 of 5 Very comfortable but got misplaced throughout day</p> <p>1 of 5 Liked how thin and soft pad was as well how much it absorbed, was not aware of pad being there except when running or working out</p> <p>1 of 5 Pad stayed in place but did not do any vigorous activities</p>	<p>3 of 3</p> <p>Of these:</p> <p>1 of 3 Did not feel pad at all except while being active</p> <p>1 of 3 It was comfortable than other pads worn and stayed in place while walking to class and moving furniture</p> <p>1 of 3 Whole adhesive came off when removing adhesive paper but sizing was good</p>

Privacy 1 = Very Poor 2 = Poor 3 = Neutral 4 = Good 5 = Very Good	Average: 4.4 0 of 5 0 of 5 0 of 5 3 of 5 2 of 5	Average: 4.0 0 of 3 0 of 3 1 of 3 1 of 3 1 of 3
Concealability in wrapper 1 = Very Poor 2 = Poor 3 = Neutral 4 = Good 5 = Very Good	Average: 2.8 0 of 5 3 of 5 0 of 5 2 of 5 0 of 5	Average: 3.5 0 of 2 1 of 2 0 of 2 0 of 2 1 of 2
Ease of opening 1 = Very Poor 2 = Poor 3 = Neutral 4 = Good 5 = Very Good	Average: 4.5 0 of 5 3 of 5 0 of 5 2 of 5 0 of 5	Average: 4.6 0 of 3 0 of 3 0 of 3 1 of 3 2 of 3
Ease of application to underwear 1 = Very Poor 2 = Poor 3 = Neutral 4 = Good 5 = Very Good	Average: 2.6 0 of 5 2 of 5 0 of 5 1 of 5 2 of 5	Average: 3.0 0 of 3 1 of 3 1 of 3 1 of 3 0 of 3
Visibility on outer garment while wearing 1 = Very Poor 2 = Poor	Average: 4.2	Average: 4.0

3 = Neutral 4 = Good 5 = Very Good	Neutral: 2 of 5 Very good: 3 of 5	Good: 3 of 3
“Did all your pads perform similarly? In what aspect did the pads perform similarly or dissimilarly?”		
Similarly	2 of 5	3 of 3
Dissimilarity	3 of 3 Of these: 1 of 3 Different layers of the pad split from each other 1 of 3 Adhesives on some of the pads would already be exposed and stuck to surface of pad 1 of 3 Sticky did not stay in place as well	0 of 3
Please rate the pad’s fuzzing after use. Fuzz is defined as, “tangled fiber ends that protrude	Average: 4.6	Average: 3.6

<p>from the surface of a yarn or fabric.”</p> <p>5- No Fuzzing 4- Slight Fuzzing 3-Moderate Fuzzing 2-Severe Fuzzing 1- Very Severe Fuzzing</p>	<p>No fuzzing: 4 of 5</p> <p>Moderate: 1 of 5</p>	<p>Slight: 2 of 3 Moderate: 1 of 3</p>
<p>Please rate the pad’s pilling after use. Pilling is defined as, “bunches or balls of tangled fibers which are held to the surface of a fabric by one or more fibers.” (ASTM) Refer to the photos below for guidance.</p> <p>5- No Pilling 4- Slight Pilling 3-Moderate Pilling 2-Severe Pilling 1- Very Severe Pilling</p>	<p>Average: 4.8</p> <p>No pilling: 4 of 5 Slight pilling: 1 of 5</p>	<p>Average: 4.3</p> <p>No pilling: 2 of 3 Moderate pilling: 1 of 3</p>
<p>Additional observations or concerns about prototype:</p>	<p>“Pad not as durable as one participant is used to (failure in adhesive and connection of layers)</p>	<p>“More comfortable than regular pads but did not stick well”</p> <p>“Vaginal area got itchy and really sweaty...don’t feel that</p>

