

PASS and *Uger*
Tools for Menstruation Management Sustainability

THESIS

**Submitted in partial fulfilment of the requirements of the degree of
Doctor of Philosophy**

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I dedicate this work to my late husband

Vijay Joshi

**You encouraged me to take up this journey
I wish you had stayed long enough by my side**

Approval Sheet

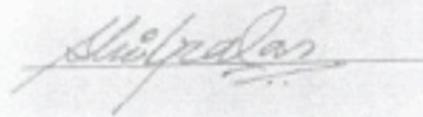
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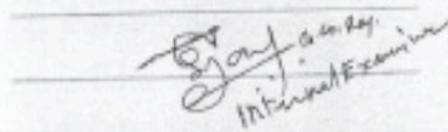
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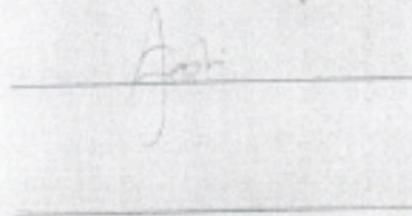
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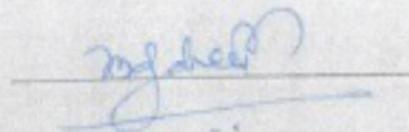



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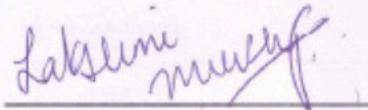


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Abstract

This thesis deals with the sustainability of menstruation management. Lifestyles in rural India are changing. Three changes in menstrual management practices that we have observed in our practice are relevant to this thesis, the increased use of underwear among girls and women, increased use of *Time Piece (TP)*, and the use of disposable sanitary napkins (DSNs). These changes do not necessarily align with recommended “best menstrual management practices” and are unsustainable. Menstrual management practices impact health, economics, cultural aspects, social and environmental factors, while creating multiple challenges for stakeholders such as rural menstruators, programme implementers, policy planners and others. Hence there are many dimensions that need consideration to make menstruation management into a sustainable process.

The framework for the study was done in three distinct categories: the devices or products used, practices around management and spaces/facilities/ infrastructure to manage menstruation. All three categories are inter – connected and interdependent. Four areas of enquiry formed the core of this thesis.

- (a) Sustainability
- (b) Social Change
- (c) Participatory Social design
- (d) Action research.

We explored the research questions through experiments, cross over trials, studies and personal communication with stakeholders, while considering three products, namely *TP*, DSNs and *Uger*.

This thesis proposes two tools for sustainable menstruation management for rural communities. The first tool called PASS is an assessment tool that can be used to score and compare systems for sustainable menstruation management. The second tool, *Uger* pads, is a tool for managing menstrual discharge in a sustainable way. This thesis, by proposing these two tools, lays out multiple possibilities for future sustainable interventions for menstruation management.

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Abbreviations and Terms

TP *Time Piece*

DSN Disposable Sanitary Napkin

MHM Menstrual Health Management

SWM Solid Waste Management

MITU Foundation Multiple Initiatives Toward Upliftment

SHG Self Help Groups

Chapter 1

Motivation and Introduction

1.0 Motivation

Menstruation is a physiological phenomenon, common across many mammals (Emera, Romero & Wagner, 2011). Human females menstruate. In the case of humans however it does not just remain as a simple body function, it is associated with many cultural beliefs, social systems and practices (Dasgupta & Sarkar, 2008). Many of these practices and methods around managing menstruation have been passed down by generations of women and men, and currently some of these have become barriers to recommended good menstrual health practices. For example, there are superstitions around menstruation which have resulted in poor maintenance of menstrual devices. Feeling shame, feeling dirty and feeling impure are perceptions associated with menstruation. Due to social norms, there is silence on the subject. Women usually do not discuss menstruation openly with men. Conversations with men are limited therefore men are poorly informed. This results in women's needs being overlooked. For instance, purchase of motor cycles may take priority over constructing a private space for women to bathe or change their menstrual product. The consequence of this is compromised hygiene. Poor personal hygiene during menstruation can also be due to limited water

availability within a community. Economic reasons can stand between intention and action: a situation, such as having no money to buy soap, can be the reason for not keeping a menstrual cloth clean or not having enough menstrual cloths to use.

In my professional practice of thirty odd years, my colleagues and I¹ have been witness to the ways in which traditional practices, taboos and superstition dominate life within rural communities, reflecting in the management of menstruation. Our practice in the area of reproductive health communication has been grounded in the districts of Southern Rajasthan and in a few other geographies in India² where we have been able to closely observe and interact with rural communities and be associated with intervention programmes in the area of menstruation management. Our work involved conducting awareness programmes for adolescent girls and women to include subjects such as changes in the body during adolescence, menstruation, pregnancy, contraception, HIV Aids and other areas of reproductive health. Modules were designed for various sessions which would be conducted at workshops spread over 2 to 3 days. In the year 2000, a menstrual product option in the form of a reusable sanitary napkin with hold up straps was designed as part of this larger body of reproductive health work. The pad was called the “*Lace Wallah Kapda*” (Lace Wallah Kapda, 2003), a designed upgraded version of cloth.³ This pad was intended for users who do not wear underwear, as underwear usage came into our work area later. This is described in detail in Chapter 4. At the time of the intervention, more than 1000 adolescent girls were taught how to hand stitch pads for themselves with a view to making young women self dependent for their menstrual needs which was found to be very empowering. This effort was acknowledged by two studies (Bharadwaj & Patkar, 2004) (House, Mahon & Cavill, 2012).

However, a few years into the intervention, around the years 2005 to 2007, the “*Lace Wallah Kapda*”, we found, was no longer as favoured. Young women reported that they folded cloth and placed it into the crotch of the underwear. Investigating this further we realised that some women and girls were using underwear, a new practice. This was a revelation for us, as we realised that underwear was easily available in the rural areas where we work, a result of improved roads in Rajasthan, which had opened up markets which now offered a variety of

¹ The use of “we” in the thesis refers to the researcher and her colleagues whose practice lies in rural and low income communities of South Rajasthan.

² A slum settlement, Nizamuddin Basti, Delhi, selected districts in Uttrakhand, Jharkhand, North Eastern States of India such as Meghalaya, Manipur.

³ This was made possible through an individual grant “Fellowship for Leadership Development, MacArthur Foundation, USA.

consumables. Cloth harvested from old garments – which has always been the practice and the newer “cloth” which was a felt fabric that was locally referred to as *Time Piece (TP)* were the two common absorbents for managing menstruation. This is detailed later in section 2.3.1. By 2010 – 2011 we were witness to more changes in the area of menstruation. In the Indian metros the volume of menstrual product debris from disposable sanitary napkins (DSN), was becoming visible. These remnants of used menstrual products were reaching already over loaded dumping sites. However, menstrual debris was rarely being discussed as a cause for concern. The disposable sanitary napkins had arrived into the district headquarters where we were working. Disposable napkins were available at many provision stores while earlier these same napkins could only be sourced at very few medical shops. We also began to see a few changes in the way menstruation was being managed within communities. At women’s group meetings, a few women would share that they bought disposables to use when they were travelling out of station or when they would go out of the house for longer durations. Menstrual debris became visible in very small amount, in pockets, at the block level from 2012 onwards, which was virtually non- existent in 2005. The government of India had also launched a free sanitary napkin distribution scheme (Schemes, n.d). We inferred that the debris was now due to increased availability, as adolescent girls were accessing disposable pads from their schools. The free pad distribution schemes for adolescent girls in government schools continues even today in Rajasthan, which has led to the build up of sanitary waste even at rural locations.

We made more observations during our practice. For example, government office records would show figures for “built toilets” but the on the ground the same structures would be used by communities for a totally different purpose, to store grain. The original objective of providing privacy for women (urinating, defecating, changing menstrual cloth) appeared to be defeated. In some government schools we found a pile up of disposable pad supplies, girls did not want these pads for a variety of reasons such as not having a usable toilet in the school, not knowing where to throw the used pads or not liking the quality of the pad that was supplied. In other schools, we saw that the pad supply itself was erratic. Even if girls wanted pads it was not available.

These observations and experiences brought us to question the sustainability of current products and the management of menstruation. If waste was visible it meant that this debris

was not being integrated back into earth. The dangers of inappropriate disposal and dearth of treatment options has been acknowledged by the Ministry of Drinking Water and Sanitation on their website (Solid and Liquid Waste Management, n.d). This led us to question impact: surely there was an impact of this waste, a health and an environmental impact on individuals and the larger community? We questioned if menstruation management had indeed become an unsustainable activity, not just for health and environment, but also for the community at large. How sustainable was the disposable menstrual product in comparison to the traditional management systems? Were the previous systems used by girls and women better than the use and throw products marketed by multi-national companies? With these queries and changes, we felt a time had come to dig deeper, to inform not just our own practice, but also the practice of other individuals and agencies who work in the area of reproductive health, of which menstruation is a part.

We found studies on sustainability, for example, the Edana Sustainability Report 2007-2008 on Absorbent Hygiene Products. However it does not feature cloth, which is a well known menstrual absorbent, not just in India but also in other geographies. While Davidson (2012) has analysed menstrual product consumption and sustainability from a social science lens in the American context, we found limited work on sustainability in the context of Indian rural communities. However menstrual waste has been calculated for the whole of India by Barman et al. (2017), to be 16180 tons of waste every month. The authors have assumed for 10 % of India's female population using disposable products. We realised that an academic perspective on menstruation management and its sustainability, applicable to rural communities was required that could potentially guide future work and interventions. Would experiments and studies around the management of menstruation contribute to the design of better systems for women? Would an enquiry be able to guide government health policies around the management of menstruation? Re-examining scenarios around menstruation management, re-examining long and short term impact, and re-looking at sustainability of menstrual practices and systems were the next steps. Through this Ph.D thesis, we also wanted to explore if menstruation sustainability could be measured or if a comparison is even possible between devices or facilities. If menstruation management sustainability could be measured, how would that be applied to a regional context such as our work area? All these issues motivated the enquiry and the overarching goal of the thesis was thus established.

1.1 Contributions

This study attempts to examine scenarios around menstruation management, examine long and short term impact, and sustainability of practices and systems. The overarching theme to guide this enquiry is, “**Menstruation Management and Sustainability**”.

We formed three central research questions;

RQ 1 How can we make the management of menstruation sustainable?

RQ 2 How can Menstruation Management Sustainability be measured?

RQ 3 How can we holistically compare for menstruation management sustainability between different menstrual products and management systems?

There are two major contributions in the area of “sustainable menstruation management” that emerged from this enquiry in response to the research questions. The first contribution is the PASS Tool (Figure 1.1) that emerged from explorations around RQ 2 & RQ 3. The second contribution is the tool Uger Cloth Pads, (Figure 1.2), emerging from RQ 1. There are other outcomes that emerged from these contributions described later in this section.

1.1.1 PASS Tool

Currently there are limited ways to assess menstruation sustainability in the context of rural communities. Multiple dimensions need to be assessed from the four perspectives of sustainability, environment, economic, health and social. In the thesis, we discuss in detail how we derived these four dimensions. To address this, we developed a tool called the “PASS Tool”. The tool is visualized as 4 pillars supporting a roof, representing menstruation management sustainability, (Figure 1.1). The four pillars of the tool correspond to the four dimensions of the management of menstruation, Environment, Economic, Health and Social. These four aspects were translated into Hindi to make the tool relevant to regional contexts.

- a) Environment Pillar - *Paryavaran* - named P, to consider impact on environment. We assessed (i) raw materials and energy use in menstrual products (ii) disposal methods and menstrual debris (iii) amount of water and detergent used during maintenance (iv) packaging at the point of sale or distribution (v) biodegradability.
- b) Economic Pillar - *Arthik* - named A - to assess direct and indirect costs to user (i) cost of devices over 18 cycles (ii) cost of devices over a user’s life time (iii) cost for maintenance of devices (iv) cost to time (v) cost to cleanup – solid waste management

- c) Health Pillar - *Swasth* - named S to assess negative or positive health impact caused by the use of the product both on the user (rashes, allergies, boils, abscess) and on the community.
- d) Social Pillar - *Samaj* - named S to consider (i) infrastructure (ii) social acceptance (iii) design, comfort and function, (iv) maintenance (v) disposal (vi) economic independence (vii) aspiration

The acronym that is formed “PASS” also denotes “pass” to mean success. The term “pass” in the English language, is well understood in rural communities in South Rajasthan, commonly used in the context of success, denoting “cleared”. Each of the pillars are further divided into three units. A score of 3 units denotes sustainable, 2 units denote neither sustainable nor unsustainable and 1 unit, not sustainable. The PASS tool is discussed in detail in Chapter 3.

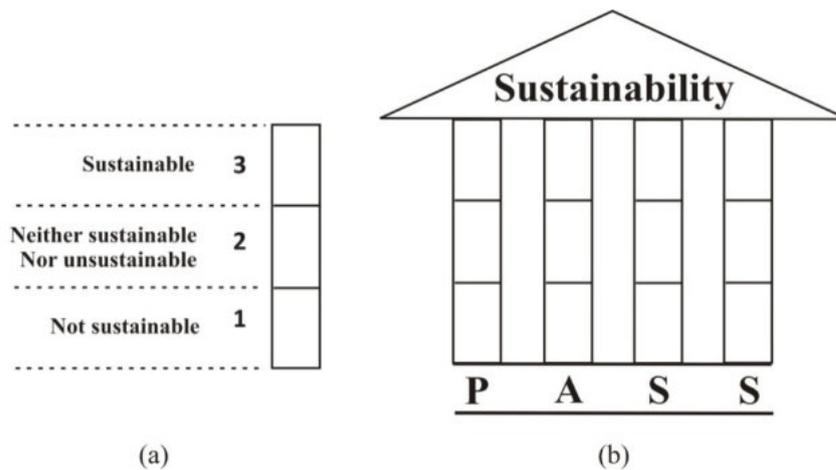


Figure 1.1 (a) Divisions in the pillars to assess sustainability (b) PASS tool for assessing sustainability of any aspect to menstruation management, device, practice or facility

1.1.2 Uger Cloth Pads

The “Uger reusable cloth pad” is a device for managing the discharges during a menstrual cycle. It was designed with collaborators as a solution for sustainable menstruation management. Three types of cloth pads were developed to suit different volumes of menstrual and vaginal discharges, namely an insert pad for heavy flow days (holder with a towel inserted in loops), a light pad for light flow days (no inserted towel) and a panty liner for white discharge or for wearing every day. (Figure 1.2).



Figure 1.2 (a) Uger Cloth pads, showing upper and lower side (b) Upper surface of pads, with insert towels placed on the sides

All these devices are made from locally sourced fabrics, designed in a way that it can be hand- stitched or made on a simple sewing machine. In the thesis, we describe the design process and the design in greater detail. The design and development of *Uger* pads is discussed in Chapter 4.

1.2 Studies Conducted

Conversations, interactions, and studies were conducted to seek answers to the research questions. We conducted nine studies to seek answers for the research questions.

1) Study 1

To assess the three menstrual devices, *TP*, *DSN* and *Uger*, with respect to the health dimension of the *PASS* tool, we had conversations with doctors working with communities from lower economic groups (corresponds to RQ 1). We spoke to 6 doctors to understand the prevalent medical issues related to menstruation and to try to understand if it was possible to establish co-relations between a menstrual product and user health. We learned that due to the multiple factors around reproductive health, direct correlations between health outcomes and the menstrual products used may not be so easily established. This study is described in Chapter 5.

2) Study 2

Conversations with disposable pad users (corresponds to RQ 1).

This was done to assess *DSNs* with respect to the health dimension of the *PASS* tool, we identified 19 users who had experienced rash, itching, boils and abscess from branded sanitary napkins. We learned from experiences of these users. We found that they had limited

information on menstrual devices; for example, no one in this group was aware of the raw materials used in DSNs, nor were they familiar with the menstrual cup. Some users were of the opinion that using cloth was unhealthy practice. As a result of this lack of awareness and perception, they were not able to make more informed selections, largely depending on what was available in the market. This enquiry pointed to tremendous scope for new research on non- allergic raw materials such as cloth- based breathable menstrual devices and others. This study is described in Chapter 5.

3) Study 3

Cross Over User Trial 1 (corresponds to RQ 1)

We conducted this trial with 13 participants in rural South Rajasthan, in which users compared *Time Piece* with the *Uger* pad for a period of 8 months. The main objective was to assess the two devices from the health and social dimensions corresponding to the PASS tool. Our main findings were that *Time Piece* was considered to be more acceptable on the social dimension of the PASS tool. *Uger* pads were also accepted and seen as functional. Its design responded to the aspirations of participants as an “upgrade” from the cloth that users harvest from home. Washing *Uger* pads for reusing per se was not perceived as a burden by users. Even so, *Time Piece*, was found to be far more convenient because it is easier to wash and dry and easier to hang out in the open without shame as compared to *Uger*. On the other hand, in terms of health dimension of the PASS model, *Time Piece* caused itching and rash in some users. Users reported no rash or itching while using *Uger*. This study is described in Chapter 5.

4) Study 4

Cross Over User Trail 2 (corresponds to RQ 1)

We conducted this trial with 51 participants in Karnataka, in which users compared *Uger* with a disposable sanitary napkin called *Rutumitra* for a period of 8 months. Like in the first study, the main objective of the study was to assess *Rutumitra* and *Uger* on the health and social dimensions corresponding to the PASS tool. Similar to the Cross over trial no1, *Uger* pads were socially accepted, liked for its design, seen as functional, again responding to aspiration, seeing *Uger* as superior to their previous product. Even in this trial washing a menstrual device was not seen as a burden. However, the time taken for maintaining *Uger* was far greater than the disposable *Rutumitra* pads. Users who disposed *Rutumitra* by burning in their personal *hande volay*⁴ found it more socially acceptable than *Uger*. However *Rutumitra* did

⁴ *hande volay* - A stove only used for heating bath water, common in many parts of South India

not find favour with those users who did not have access to a *hande volay*. This contrast also underlined the fact that in rural areas, there are no systematic disposal mechanisms, and users need to dispose menstrual products themselves. In terms of the health dimension of the PASS tool, *Rutumitra* caused itching in 4 users, while only one participant experienced itching with *Uger*. This study is described in Chapter 5.

5) Study 5

Study of menstrual debris (corresponds to RQ 2, RQ 3)

Over the last 100 years or so, disposable sanitary napkins have been gaining favour among women all over the world. To assess the impact of DSNs on garbage disposal mechanisms, we studied menstrual waste generated by tracing the menstrual garbage journey from a girls' hostel on the IIT Bombay campus, where approximately 400 women of menstruating age live. We found that 6 % of the waste generated from the hostel consisted of disposable sanitary napkins. This puts a huge environmental load on the municipality to dispose this garbage. This enquiry pointed to tremendous scope for reusable menstrual devices that reduce solid waste. This is described in Chapter 6.

6) Study 6

Study of raw materials (corresponds to RQ 2, RQ 3)

To assess the three products with respect to the environmental dimension of the PASS tool, we studied the three menstrual devices from the perspectives of raw materials and the end of life of the devices. The textile laboratory at Banasthali Vidyapeeth, Rajasthan, identified *Time Piece* as felted fabric made of synthetic polyacrylate material. *Uger* was identified as being of cotton fabrics and hence seen as environmentally safe. In contrast, we found that disposable napkins are made of different raw materials such as wood pulp, SAP (gel), polymer materials, adhesives, silicon coated paper and other chemicals. This study is described in Chapter 6.

7) Study 7

Experiments around disposal of menstrual devices (corresponds to RQ 2, RQ3).

To further assess DSNs with respect to the environmental dimension of the PASS tool we buried, burned and threw away used menstrual devices simulating methods used by rural users. We found that burying cloth and *Uger* pads was sustainable as they bio-degraded, whereas *Time Piece* and DSNs remained intact even after being buried for many weeks. We describe these findings in detail in the thesis. This is described in Chapter 6.

8) Study 8

Water and detergent usage for maintaining menstrual devices (corresponds to RQ 2, RQ3). To further assess *Time Piece* and *Uger* with respect to the environmental dimension of the PASS tool we assessed the quantity of water and detergent required to wash the two reusable devices. We found that *Uger* pads required the most water and detergent when compared with *Time Piece*. *Rutumitra* on the other hand requires no water being a one time use menstrual device. We provide the detailed analysis in Chapter 6.

9) Study 9

Cost analysis (corresponds to RQ 2, RQ3)

This study compared the cost of the three menstrual products. We studied the cost of products, the maintenance costs, the costs of resources used, the cost associated with time (time taken for maintenance), the costs associated with disposal (municipality), the cost to human life (sewer cleaners) and others costs detailed in Chapter 6.

1.3 Other Outcomes – Dissemination of Tools

Contributions from this research are currently being implemented on ground. We have incorporated our learning into practice, based on our understanding that there can never be a “one size fits” all for sustainable menstruation management. We have built sustainability components into our pre-existing set of training modules and now conduct our programme implementation, focussed on informed choices and sustainability. We have put in place strategies for including men in all aspects of our menstruation work.

Our approach in the practice of reproductive health has always had a copy left⁵ focus , a philosophy that aligns with Victor Papanek, who states in his book, *Design for the Real World*:

“If I design a toy that provides a therapeutic exercise for handicapped children, then I think it is unjust to delay the release of the design by a year and a half, going through a patent application. I feel that ideas are plentiful and cheap, and it is wrong to make money from the needs of others.”
(Papanek, 1971)

⁵ Copy Left – is a general method for making a program (or other work) free (in the sense of freedom, not “zero price”, and requiring all modified and extended versions of the program to be free as well.