	<p>“Needs more than just 4 adhesive spots and pad was hard to attach to underwear</p> <p>“Pad separated when participant took it off underwear after use”</p> <p>“None of the pads moved while wearing”</p> <p>“Addition of wings and more adhesive spots”</p> <p>“Did not hold larger tissue/clots (participant had endometriosis) and fluff moved inside mesh”</p>	<p>with commercial pads,” mesh opened up slightly on side</p> <p>“Whole adhesive came off when trying to remove paper part of glue dot”</p>
<p>Please compare the pad you tested today with the product that you currently use to manage your menstrual cycle. Does this product fit your preferences more or less than what you use currently?</p>	<p>“Mostly fits what is preferred because more comfortable than typical pads but what would hold me back is durability and absorbency”</p> <p>“Fits preference for comfort and absorbency but did not stick well to underwear (liked sticky parts that wings provide)”</p> <p>“Fit preferences and worked well”</p>	<p>“Doesn’t fit preference only because typically uses tampons and menstrual cup”</p> <p>“Prefers tampons but good to sleep in and very good size”</p> <p>“Satisfactory compared to pad usually used, pad slid due to adhesive problems and slightly opened up”</p>

	<p>“Fits preference, likes how thin and comfortable yet absorbent, but wants more secure onto panty”</p>	
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Table 10. The table above reflects all of the data collected in the efficacy test by UT Austin students. The question is listed along with the results for each question and comments relating to the data collected. Data is divided, when appropriate, to compare pad type 1 and pad type 2.

RST Focus Group Questionnaire Data	
Survey Question	Descriptive Statistics (# of participants, range)
Which of the following menstrual products did you use while you were in a camp?	
Disposable Pads	7 of 7
Reusable Pads	
Tampons	
Other, please specify:	
How did you store your menstrual product while you were in a camp?	
In a disposable cover	6 of 7
In a reusable cover	
Other, please specify:	1 of 7 “inside my bag”

How did you prefer to have your menstrual product packaged while you were in a camp?	
Individually wrapped	2 of 7
Pads stored together with one outer wrapper	2 of 7
Both: pads wrapped individually and with outer wrapper	3 of 7
Other, please specify:	
What was your method of disposal for your menstrual product while you were in a camp?	
Throw in routine waste	5 of 7
If a reusable pad, wash and reuse	
Burn	
Other, please specify:	
Not Reported	2 of 7
What do you wish you had to support your menstrual cycle while you were in a camp?	
Disposable Pads	3 of 7
Disposable Pads and Extra Underwear	1 of 7
Not Reported	3 of 7
Age	

	28	1 of 7
	36	1 of 7
	39	1 of 7
	40	1 of 7
	44	1 of 7
	51	2 of 7
Year you moved to the United States		
	1997	1 of 7
	2008	2 of 7
	2017	1 of 7
	2018	2 of 7
	2019	1 of 7
Was your home in your country of origin an urban or rural environment?		
	Rural	2 of 7
	Urban	3 of 7
	Not Reported	2 of 7
Year left country of origin		
	1997	1 out of 7
	2001	1 out of 7
	2004	1 out of 7
	2006	1 out of 7
	2009	1 out of 7
	2017	1 out of 7

Table 11. All questions and data collected from the questionnaire conducted during the focus group with RST.

Wave 1: Preference Survey with Displaced Women in ITS in Lebanon	
Survey Question	No. of Participants (% of total Participants) n =
	32
Age	Range: 18-53 years old
Country of Origin	
Syria	29 (90.6)
No answer	3 (9.4%)
Was your home in your country of origin an	

urban or rural environment?	
Urban	2 (6.3)
Rural	29 (90.6)
No answer	1 (3.1)
What year were you displaced from your home?	
2010	1 (3.1)
2011	11 (34.4)
2012	7 (21.9)
2013	5 (15.6)
2014	5 (15.6)
2015	2 (6.3)
2016	1 (3.1)
What year did you arrive to Lebanon?	
2010	1(3.1)
2011	11 (34.4)
2012	6 (18.8)
2013	5 (15.6)