To this end, we have disseminated the two contributions PASS and *Uger* Pads, making both tools copy left for anyone to use or modify. To make *Uger* pads widely accessible, we have established a pad production unit, managed by a group of women from a lower economic segment of Udaipur city. *Uger* is available for purchase through outlets and through orders on line.

Between January 2016 and May 2019, Jatan Sansthan has reached out to more than 35,000 women, girls, boys and men from rural communities, through sustainable menstruation management workshops where participants have learned to assess menstrual products through PASS and have learned to stitch *Uger* pads. We were commissioned by the state governments of Rajasthan, Jharkhand, Bihar, Haryana, Maharashtra, UN agencies and CSRs⁶ to conduct menstruation management sustainability workshops with stake holder groups. Jatan Sansthan has also established *Uger* pad production units at state government levels, Semdega in Jharkhand, Ukhrul in Manipur, Dima Hasao in Assam, Tura in Meghalaya and Changlang in Arunachal Pradesh.

Uger pads have also received recognition from other sectors. We were shortlisted for the award, Design to Improve Life in 2015. Our work was recognised by the Pune International Centre in 2018 which gave us an opportunity to show case our work at the Honey Bee Innovators Meet at IIM⁷, Ahmedabad in 2019. We discuss dissemination efforts in Chapter 7.

1.4 Organisation of Chapters

Chapter 1 – Motivation and Introduction

This chapter introduces the background to the enquiry. The overall content of the thesis intent, “Sustainable Menstruation Management” is established and the multiple studies that were conducted are introduced.

⁶ CSR – Corporate Social Responsibility

⁷ IIM – Indian Institute of Management

Chapter 2 – Literature Review - Menstruation Management: Devices, Practices and Facilities

This chapter lays the background to menstruation, detailing aspects to management by individuals and communities, through three categories, devices, practices and facilities, which form the framework for the study. We introduce menstruation sustainability establishing the need for discussion and research. A definition for “Sustainable Menstruation Management “ is formulated. The 3 central research questions are outlined.

Chapter 3 – The PASS Tool: Assessing multi-dimensions of menstruation management

This chapter explains the tool we developed for menstruation management sustainability, with four pillars to represent the four dimensions of sustainability, environment, social, health and economics. The tool was made relevant to the study area, South Rajasthan, with each pillar in Hindi, renamed to form the acronym PASS. The measuring tool PASS was proposed as a way to measure and compare the different menstrual management systems for sustainability.

Chapter 4 – *Uger* Cloth pads

In this chapter, the design and development of the menstrual management device *Uger* is discussed. Feedback sought for *Uger* through collaborators to determine comfort, function and other aspects is also presented.

Chapter 5 – Assessing Health and Social Impact of Menstrual Devices

The assessment of menstrual products of through the health and social dimensions of the pillars of the PASS tool is given in this chapter. The health dimension was assessed by conversations with doctors in Study 1 and conversations with DSN users in Study 2. *Uger* products are put through two cross over trails. The first trial was in rural Southern Rajasthan using *Time Piece* and *Uger* pads (Study 3). The second trial was in a rural area near Bengaluru in Karnataka, using *Uger* pads and *Rutumitr*, (Study 4).

Chapter 6 – Assessing environmental and economic aspects of menstrual devices through PASS

The assessment of menstrual products through the two pillars of environment and economics is discussed here. We assessed the raw materials in menstrual devices in Study 5 and

menstrual debris in Study 6. We conducted experiments around disposal of menstrual waste in study 7 and assessed water and detergent use for maintenance of reusable products Study 8. Costs associated with menstrual products, time taken for maintenance, disposal and health costs around management were also assessed in Study no 9.

Chapter 7 – Dissemination

Uger and PASS were disseminated to inform practice. In this chapter examples of dissemination are discussed.

Chapter 9 – Conclusion

The concluding chapter summarizes contributions made through the enquiry, pointing out the advantages and disadvantages of both tools PASS and *Uger* and discusses the limitations. The thesis is concluded proposing potential areas for future research.

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Chapter 2

Review

Menstruation Management: Devices, Practices and Facilities

2.0 Introduction

There is little documentation on the subject of how early women, such as forest dwellers, managed menstruation. It is assumed to have been a simple action of wiping off blood and other vaginal discharges with grass or leaves. Early humans, hunted, gathered, reproduced and passed on, the next generation carrying on in much the same way (Encyclopaedia Britannica, 2017). When communities began to settle, the way life was managed changed, the simple hunting – gathering sequence was replaced by agriculture and other activities, such as domestication of animals (Encyclopaedia Britannica, 2019), and others over time. We speculate that systems for managing menstruation too must have evolved in the same way, taking on the variety of forms that are known today. Some of these systems are described in this chapter in which we look at devices, practices and facilities (physical infrastructure) around menstruation in current times. We introduce the multi-dimensional nature of menstruation management, bring in issues around the sustainability of systems, identify gaps and lay the ground for research questions.

2.1 Introduction to Menstruation – The Biological Process

Season after season, the earth renews itself. Leaves of a trees shed in March/April/May in South Rajasthan, making the landscape bare, but soon new leaves replace this during the rainy season. Nature has its own methods and systems to rejuvenate and regenerate. The process of this rejuvenation begins with an expulsion or removal of the old or something no longer required - making place for the new. The human body follows the rules of nature and is no different. It removes unwanted substances from the body through the different states of matter, in the form of liquids- for example urine, blood or sweat, solids in the form of stools, dead skin and others, and gases in the form of belching, queefing⁸ or farting.

Some of these expulsions have positive and negative associations depending on culture. Farting is seen as funny or normal in some cultures but may be opposite in others, belching may be a sign of appreciation or may be considered impolite. The other negative associations of expulsions are the odour and the appearance of the expelled items like urine, faeces or menstrual blood. Most expulsions are therefore managed by humans in some way. For example, sweat is managed by wiping off, by bathing and sometimes by the use of anti-perspirant chemicals to block or suppress it. Urination and defecation are done in a latrine/washroom or in the open fields/jungle, but in privacy, necessarily away from where people live, cook or eat.

All these expulsion processes performed by the body are common to men and women, however, the expulsion of blood or the process of menstruation is unique to girls and women. A chapter on menstruation in a text book on anatomy defines menstruation in the following way:

Menstruation is a function peculiar to women and the higher apes. It may be defined as periodic and cyclic shedding of progestational endometrium accompanied by loss of blood. It takes place at approximately 28 days intervals between menarche and menopause. (Jeffcoate, 1983)

Adolescent girls and women have a uterus within their bodies connected to the ovaries by fallopian tubes. The eggs/ova in the ovaries start maturing between the age of 9 to 16 years of age. One egg/ovum is released from the ovary every month. The egg passes through the fallopian tube and reaches the uterus. Before the egg/ovum leaves the ovary, the uterus builds

⁸ Queefing – meaning - Vaginal Flatulence - an emission or expulsion of air from the vagina.

up its inner lining with extra blood and tissue in readiness for pregnancy. If the sperm meets with the ovum, conception takes place. The lining of the uterus supports the growing baby (foetus). If conception has not taken place, the uterus no longer needs the lining blood and tissue. Hence, the uterus begins shedding its lining and blood flow starts. Menstrual flow consists of blood, mucus and fragments of lining tissues. (Periods,n.d) (Menstruation,n.d). This discharge lasts about 2 to 7 days on an average and contains blood and tissue that exits from the body through the cervix and vagina. (Overview Periods,n.d). The process repeats at intervals, in cycles. This repeat cycle varies from person to person, however, on an average it ranges between 28 to 32 days. A woman will experience around 400 or more menstrual cycles in her life that is for over 40 or more years during her reproductive life span. The amount of blood that flows out from the body in each cycle is usually half a cup - 35 ml to 45 ml. (Jeffcoate,1983). Figures 2.1 shows the uterus and its location while figure 2.2 explains the menstrual cycle.

The Uterus

The Uterus is located here. It is connected to the two ovaries on either sides by fallopian tubes. Eggs in the ovaries start maturing during adolescence, between 9 to 16 years.

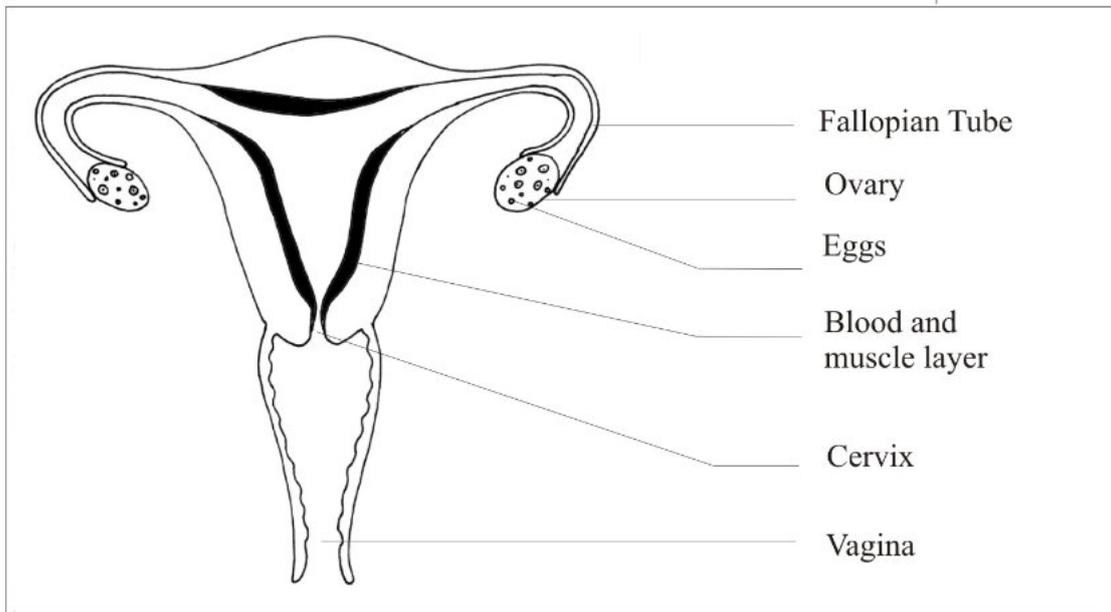
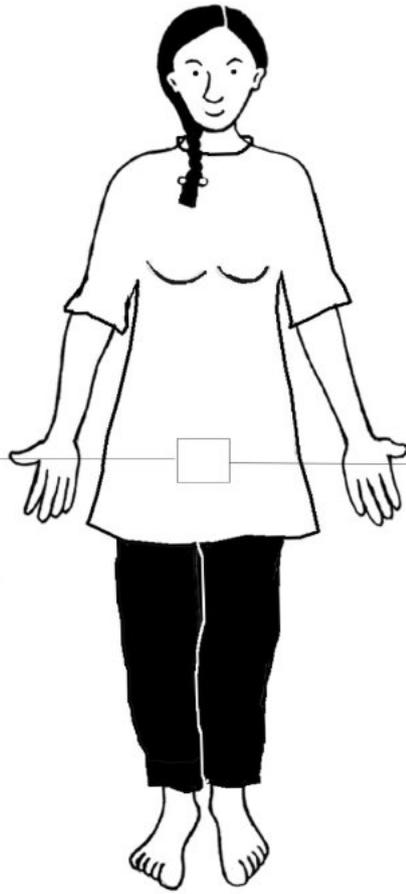


Figure 2.1 Location of the uterus and parts of the uterus

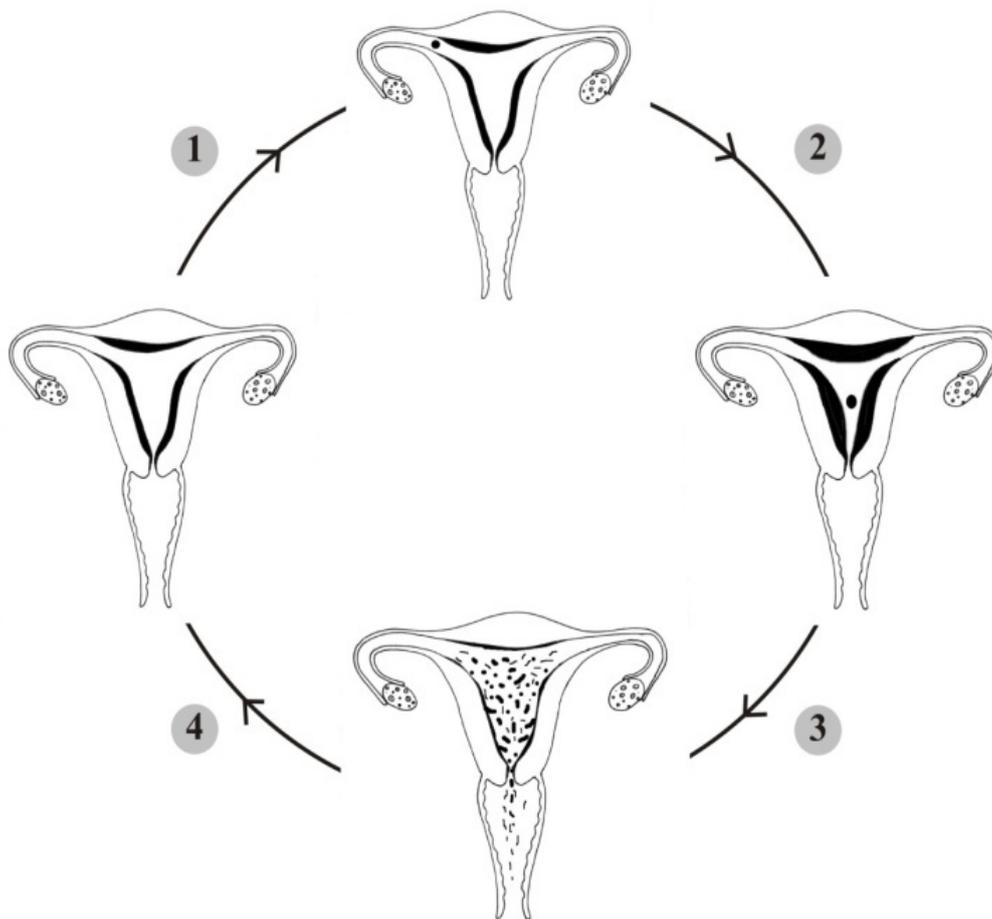


Figure 2.2 Diagrammatic representation of the menstrual cycle.
 (1) Egg released from ovary (2) Egg in fallopian tube, lining in uterus forms
 (3) Uterus lining thickening, egg exits body (4) Lining breaks down into the form of blood.

The process of menstruation is referred to as menses, the word *mensis* means “month” in Latin, the plural, is menses. Dictionaries define menses as a noun, describing it as “the flow of blood that comes from a woman's body each month” (Menses, n.d) Another word used for menses is *catamenia* (Jeffcoate,1983). Periods is a word that is commonly used to denote monthly/periodic shedding of a female's uterus lining. Since menstruation has a social dimension, (shame, silence, which we will come to in section 2.4.1) it is referred by many different names. House, Mahon & Cavill (2012) say “Most cultures have secret codes and practices around managing periods”. The words for period, in the areas we work is also in code, with terminologies such as *gaba jana*⁹, *time*, *MC*, “*Meri Aunty a gaye*”, “*Guest aa gaya*”¹⁰ and other.

⁹ *Gaba* means cloth in Mewadi, the language of South Rajasthan, *MC* is short for Menstrual Cycle

¹⁰ My aunt has come, guest has come

2.2 Framework for Review

Menstruation, unlike most other body secretions, such as urine, sweat or faeces, is perceived to be more unpleasant and dirty. While we manage sweat, urination and other needs associated with body expulsions, there is a huge difference in management when it comes to menstrual discharges. If we take urine as an example: an average adult releases 800 to 2,000 millilitres of urine per day (Pietrangelo,2017) at intervals, which can be voluntarily controlled for a while. The activity of defecation is similar. It can be voluntarily controlled for a short time. In the case of menstruation the female body cannot voluntarily control the expulsion. It is a slow, gradual and continuous flow of blood and tissue over 2 to 7 days as these discharges are not released at one go (like urination). In most cultures it is not accepted if the blood flow is left to itself, it is expected that a menstruator¹¹ will manage the flow through some method or system. This continuous management is therefore done within a space through a sequence of actions involving both use and care of devices. This is the reason menstruation is different from other body functions as there are a number of social customs, taboos, attitudes, approval from society or peer group superstition and lack of factual knowledge, coupled with a host of gender issues such as parity and power. These are discussed later in section 2.4.2. From this we see that menstruation management has its roots from earlier civilizations and religious text.

An individual menstruator manages menstruation in a sequence, refer figure 2.3.

- Selecting and then using the devices and methods, to catch, contain or absorb the flow of blood coming from the uterus, in order to keep and feel clean and ensure that outer clothing remains stain free,
- Using places with privacy to change the device, when the device is full and is no longer able to contain or absorb the flow,
- Taking care of the soiled/used device



Figure 2.3 Menstruation management sequence

¹¹ Menstruator – a person who menstruates, a word coined by those working in the menstruation space, to be inclusive of all gender types , to include all human bodies that menstruate.

Three distinct categories emerge from this, the device or product used, practices around management and spaces/facilities/ infrastructure to manage. All three categories are inter – connected and interdependent, Refer to Figure 2.4, and form the framework we use for reviewing literature.

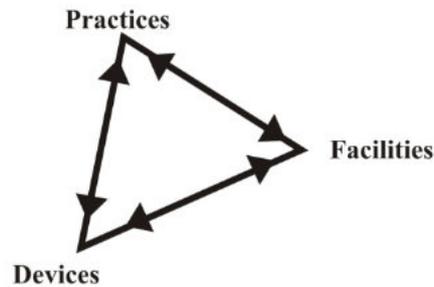


Figure 2.4 The interconnected and interdependent nature of menstruation management, devices, practices and facilities.

In section 2.3 we discuss the devices that are used for managing menstruation, in section 2.4 we look at practices around menstruation and in section 2.5 we discuss facilities for managing menstruation. Another important criterion is availability, access and affordability of the devices, we will come to these in later discussions. There are multiple dimensions to all menstrual devices. For example, environmental and health come into play due to the raw materials and manufacturing processes of the products. Social needs are to be considered due to community practices and economics due to affordability.

2.3 Devices for Managing Menstruation

In this section we look at the range of devices that girls and women have used for their menstrual needs, in order to get a full picture of what these are from perspectives of design and function, how they are worn and the management systems behind these devices. In this section we review mainly the devices that are available and accessed by women in the context of our work area (rural Rajasthan), while briefly touching upon products used in other contexts. We review options which we have categorized into reusable products (section 2.3.1), those that are used one time and then disposed, (section 2.3.2) and those products that are hybrid, which has one reusable component and one disposable component, (section 2.3.3). Be it any device, a user will need to wear or change into a fresh product two to four times in a day. We will return to these discussions in the proposal of our own interventional device in chapter 4, and environmental, economic, social and health aspects of devices in chapters 5–6.

2.3.1 Reusable Devices

All over the world, women have traditionally recovered good parts of fabric from old cotton garments, bed-sheets, towels and other textiles for use during menstruation. These are washed, dried and reused. This practice has been reported in many studies in the Indian context (Shanbhag, Shilpa, D'Souza, Josephine, Singh & Goud, 2012). McMahon, Winch, Caruso, Obure, Ogutu, Ochari & Rheingans, (2011) also report use of cloth in rural Kenya. Women in Bangladesh use “nekra” rags from old saris (Ahmed, 2008). Sapkota, Sharma, Budhathoki, Khanal & Pokharel (2013) report cloth use in Nepal. It is known from our own professional practice that women from South Rajasthan too fashion their own absorbents from petticoats, *safas* (turban) *dhotis* (sarong), *ghagras* (skirts), *kurtas* (long loose shirts/tops worn over *salwars* or loose trousers), saris (traditional Indian draped textiles) or other fabrics available at home, refer figure 2.5. This system of using whatever resource is available at home, “make shift” arrangements, is a reflection of our culture. Dinkar (2017) in an article writes of how Indians are not a wasteful society, which reflects in their everyday practice of saving and recycling. This inherent nature percolates into solutions, such as recovering cloth as a *Jugaad* (solution) for menstruation. In the foreword of the book *Jugaad* Innovation, Ratan Tata, the well known Indian industrialist writes:

“*Jugaad* is derived from experience of innovating frugal, homespun and simple solutions to the myriad problems that beset everyday life in India.” (Radjou, Prabhu, & Ahuja, 2012)

The other perspective to *jugaad* is repurposing. “Repurpose literally means give an item a new purpose taking on a second life.” (Mills, 2012). Farrant, Olsen & Wangel (2010) state that there is an environmental benefit when clothes are reused as it cuts the production process if new fabric had to be made. Repurposing saves energy, reduces pollution, it has economic benefits and it reduces waste. (Aguirre, 2010). Thus, a device created by a user from resources close at hand is a sustainable menstrual device as it is always accessible. The drawback of cloth from the home is that the user has no way of gauging what fibres have gone into the making of the fabric. This could be either cotton or a cotton polyester mix. However, menstruators draw on their experience and repurpose only those cloths after gauging for absorbency as they are aware that polyester fabrics do not efficiently absorb vaginal discharges.

Juggad, unfortunately, takes on many other forms in the area of menstruation management. In our practice area we often have seen women crushing newspapers and placing this in a rectangular piece of cloth, making absorbents by using items around them. How safe or unsafe this practice has not been studied.



Figure 2.5 Cloth recovered from a *kurta*, that has been used for menstruation, residual stains can be seen.

There are more observations around menstrual cloth that we have made in our practice. We have seen that there is a very important feature of cloth, the action of folding and refolding, an advantage only found in a piece of cloth. Menstruators manage reusable devices very intelligently. At the top surfaces of a cloth get soiled with discharge within a couple of hours, users then re-fold the cloth in different ways to bring any unsoiled and dry surface to the top. This way, the cloth gets turned around and the same piece of cloth gets used for a longer period of time, while bringing fresher surfaces in contact with the body. Figure 2.6 demonstrates the way cloth is folded.