2014	5 (15.6)
2015	2 (6.3)
2016	1 (3.1)
2017	1 (3.1)
Look at the samples that the LRC volunteer has. What do you think these samples are used for? Please describe in the space below.	30 (93.8) participants said “for menstruation” 1 (3.1) participant said “thick and big” 1 (3.1) participant did not answer
Do these samples look like pads you have used before?	
Yes	19 (59.4)
No	13 (40.6) Reasons: <ul style="list-style-type: none"> • “very thin” • “smaller in size” • “wrapped in bag”
Would you use these samples for your menstrual needs?	
Yes	30 (93.8)
No	2 (6.3) participants reported NO Reasons: <ul style="list-style-type: none"> • "smaller"

	<ul style="list-style-type: none"> • "thin"
<p>"Each package contains 3 pads (Type 1 = SAP, Type 2 = Felt). Which pad do you prefer? Please explain or elaborate your preference."</p>	
Type 1	17 (53.1)
Type 2	14 (43.8)
No preference	1 (3.1)
<p>"Which of the following menstrual products do you use <u>most</u> of the time?"</p>	
Disposable Pads	<p>31 (96.9)</p> <ul style="list-style-type: none"> • 25 (78.1) use disposable pad brand "Private" • 1 (3.2) of participants use disposable pad brand "Alwes" • 1 (3.2) report using الولادة فوط • 5 (16.1) did not specify
Reusable Pads	1 (3.1)
	**This question was not clearly written and may have affected participants responses.

Would you like to change the product you currently use to one of the options below?	
Disposable	29 (93.5) 19 (65.5) of 29 specified Private
Other	2 (6.5) “I don’t want to change” “Wrap in bag and throw in garbage”
What is the most important factor for you when choosing a menstrual product?	
Price	15 (46.9.5)
Comfort	17 (53.1)
No answer	1 (3.1)
If both pads cost the same amount and were made of the same material, would you buy A, the pad with wings (W), or B, the pad without wings (NW)?	
With wings	27 (84.4)
Without wings	5 (15.6)

<p>If a pad A with wings (W) cost 300 Lebanese Pounds and a pad B without wings (NW) cost 200 Lebanese Pounds, would you buy the pad with wings or the pad without wings? Please explain or elaborate on your preference?</p>	
<p>With wings</p>	<p>22 (68.8)</p> <p>Participants that gave reasons:</p> <ul style="list-style-type: none"> • 8 participants that prefer pad WITH wings report that their reason is "for comfort" • 2 participants that prefer pads WITH wings report "good" and "suitable for body" • 4 participants that prefer pads WITH wings report "to keep pad in place"
<p>Without wings</p>	<p>10 (31.3)</p> <p>Participants that gave reasons:</p> <ul style="list-style-type: none"> • 5 participants that prefer pads with WITHOUT wings reported "I prefer the cheaper"/"price" as reason • 3 participants that prefer pad WITHOUT wings report that their reason is "for comfort"

What thickness of pad do you prefer to wear?	
Thin (3mm)	1 (3.1)
Medium (7 mm)	19 (59.4)
Thick (10 mm)	12 (37.5)
If you use pads, how do you attach them to your clothing?	
I use pads with adhesive backing	31 (96.9)
No answer	1 (3.1)
How long do you prefer your pads to be? Which of the following pads from the picture below has a length that looks most like what you prefer? The pads in the bag given to you by the LRC volunteer is size medium.	
Large (30.48 cm)	12 (37.5)
Medium (20.32 cm)	17 (53.1)

Small (15.24 cm)	1 (3.1)
No answer	2 (6.3)
Do you prefer a pad that is white, or do you prefer a different color?	
White	32 (100)
On which side of the pad would you prefer to have colored fabric?	
Top	1 (3.1)
What do you prefer the individual pads to be wrapped in?	
Plastic	7 (21.9)
Paper	24 (75.0)
No Wrapping	1 (3.1)
Do you prefer that the material used to wrap the individual pad is white or do you prefer a different color?	
White	30 (93.8)