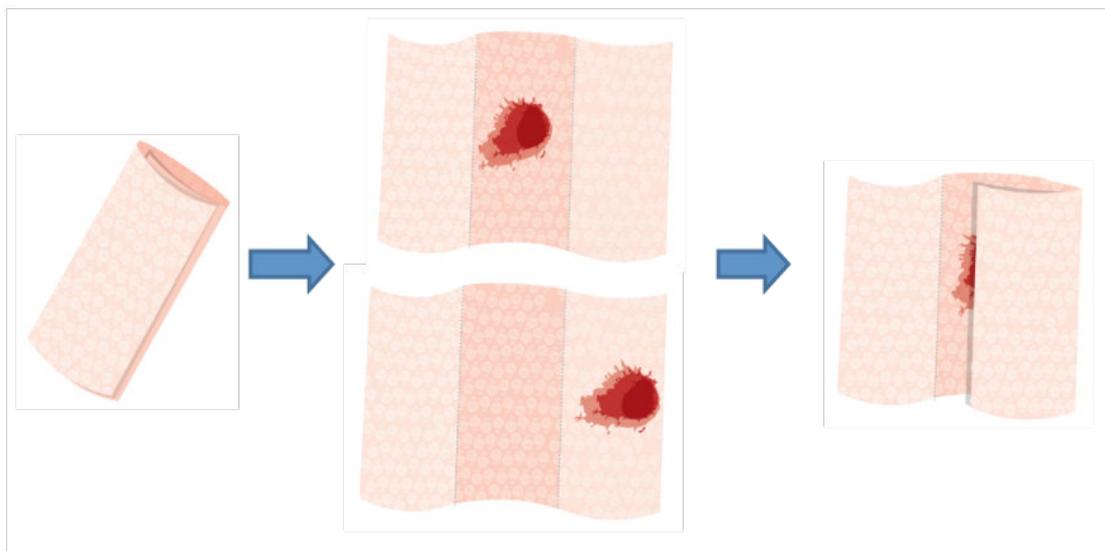


Figure 2.6 Way of folding of soiled menstrual cloth

This folding feature was used by the researcher in her design practice, which we can bring to the discussion at this juncture in the form of an old case study of relevance to the thesis. A reusable sanitary napkin with hold up straps was designed by the investigator in the year 2000 where she had developed a reusable cloth sanitary napkin as part of a larger body of reproductive health work. The pad called the “*Lace Wallah Kapda*”¹², was a modified and upgraded version of cloth.¹³ The pad base or holder has loops for inserting a towel and straps with buttons that can be fixed on to the drawstring tied at the waist. Refer Figure 2.7.



Figure 2.7 (a) *Lace Wallah Kapda* or cloth sanitary napkin with hold up straps
(b) How to wear the *Lace Walah Kapda*

At the time of the design intervention, underwear use was very uncommon in rural Southern Rajasthan, so the design had to respond to this aspect. The device was held up with a drawstring, and included the advantage of the towel folding feature described in the previous paragraph. More than 1000 adolescent girls were taught how to make these pads for themselves, with a view to empower young women to be self dependent for their menstrual needs. Acknowledged by two studies (Bharadwaj & Patkar, 2004) (House, Mahon & Cavill, 2012), those years were the early years of reproductive health interventions by NGOs where menstruation was one part of a number of other health topics, such as contraception, HIV/AIDS and others (Murthy, 2017). The *Lace Walah Kapda* was made copyleft. We used the copy left philosophy to disseminate our research work, which we will come to again in Chapter 7. In the year 2002, Oxfam¹⁴ representatives in Gujarat modified the design into a

¹² A cloth with straps

¹³ This body of work was made possible through an individual grant received by the researcher entitled “Fellowship for Leadership Development, MacArthur Foundation, USA.”

¹⁴ Oxfam – a charitable organization with head quarters in the United Kingdom

“langoti” (a traditional Indian loincloth for men) style, eliminating the button arrangement. This was mass produced for a specific purpose to distribute such pads to women affected by the Gujarat riots in the walled city of Ahmedabad. Refer figure 2.8. This pad design will find mention later when we report use of this in the Cross over trial no 1 in Chapter 5.



Figure 2.8 Oxfam Pad, designed to be worn with a draw string

Coming back to the *Lace Walah Kapda*, it was found to be popular for some years, but seemed to have fallen out over time, the fall out was estimated around the years 2005 to 2007. The reasons for the fallout were never completely monitored. From conversations in the field, we got to know that underwear availability was becoming common. Users placed cloth in their underwear, a life style change. This life style change was one reason (among others) which motivated the researcher to begin the Ph.D journey.

In the years 2010 /2011 we realized from our practice that many menstruators use another type of “market” cloth which is described in this paragraph. The “market” cloth locally referred to as *Time Piece*. These are pieces of fleece fabric 10 X 12 inch, costing between Rs 10 to Rs 12. Also referred to as “*Falanil*” (flannel) by some users, the “*Time Piece*” (*TP*) is available in dark colours, maroon, navy blue, black, military green and chocolate brown. This device is socially well accepted. It is favoured for its ability to wash easily and dry very quickly. Additionally no residual blood stains are visible upon washing, giving the appearance that it is clean. Refer figure 2.9. Users who use *TP* also follow the same method of folding and refolding cloth previously described. There is another version of the *TP* that is available. It is a stitched version, made into the shape of a pad with a sponge core in between. Figure 2.10 (a) and (b). The use of *Falanil* has also been documented by a team from Sewa Rural Hospital, in Gujarat. (Shah, Nair, Shah, Modi, Desai & Desai, 2013). From our professional

practice in other states in India, we have seen that the *TP* is available widely in markets in states such as Bihar and Madhya Pradesh, although we have not observed this in South India.



Figure 2.9 *TPs* in different colours



Figure 2.10 (a) *TP* stitched into the shape of a pad (b) With a sponge inner core

Local sellers at the bazaars of Railmagra, Rajsamand District have an interesting story saying that *TP*, comes from the term “cut piece” meaning piece of fabric and, “*Time*” for that time of the month; hence, "Time Piece" . Refer Figure 2.30 (a) and (b). This was what we learned from an interview with co – owners of a shop.

“*TP* was originally a fabric to wash trucks and cars. We go to Gujarat to buy ladies items in wholesale shops, bindis, choodis¹⁵, undergarments, and other fancy items. We got to know about this fabric from Gujarati suppliers. It is sold to us in bulk - 24 pieces in one pack. We know that it is factory manufactured in large thans¹⁶, and then cut to size. Cherry, maroon, red, are the colours that are

¹⁵ *Bindi* – red dot for forehead, *Choodi* - bangles

¹⁶ *Thans* –Hindi language- term for fabrics that come in bales

favoured. Some ladies feel shy when they ask for *TP*, so their husbands come to buy them.” Interview Sureshji and Mohanji, March, 2012

These four reusable products that we have so far discussed, cloth, *TP*, *Lace Walah Kapda* and Oxfam pad, will later play a role as we design the intervention tool to manage menstruation.

There are other reusable menstrual products. While these are not available in our work area, they are useful examples to mention in this review as it gives a holistic picture of currently available devices. Cloth cut and stitched into pad shapes with wings, has been available in America since 1993 started by a company Glad Rags¹⁷. It is available online Gladrags (n.d) refer figure 2.11 (a). Another cloth based device is the “Inter Labial” pads sold online by a group called *Sochgreen* (sochgreen,n.d) Figure 2.11 (b). Both cloth pads and labial pads are not available at kirana stores or super markets so in one sense they are not main stream products and not accessible for a user from a rural setting.



Figure 2.11 (a) Cloth pads, (b) Labial Pads

The sea sponge is another natural absorbent for menstruation that can be traced back to 1940, sold in tin boxes at that time (Sponge, n.d). Currently these can be purchased online Figure 2.12 (a). Both sponge and cloth pads are washed and reused. There are other reusable devices such as the menstrual cup. There are many companies manufacturing cups and they are easily available on line Figure 2.12 (b). In terms of the product function, the cup is the only product that collects menstrual discharge unlike other products that absorb.

¹⁷ <https://gladrags.com/pages/about-us> and <https://en.wikipedia.org/wiki/GladRags>

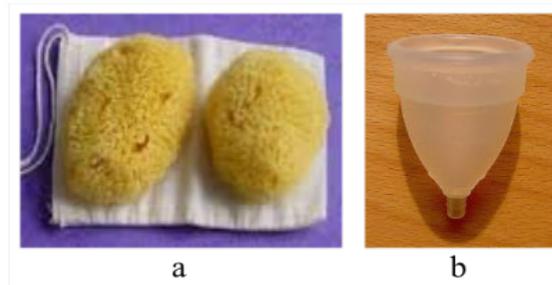


Figure 2.12 (a) Sponge (b) Menstrual Cup

However, as mentioned earlier, cups and sponges are not used in our study area but we have found this relevant in the context of giving users information so that they make sustainable choices. These devices will feature later in our dissemination strategies post the research in Chapter 7.

2.3.2 Disposable Devices

Menstrual devices that can be used only one time and then thrown away are called disposable menstrual devices in which, the maintenance of washing and drying is eliminated. While there is limited documentation on the disposables that early women may have used, it can be assumed to have been leaves and grass to wipe off blood. However, other natural disposable items, such as sphagnum or peat moss, was said to have been used in medieval times (Harris, 2014). The highly absorbent property of sphagnum moss was used in numerous bandages and sanitary napkin experiments by Johnson and Johnson in the early part of this century (Roe, 1992). The use of papyrus or grass, fashioned into a cylindrical shape so that it can be inserted into the vaginal canal, has been mentioned by Habiger (1988). Disposable Sanitary Napkins (DSNs) to manage menstrual flow, were developed and sold commercially in 1897 by Johnson and Johnson in America, under the brand name of Lister Towels, documented on a website dedicated to their company history (Gurowitz,2008). These early sanitary napkin designs had to be worn with bulky belts. See Figure 2.13 (a). The bulky belt was reduced to a simple elastic by the early seventies Figure 2.13 (b) with a plastic strip at the bottom of the pad giving it a leak proof feature.