Other	2 (6.3) • 2 of 2 (100) said Black
Which of the following methods do you <u>most</u> commonly use to dispose of your pads?	
Throw in household waste	29 (90.6)
Other	3 (9.4) • 3 of 3 (100) report wrapping in bag (tightly) and throwing in routine waste
Which of the following methods would you <u>prefer to</u> use to dispose of your pads?	
Throw in household waste	29 (90.6)
Other	3 (9.4) • 3 of 3 (100) report wrapping in bag (tightly) and throwing in routine waste
Do you buy your own pads?	
Yes	30 (93.8)
No	1 (3.1)
No answer	1 (3.1)
In what quantity do you currently buy your pads?	

Individually	21 (65.6)
Bulk Packages	11 (34.4)
Where/From whom do you currently buy your pads?	
Store	30 (93.8)
Other	1 (3.1) <ul style="list-style-type: none"> • “From pharmacy”
No answer	1 (3.1)
Do you pay for your pads?	
Yes	31 (96.9)
No	1 (3.1)
How much do you currently pay for pads? Please describe in the blanks below:	Range between 1000-6000 LL for 7-14 pads 5 participants pay 2500 LL for 10 pads 4 participants pay 1500 LL for 10 pads Lowest price is 125 LL per pad Highest price is 500 LL per pad
Would you be interested in learning how to fabricate menstrual pads for you and/or your community?	

Yes	7 (21.9)
No	20 (62.5)
Maybe	5 (15.6)

Table 12. All questions asked and data collected from the preference testing done with displaced women in the IS in Southern Lebanon.

Wave 2: Efficacy Test with Displaced Women in Southern Lebanon - PART ONE	
Survey Question	No. of Participants (% of total Participants) N=33
Age	Range: 19-50
Day, month, and year you were born	
What country were you born in?	
Syria	34 (100)
Lebanon	0 (0)
Did you live in an urban setting?	
Yes	2 (6)
No	20 (60.6)
No Answer	11 (33.3)
Did you live in a rural setting?	
Yes	31 (93.9)
No	2 (6)

No Answer	0 (0)
Did you live somewhere else?	
Saudi Arabia	1 (3)
Turkey	1 (3)
No Answer	31 (93.9)
What year were you displaced from your home?	Data not collected by LRC volunteers
What year did you arrive to Lebanon?	Data not collected by LRC Volunteers
Are you currently menstruating?	
Yes	8 (24.2)
No	24 (72.7)
Other	1 (3) “Pregnant”
Which of the following menstrual products do you use <u>most</u> of the time?	
Disposable Pads	33 (100) <ul style="list-style-type: none"> • 2 out of 33 specified “Sandra” • 1 out of 33 specified “Always” • 1 out of 33 specified “Private” • 1 out of 33 specified “Brivo” • 2 out of 33 specified “Life”
Reusable Pads	0 (0)
Tampons	0 (0)
Other, please describe:	N/A

How much do you currently pay for pads? Please describe in the blanks below:	Range between 1000-9000 LL for 5-40 pads Lowest Price is 75 LL per pad Highest Price is 714 LL per pad
Is there something you would change about your current menstrual product? (design, thickness, price)	*In some cases answers suggest that this question was misinterpreted as it seems they are were giving feedback on our pad prototype and not their current product.*
Yes, explain:	14 (42.4) <ul style="list-style-type: none"> • “Thickness” • “No wings” • “Length” / “Size” • “Price” • “Allergic”
No, I like the product I currently use	19 (57.5)

Table 13. Questions and results collected from the first efficacy test (Wave 2) survey conducted with displaced persons in the ITS in southern Lebanon.