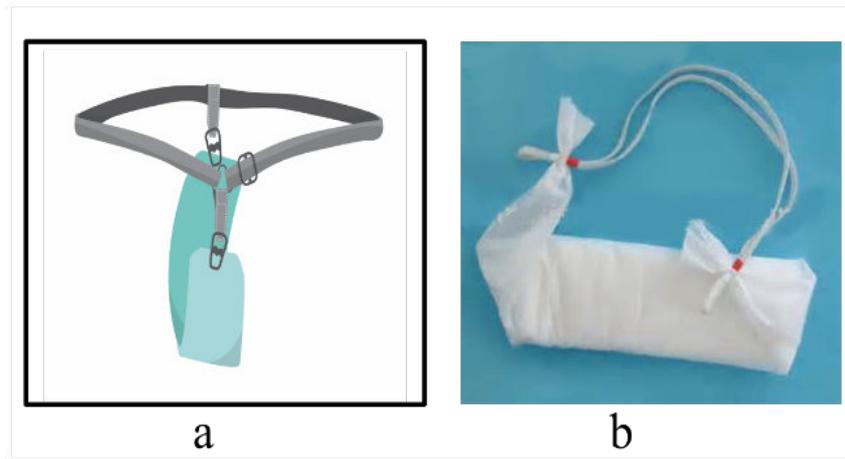


Figure 2.13 (a) Early sanitary napkin bulky belt. Illustration reference taken from the www.mum.org
 (b) Pad with sleeker elastic belt – Brand Carefree by Johnson and Johnson

The introduction of an adhesive strip at the bottom of the pad surface was the next design evolution in the eighties (mum,n.d), This pad could now be pasted to the crotch of the underwear, eliminating the need for hold up belts. Figure 2.14 shows a generic branded napkin.



Figure 2.14 Generic pads with adhesive strip, without wings

The late nineties saw more design modifications. There were two significant innovations: thinner, longer pads with an increased absorbing capacity and the addition of “wings” in the pad with adhesive on the bottom surface of the wings, (mum,n.d). Figure 2.15 shows a photo of a generic winged branded sanitary napkin.



Figure 2.15 A generic pads with wings and adhesive features

The pad thickness saw change over the past two decades, evolving from the earlier versions measuring half an inch to the newer versions measuring less than one mm. Non-woven polymers as outer coverings, gels to absorb fluids and good quality adhesives are technologies that have been used to create thin leak proof surfaces (mum,n.d).

Rural adolescents in government schools in South Rajasthan have access to DSNs through the government school system. We will refer to this again in section 2.3.4. We went looking for the common brands available in the local bazaars of Rajsamand (district headquarters town) and Railmagra (block) in the years 2012-13. We found the brands Don't Worry, Sofy, Whisper and Stayfree. These brands continue to be available.

In the category of DSNs, there is a “home made” version, hand made with gauze and cotton. These are routinely given to women at both government and private hospitals in Rajasthan after a woman has delivered a baby. Figure 2.16 shows the handmade pad, given to the researcher by Shreyas Hospital, Udaipur in December 2017. The home made feature is relevant to the thesis when we address economic issues we will return to in chapter 8.



Figure 2.16 Pad made from gauze and cotton, from Shreyas Hospital, Udaipur

In response to environmental aspects, some organisations have been experimenting with natural compostable materials. These include disposable pads made of water hyacinth, called Jani pads (Chua, 2011), refer figure 2.17 (a), banana fibre pads called Sathi pads (Saathipads, n.d.) refer figure 2.17 (b) pads made with corn starch and bamboo, Carmesi pads (Carmesi, n.d) some of which can be purchased online. However, these are not mainstream products. Mass production of these pads will need careful consideration, as raw materials requirements will be immense and will require very well planned renewing of resources. We do not consider these products in this thesis, but this could be part of future work.



Figure 2.17 (a) Pad of Water Hyacinth Pad, Jani (b) Pad of Banana Fibre, Saathi

A disposable product invented in America in the early thirties was the tampon, Tampon.(n.d), refer figure 2.18. The core absorbent materials in a tampon is cellulose, some tampons also have a layer of non woven polymer on the tampon head. Tampons may or may not come with an insertion device called applicator. These applicators are either made of cardboard or plastic (Spinks,2018). Tampons are not used in the area where we practice and are also not available, however they can be procured easily in cities such as Udaipur and Jaipur. It is often perceived in the Indian context as improper to insert something into the vagina before marriage, Mulki (2017). According to Ramnani (2018), there are poor sales of tampons in India. She writes that it is 7 times slower than sanitary napkins, citing two reasons for poor sales, lack of awareness and the cultural issues around inserting an object or finger into the vaginal canal. This is relevant for this enquiry, as it points to an important aspect: that however well- designed a product may be, it always will need social sanction before use. While tampons are not a part of this enquiry, devices that be inserted could be a matter of future investigation.



Figure 2.18 Tampon

2.3.3 Hybrid

There are some examples of hybrid, i.e. a combination of reusable and disposable devices or a combination of raw materials. The pad from the project Be-Girl (Chen, 2013) – in Rawanda is one such example (Figure 2.19). In this example one part of the pad is disposable while the other part reusable. Chen (2013) reports ‘The nylon waterproof envelope can be filled with disposable toilet paper or a reusable washable cloth.’



Figure 2.19 Hybrid pad, sleeve is of a reusable plastic base, the insert can be either washable or disposable. (Chen, 2013)

Another example is from Goonj, an NGO in India¹⁸, they recover cloth from garments and recycle these into sanitary napkins. Cuttings and scraps from material are used as fillers and placed within a square piece of fabric. Once the pad is used, the inner scraps are thrown away while the outer cloth is washed and reused. Refer figure 2.20

¹⁸ Goonj distributes menstrual cloth during disaster relief and other calamities



Figure 2.20 Goonj Pad

A third example is from a personal communication with Rajini, a field manager from the NGO, Doosra Dashak. She says she has seen women use cloth bags that are filled with fine sand or ash forming the absorbent core of the pad. When a change is required, the user tips out the core and refills this with fresh sand. Greene (1999), also reports the use of ash in the Almora region of India.

Another kind of hybrid is a combination of different raw materials like the use of PUL – Polyurethane laminate- in cloth pads. This is a fabric with a polyurethane film (plastic) bonded to it, giving the fabric the waterproofing property. From the internet we found information that these fabrics are not environmentally safe as they cannot be composed (PUL 2018) (Bakker, 2018)) . Ecofemme, a cloth pad unit based in Auroville in Tamil Nadu, (Ecofemme, n.d) uses PUL fabric for the bottom layer of their pad. Refer Figure 2.21.



Figure 2.21 Ecofemme pad which has a bottom layer of PUL

We will come back to the hybrid concept in chapter 4 when we design a menstrual device.

2.3.4 Device-less Management

Menstruation can be managed without devices. It is of relevance to this review as it throws light on other methods of managing, which may not be a very healthy. An individual's garment, outer clothing such as skirts functions as a device to catch the flow. Women bleed directly on to their skirts, which have many gathers (pleats). They tuck the pleats between their legs, to absorb bleeding directly on to it. Once wet, a drier portion of the skirt is tucked in. We used to hear of this practice when talking to older women in Rajasthan. We found this practice to be alive in South Rajasthan with Jat and Rebadi communities¹⁹. It appears that women bathe and wash out their skirt only at the end of the cycle. Since an individual will be wearing dried (but bloodied) cloth over a menstrual cycle of four days or so, we can assume it is an unhealthy practice. How or why these practices began is not documented to the best of our knowledge, but we can only assume that there must have been a water shortage or non availability of other absorbents. The fabric of the skirt the women use is called *Fetia*, the colour of the *Fetia* is a dark indigo and maroon, that perfectly camouflages menstrual discharge. See figure 2.22



Figure 2.22 *Fetia* Fabric used in *ghagras* or skirts that serve as menstrual absorbents

Wearing two frocks / dresses at a time, or two under garments are other practices, as per personal communication with the researcher, who was visiting the Yergalem Health Centre, associated with the Family Planning Association of Ethiopia, at rural Hawassa in Ethiopia in 2013, when she was on a project field visit. We also found this way of managing reported by another study from Africa, (Hennegan, Dolan, Steinfeld & Montgomery 2017). In the contemporary terms, this method of using the garment itself as a device is referred to as “free

¹⁹ The researcher was consultant to the Tata Trust, MHM intervention at Sirohi, Rajasthan. At a focused group meeting organized in August 2017, we held conversations with womens group associated with the project, this information was shared at the time.

bleeding” or “free flow” which came into focus during a marathon race. Runner Kiran Gandhi²⁰ continued the marathon even as she was bleeding without stopping to wear an absorbent. This was lauded by media as a symbol of empowerment. In this case we assume that the runner would have changed her clothes after the marathon, so still healthy in comparison to the Jat community.

In our own areas of practice in Rajsamand district we have not come across this method. However what such practices point to is that there are multiple ways of managing menstruation that societies have followed and the current range of reusable and disposable options must have evolved overtime from the point of wearing nothing to all the absorbents we see today.

The other form of device less management is suppression of menstruation, which means stopping periods temporarily by the use of medication. Gynaecologist Dr V. Ramakrishnan²¹ shares that women opt for delaying periods for many reasons such as participation in religious activities, havan²² or a pooja²³, having guests at home, travelling and other reasons. From her practice in South Rajasthan for over 30 years, she knows of many of her patients who have admitted often to have accessed drugs directly from the many pharmacists. According to her, a drug Primolut N is a commonly dispensed. The practice of using drugs sold off the counter without consulting a doctor, while common, can have negative side effects, reported by a study in the USA, Hillard (2014). Another example of suppressing menstruation is removal of the uterus or hysterectomy in women with mobility and disability issues, to ease the burden of management on carers. A more recent study from the US reports that “Evidence suggests that women with varied types of disability are at heightened risk (to mean more chances) of having a hysterectomy”, as families want to reduce work burden while looking after their family members (Drew,2013). Sassoon Hospital in Pune was in the eye of protests and controversy over a plan to conduct 100 hysterectomy operations in 1994. Stree Kruti et al (1994) have documented this case and argue in favour of reproductive rights for women with disabilities. An article in the Time Of India, Pandit (2019), reports positive stories of how mothers are protecting their disabled daughter’s wombs, therefore we can see the two sides of this way of management. In our own field area, we have come across one mother managing

²⁰ <https://www.cosmopolitan.com/health-fitness/q-and-a/a44392/free-bleeding-marathoner-kiran-gandhi/>

²¹ Consultant, Parivar Seva Clinic and owner Shreyas Hospital, Udaipur

²² A ritual burning of offerings such as grains and ghee, held to mark births, marriages and other special occasions.

²³ the act of worshipping

menstruation for their differently abled daughter by stitching a *TP* directly on to the underwear. While this may not be in the scope of this thesis, there is tremendous scope for future research in disability and menstruation in order to include all categories of menstruators.

2.3.5 How Users Wear Devices

We have discussed previously how the availability of underwear changed a management technique. We have also seen that DSN availability in our area has prompted menstruators to use the product. If underwear was not simultaneously available in the markets of Southern Rajasthan, we can speculate that DSNs will not have been purchased. In this section, we describe the wearing of devices relevant to our work area, cloth, *TP* and DSNs which have relevance as we will use this analysis to develop our intervention, a menstrual management tool, later in section 4.1.2. There is a social perspective to wearing which we also will discuss in this section. We know from practice that users recover pieces of cloth that are lengthy enough to be worn tucked in at the front and back of a *nada*²⁴ tied around the waist, refer Figure 2.23 (a), this method is used by those who do not wear an underwear. Smaller lengths of cloth are placed into the crotch of the underwear, refer Figure 2.23 (c). From our practice we are aware that young girls like the under wear method, while older women are very familiar with and use the *nada* method. From our interactions in the field areas we noted that opinions and preferences vary. Jaishreedevi of Badgaon Block, Udaipur district, a women now in her mid 60s, who only used the *nada* method through all her reproductive years, shared how the cloth stays very firmly in place: *“I could climb a tree and do so many tasks with no problems! Women of my generation never needed a sandi*²⁵. Quite the opposite opinion was noted from the comment of an adolescent girl Mayna of the same village who said *“It is so old fashioned to wear cloth with a nada. We, that is all my friends use cloth and place it in our underwear.”*

²⁴ *Nada* - Drawstring

²⁵ Local name for underwear.

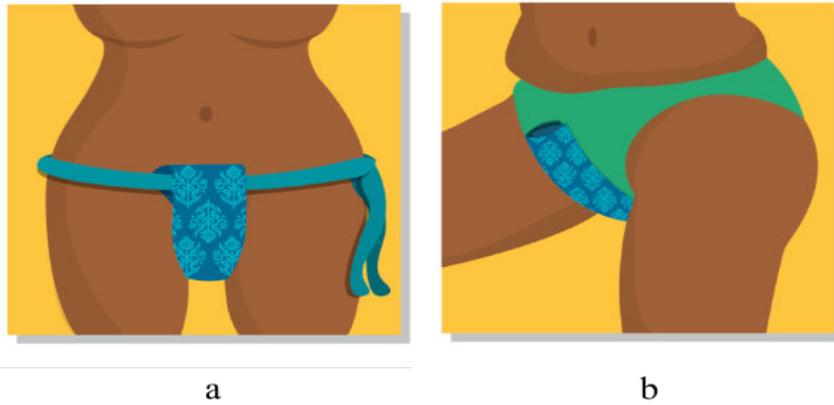


Figure 2.23 (a) Cloth length long enough for tucking into a draw string at both front and back (b) Folded and placed into crotch of the underwear

TP, on the other hand is available in a standard size 10 X 12 inches. This dimension is not suitable for the nada method as it is not long enough so this is worn folded and placed in the crotch of the underwear just as the cloth illustrated in Figure 2.23 (a).

In the case of the disposable sanitary napkins, both plain pad figure 2.24 (a) and winged Figure 2.24 (b), are pasted to the crotch of the underwear, figure 2.24 (c).

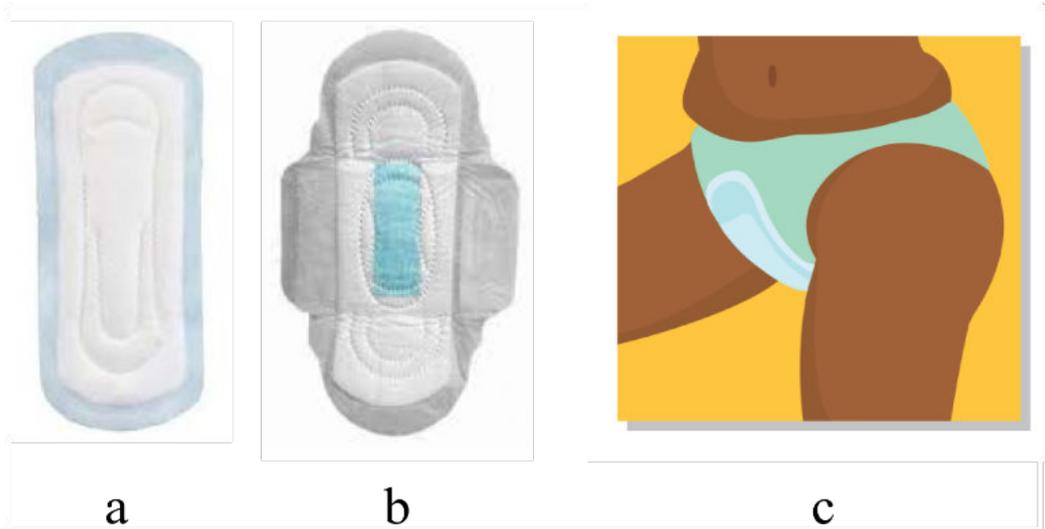


Figure 2.24 (a) Plain pad (b) winged pad (c) pasted to the crotch of the underwear

At this juncture it is useful to compare the design aspect of pads with wings and without wings as this will have a bearing on the sustainable management tool described later in Chapter 4. As a user walks, the overflow of blood from the core area of the pad moves to the

sides. Pads without wings have disadvantages. See Figure 2.25. The adhesive area is smaller, so it is not fixed very firmly to the crotch of the underwear. The discharge moves to the sides and stains underwear and often outer clothing.

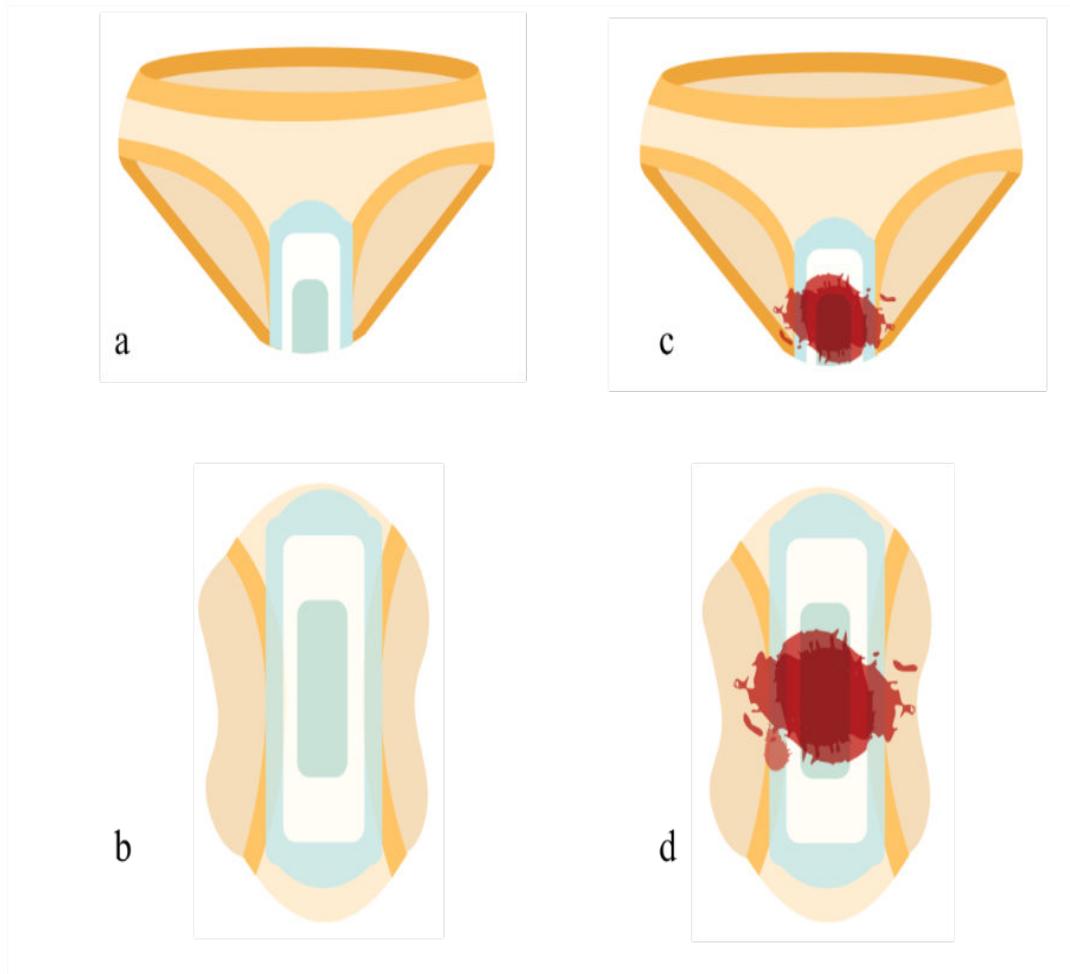


Figure 2.25 (a) Pad without wings pasted onto underwear (b) Close up of crotch area (c) Discharge moves to sides (d) Underwear stained, outer clothing stained

Pads with wings have advantages. The adhesive under the wings allows the pad to be firmly pasted around the crotch area catching the side flow as the wings provide a larger absorbing surface area in the vaginal region. The discharge moves on to the wings keeping undergarments relatively stain free. Refer figure 2.26 (a) (b) (c) (d).

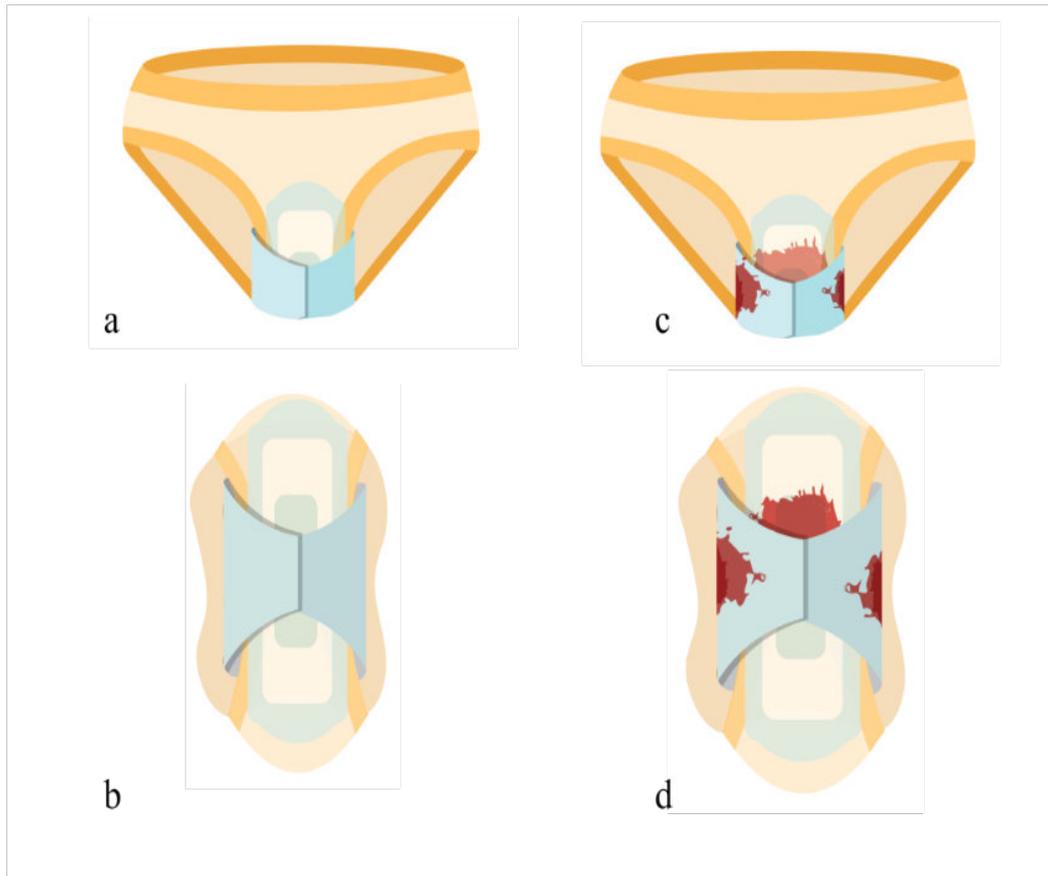


Figure 2.26 (a) Pad with wings pasted onto underwear (b) Close up of crotch area (c) Discharge moves to wings (d) Underwear remains relatively stain free

The useful design feature of winged pads is not present in either cloth or *TP*. We will come back to this aspect later in chapter 4. Another convenience feature in many branded disposable pads is the individual wrapping, refer figure 2.27. A user can carry an individual pad in a purse or bag in a hygienic way (dust free) and use this same wrapper to discard the pad. This feature of wrapping is used later when we come back to designing in chapter 4, when we discuss the design of the menstruation management tool.