Wave 2: Efficacy Test with Displaced Women in Southern Lebanon - PART TWO	
Survey Question	No. of Participants (% of total Participants) N=33
<i>Think about the pad you were given for the following questions.</i>	
While wearing it, were you aware of the pad?	
Yes, explain:	4 (12.1) Reasons:

	<ul style="list-style-type: none"> • “Thick” • “Thin”
No	29 (87.9)
Did the product remain in place during various activities?	
Yes	26 (78.8)
No, explain:	7 (21.2) <ul style="list-style-type: none"> • “Not fixed” • “Without wings it is not fixed” • “Sometimes it moves”
Was the pad comfortable?	
Yes	26 (78.8)
No, explain:	7 (21.2) <ul style="list-style-type: none"> • “It is thin” • “Thick” • “Because it is not fixed and it moves” • “Leakage” • “Not fixed”
Did you feel that the pad caused any personal embarrassment in terms of visibility or sound?	
Yes, explain:	2 (6) <ul style="list-style-type: none"> • “Leakage” • “Visible”
No	28 (84.8)
No Answer	3 (9.1)

Was the pad easily used with your regular underwear?	
Yes	30 (90.9)
No, explain:	3 (9.1) <ul style="list-style-type: none"> • “Glue not removed from underwear”
Were all the pads equally effective? (e.g. all pads had the same absorbency, all pads felt the same)	
Yes	30 (90.9)
No, explain:	3 (9.1) <ul style="list-style-type: none"> • “Does not absorb” • “Leakage”
What suggestions do you have to improve the pad and why?	
Answer	14 <ul style="list-style-type: none"> • 5 out of 14 included “Wings” • 6 out of 14 included “Thicker”/ “Thickness” • 2 out of 14 included “Size” • 2 out of 14 included “Wider”
No Answer	19
Please mark an X on all areas where you had problems with your pad (leakage, material	Answer: 19 <p>Region 5, 7, and 6, 8: 14 out of 19</p> <p>Region 1, 2 and 11, 12: 2 out of 19</p> <p>Region 5, 7: 2 out of 19</p> <p>Region 5,7 and 6,8 and 1,2 and 11,12: 2 out of 19</p>

ripping, etc.) and what the problem was.



Descriptions:

- 16 out of 19 included “Leakage”
- 1 out of 19 said “Small in size so they used 2 instead of 1”
- 1 out of 19 said “Does not absorb and is not easy to be removed”
- 1 out of 19 said “It moves and wraps in underwear while moving”
- 1 out of 19 said “Size is very small”

No Answer: 14

Think about the pads you used for this study versus the product you currently use. Would you pay the same amount for these pads?

I would buy this pad only if it costs less than my usual pad	8 (24.2)
I would pay the same amount	14 (41.4)
I would be willing to pay more for these pads	11 (33.3)

Please circle the number that best describes your likes/dislikes of the pad.	
1- I strongly disliked the pad	4 (12.1) Reasons: <ul style="list-style-type: none"> • “Absorption” • “Should have wings and the ability to absorb more”
2- I disliked the pad	1 (3)
3- I kind of disliked the pad	0
4-I neither liked nor disliked the pad	8 (24.2) Reasons: <ul style="list-style-type: none"> • “Preferred to be removed easily” • “Same as usually used”
5- I kind of liked the pad	7 (21.2)
6- I liked the pad	11 (33.3) Reasons: <ul style="list-style-type: none"> • “Thickness” • “Comfortable good in size and thickness no leakage” • “Fixed” • “No sounds”
7- I strongly liked the pad	2 (6) Reasons: <ul style="list-style-type: none"> • “Comfortable”
We want to know if you would use this pad or if you prefer to use the menstrual products you used previously.	
1- I definitely would not use this pad	3 (9.1)

2- I would not use this pad	1 (3)
3- I probably would not use this pad	0
4- I may or may not use this pad	6 (18.1) Reasons <ul style="list-style-type: none"> • “Absorb more” • “More thickness”
5- I probably would use this pad	11 (33.3)
6- I would use this pad	8 (24.2) Reasons <ul style="list-style-type: none"> • “I would buy this, it has good quality”
7- I definitely would use this pad	4 (12.1) Reasons <ul style="list-style-type: none"> • “Good in thickness, size, and absorption
Do you prefer pads with wings?	
Yes	29 (87.9)
No	1 (3)
Don't Know	1 (3)
Prefer not to answer	0
Other, please specify:	0
No Answer	2 (6)
Please look at the pads given to you. Would you like them to be thicker?	
Yes	15 (45.5)
No	16 (48.5)
Don't Know	2 (6)
Prefer not to answer	0

Other, please specify:	0
Think back to when you arrived, how long would you be willing to wear this pad before you would want the ideal menstrual pad available to you?	
Always, this is my ideal pad	19 (57.6)
Never, I would use my own solution	2 (6)
1 month	3 (9)
2 months	3 (9)
3 months	0 (0)
4 months	6 (18.1)
Other, please specify:	0 (0)
We are looking to engage women in this community who are willing to be taught the fabrication process in order for the project to continue and benefit your community. Do you see yourself as one of the women interested in being taught this process?	
Yes	28 (84.4)
No	4 (12)
Maybe:	1 (3)

Table 14. Questions and results from the first efficacy test (Wave 2) with displaced persons in the ITS in Southern Lebanon.

Wave 3: Efficacy Test with Displaced Women in Southern Lebanon – PART ONE	
Survey Question	No. of Participants (% of total Participants) N=35
Age	Range: 19-45
Day, month, and year you were born	--
What country were you born in?	
Syria	--
Lebanon	--
Did you live in an urban setting?	
Yes	--
No	--
No Answer	--
Did you live in a rural setting?	
Yes	--
No	--
No Answer	--
Did you live somewhere else?	
No Answer	
What year were you displaced from your home?	--
What year did you arrive to Lebanon?	--
Please describe the type of underwear you wear.	
Which of the following menstrual products do you use <u>most</u> of the time?	

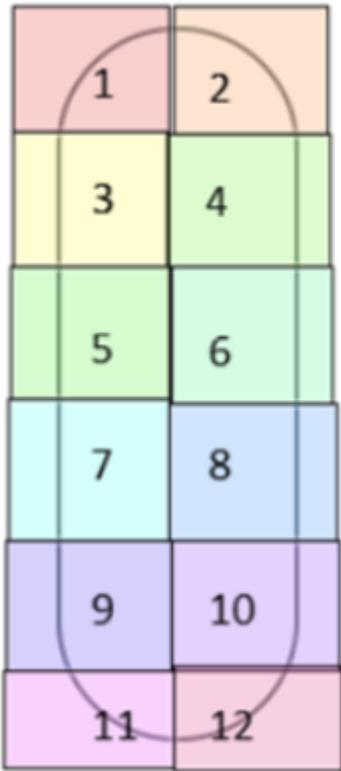
Disposable Pads	--
Reusable Pads	--
Tampons	--
Other, please describe:	--
How much do you currently pay for pads? Please describe in the blanks below:	Average Price Per Pad: 282.82 lbp Lowest Price Per Pad: 150 lbp Highest Price Per Pad: 500 lbp
On average, how many pads do you wear in a 24- hour period? (1 full day + night)	Average: 3.7 pads

Wave 3: Efficacy Test with Displaced Women in Southern Lebanon - PART TWO	
Survey Question	No. of Participants (% of total Participants) N=33
<i>Think about the pad you were given for the following questions.</i>	
How many of the pads given to you did you wear in one 24-hour period (day and night)?	Average: 3.8
1	2 of 35 (5.7)
2	3 of 35 (8.6)
3	11 of 35 (31.4)
4	1 of 45 (2.9)
5	15 of 25 (42.9)
No Answer	3 of 35 (8.6)
While wearing it, were you aware of the pad?	
Yes, explain:	1 of 35 (2.9) <ul style="list-style-type: none">• “thick”
No	31 of 35 (88.6)
No Answer	3 of 35 (8.6)
Did the product remain in place during various activities?	

Yes	28 of 35 (80.0)
No, explain:	4 of 35 (11.4) <ul style="list-style-type: none"> • “not fixed” • “not fixable needs more glue” <ul style="list-style-type: none"> • “it was not fix” • “not fixed”
No Answer	3 of 35 (8.57)
Was the pad comfortable?	
Yes	28 of 35 (80)
No, explain:	3 of 35 (8.6) <ul style="list-style-type: none"> • “not fixed and don’t remain in place” <ul style="list-style-type: none"> • “larger size” • “not fixed”
Did you feel that the pad caused any personal embarrassment in terms of visibility or sound?	4 of 35 (11.43)
Yes, explain:	2 of 35 (5.7) <ul style="list-style-type: none"> • “visible” – 2 of 2
No	30 of 35 (85.7)
No Answer	3 of 35 (8.6)
Was the pad easily used with your regular underwear?	
Yes	29 of 35 (83.9)
No, explain:	3 of 35 (8.6) <ul style="list-style-type: none"> • “not fixed” – 2 of 3 • “did not remain in place”
No Answer	3 of 35 (8.6)
Did you have any problems with the adhesive of the pad?	

Yes, explain:	5 of 35 (8.6) <ul style="list-style-type: none"> • “does not remain in place and the underwear got all blood” <ul style="list-style-type: none"> • “needs more glue” <ul style="list-style-type: none"> • “not fixable” • “not fixed” – 2 of 5
No:	27 of 35 (77.1)
No Answer	3 of 35 (8.6)
Were all the pads equally effective? (e.g. all pads had the same absorbency, all pads felt the same)	
Yes	31 of 35 (88.6)
No, explain:	1 of 35 (2.9) <ul style="list-style-type: none"> • “did not use all of them”
No Answer	3 of 35 (8.6)
How many of the 5 menstrual pads provided to you did you use?	
1	2 of 35 (5.7)
2	0 of 35 (0)
3	0 of 35 (0)
4	0 of 35 (0)
5	30 of 35 (85.7)
No Answer	3 of 35 (8.6)
If you did not use all the menstrual pads provided to you for this survey, why did you not use these menstrual pads	<ul style="list-style-type: none"> • “its not comfortable” • leaks, not comfortable” <ul style="list-style-type: none"> • Do not last long”
Please mark an X on all areas where you had problems with your pad (leakage, material	<ul style="list-style-type: none"> • Front left: 9 of 35 (25.7) • Front right: 10 of 35 (28.6) • Middle left: 10 of 35 (28.6) • Middle right: 10 of 35 (28.6)

ripping, etc.) and what the problem was.



- Back left: 11 of 35 (31.4)
- Back right: 12 of 35 (34.3)
- No Answer: 19 of 35 (54.3)

- Leakage: 12 of 35 (34.3)
- Folding on Edges: 6 of 35 (17.1)
- Material Ripping: 9 of 35 (25.7)
 - Other: 4 of 35 (11.4)
 - “thicker and longer” – 2 of 4
 - longer in size and thicker”
 - “longer in size, more adhesive”

Think about the pads you used for this study versus the product you currently use. Would you pad the same amount for these pads?

I would buy this pad only if it costs less than my usual pad	12 of 35 (34.3)
I would pay the same amount	16 of 35 (45.7)
I would be willing to pay more for these pads	3 of 35 (8.6)
No Answer	4 of 35 (11.3)

If these menstrual pads were distributed to you for free, how long would you be willing to wear this menstrual pad

before looking for something else?	
Always	27 of 35 (77.1)
1 month	0 of 35 (0)
2 months	0 of 35 (0)
3 months	0 of 35 (0)
4 months	0 of 35 (0)
Other, please specify:	2 of 35 (5.7)
	<ul style="list-style-type: none"> • “she will use it when she has no other choice” – 2 of 2
We are looking to engage women in this community who are willing to be taught the fabrication process in order for the project to continue and benefit your community. Do you see yourself as one of the women interested in being taught this process?	
Yes	30 of 35 (85.7)
No	3 of 35 (8.6)
Maybe:	0 of 35 (0)
No Answer	2 of 35 (5.7)

Table 15. Questions and results from the first efficacy test (Wave 3) with displaced persons in the ITS in Southern Lebanon.

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