Figure 2.27 Individually wrapped branded napkins

2.3.6 Access and Availability of Devices in South Rajasthan

Access and availability is a key dimension of menstruation management. These can be both economic and social. In this section we discuss the social aspects of access and availability of the three products in our area, cloth, *TP* and DSNs. Economic aspects will be discussed in Chapter 6. We already have discussed cloth which is available at home. *TP* on the other hand can be accessed both from the bazaar refer figure 2.8 (a) (b) or right at the doorstep refer Figure 2.29.



Figure 2.28 (a) *TPs* in bulk packing (b) Display at shop

Women also have the option of buying *TPs* at their doorstep from itinerant sales women who come door to door with baskets on their heads, selling underwear, bangles, handkerchiefs and others products including the *TPs*, Figure 2.29. This is very convenient as, although there are roads, connectivity for local residents is poor, buses are infrequent or in some cases non-existent for villages located in the interiors. Residents of Kadbamanya village for example have to walk to Pachamta, a 40 minute walk to the main road, from where they can get a bus to Railmagra, another journey of 30 minutes to the bazaar.



Figure 2.29 Bangle seller selling TP

In our practice area, DSNs are available in the local bazaars, at kirana²⁶ shops, cosmetic shops and pharmacies, which rural women using DSNs access. Another access point for sanitary napkins for adolescents is through the Rajasthan Government Schools under the "Scheme for Promotion of Menstrual Hygiene among Adolescent Girls in Rural India". (Schemes, n.d). Under this scheme, napkins are supplied to the schools, refer Figure 2.30 (a) and (b) and 2.31 (a) (b).



Figure 2.30 (a) DSN packet - front, containing 6 pads provided by the government; Rajasthan Medical Services Corporation (b) Reverse side of packet

²⁶ Provision stores

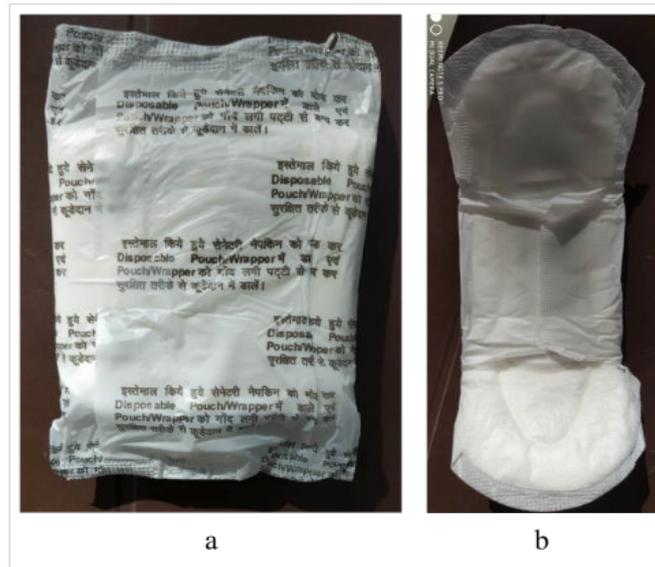


Figure 2.31 (a) Individual plastic wrapping (b) Sanitary napkin

During conversations with government school principals, we have come across some observations. We learned that free pad distribution also can be an unsustainable scheme. In one case, the principal of a school²⁷ confirmed that pads are being routinely supplied by the government²⁸ and are periodically taken by girls. In another school, the principal²⁹ confirmed that while the supply is continuous, he has a room in his school partially filled with pad packets as girls are not taking them. He admitted that he has not found out why, he only guesses that girls may be shy to ask for these as currently there is no lady teacher posted at the school who is usually the designated person for distribution. At two interface meetings³⁰ organised by Jatan Sansthan wherein adolescent school girls met with department staff, it was reported that for “months on end, there is often no lady teacher posted in the school. Therefore, students do not want to approach a male teacher for pads. At these meetings it was also reported that there is no regular pad supply. Undisturbed, continuous availability of menstrual products is a requirement for all menstruators which is absent. We come back to this un-sustainable aspect around access, later in Chapters 5 and 6.

²⁷ Name of both school and principal has been withheld to maintain confidentiality

²⁸ The numbers of pad packets received depends on the number of registered adolescent girls from class eight onwards

²⁹ Name of both school and principal has been withheld to maintain confidentiality

³⁰ Meeting no 1 – held on 28th May, 2018, Gangapur, Block Sahada, Bhilwara (Rajasthan). District Level Dialogue between Government Officers and Adolescent girls, dialogue initiated by Jatan Sansthan, Meeting no 2 held on 7th June, 2018, Jaipur, Interface between Elected Women Representatives and Adolescent Girls with the Department Of Women and Child Development

2.4 Practices around Menstruation

Menstruation Management is influenced by many social factors such as the practice of isolating women, tradition, patriarchy and superstition. We argue that isolation and shame reinforced by social customs have a negative impact, creating feelings of low self-esteem, feeling negative toward a normal physiological phenomenon, feeling dirty and disgust. In the context of this enquiry this is of importance as these factors push women to continue practices that are detrimental for them, leading to unsustainable management. In this section, we analyse practices by women to manage menstruation and investigate the social aspects of these practices.

2.4.1 Isolation, Pollution, Shame

In the review of literature we consider social aspects to menstruation management, isolation, the notion of feeling polluted during menstruation and feeling shame. We give examples from other regions and our own practice area.

Cicurel & Sharaby (2007) write about Jewish women in Ethiopia:

“The women of the menstruating woman's family left food outside the fence, so that they would not come into contact with "the woman of the curse," since whoever touches her must undergo purification. The utensils and objects the menstruating woman used were regarded as impure and had to undergo purification after the isolation period.”

In Nepal the system of isolation is called *Chaupadi*. Women retreat into forests and caves and stay there during their menstruation to return after their cycle is complete, (Kadariya & Aro 2016) (George, n.d). The authors argue that this alienates women making them feel unwanted and impure. Sedhai (2017) says the Supreme Court of Nepal only recently has recognized the practice of *Chaupadi* as detrimental to women and has banned this practice, a move toward positive social change.

The system of staying away from home is reported from tribal areas in Central Maharashtra, where menstruators go to the *gaokar* or menstrual hut at the edge of the forest. The NGO Sparsh, in 2015, reported that 233 *gaokars* still exist and are routinely used. (Banished for

menstruating, n.d). During training programmes on menstruation at ASHA³¹ workers trainings³² in villages around Munisyari, Joshimath, Karanprayag in Uttratrakhand in the years 2006-2009, we learned that menstruating women retreat into the “got” or the cowshed. Considered as polluted, they stayed here for three days away from the families. After the third day, cow urine is sprinkled upon themselves to purify their bodies after which they enter their homes.

There are very recent examples of isolation, as in the case of a young girl from Anaikkadu village in Thanjavur district, Tamil Nadu, (Nair, 2018). In November of 2018, she was in isolation due to her periods, when cyclone Gaja hit her village. The roof of the hut fell on her and she was killed. These tragedies may be one off, but isolation is the practice in her community which lead to the tragedy. When we compared this with other forms of isolation it does not lessen the alienation in any way. Personal conversations with adolescents in the village Sangod, near Kota, Rajasthan gave insights during the Nirmal Bharat Yatra (Desai, 2012) a flagship programme of the government of India.³³ We saw examples of isolation within homes. Adolescent girls told us that their elders make them sleep on the floor in a separate room, families giving them thin *Kattas*³⁴ as the floor coverings, refer Figure 2.32. Very basic facilities (such as thin quilts in winter), are provided at this time so as to not pollute the rest of the items in the main part of the house. Food is left for them in a plate, placed on the floor, outside this room, so that there is no contact with other family members, so that others are not defiled by the touch of a menstruating individual.

³¹ ASHA – Accredited Social Health Activist – Community Health Worker under the NRHM – National Rural Health Mission

³² The researcher was consultant with Futures Group International, for ASHA workers trainings at Uttrakhand years 2006 to 2010

³³ The researcher was consultant with WSSCC, Water and Sanitation Collaborative Council, and traveled to three of the six locations with the Nirmal Bharat Yatra

³⁴ *Kattas* - plastic sacks that are recycled from cement or grain sacks



Figure 2.32 Plastic *Katta* used for sleeping at the time of menstruation, at the home of an adolescent girl, village Sangod, Kota, Rajasthan

House et al. (2012) speak of pollution, as universal for women and across cultures:

“All women, regardless of their social caste, incur pollution through the bodily processes of menstruation and childbirth.”

Forms of isolation are routinely practiced in West Bengal, according to Dasgupta & Sarkar (2008). They found families isolating menstruators, not allowing girls and women to do household chores at this time seeing them as “not pure”. This self imposed or community imposed feeling of pollution results in low self esteem (Brock, Rowse & Slade, 2016). Along with isolation comes the feeling of being singled out, and this instils shame. In fact, the beginnings of shame are instilled early when at menarche, menstrual absorbents are passed on to menstruators discreetly. This has been described by academic and menstrual activist Chris Boble who writes:

“.... a young woman’s first period is marked not with celebration, but with a quick, furtive talk about supplies.” (Bobel, 2010)

Furtiveness even during celebrations at puberty, common in South India such, as *manjalneerattu vizha* or turmeric bathing ceremony has been pointed out by Narayan, Srinivasa, Pelto & Veerammal (2001). The authors feel that in this socially sanctioned moment, when the onset of menstruation is acknowledged, the opportunity is not used to communicate information about reproductive health, which will be useful for the young adolescent girl. As pointed out by Narayan et al., (2001) ;

“ The events and experiences surrounding menarche can be a significant influence on young girls’ view of themselves, as well as on

their understanding of reproductive health issues, and on appropriate behaviour for hygienic management of menstruation. “

At a time when an adolescent needs support to understand changes in the body and learn to manage it, silence is created treating menstruation in a negative way.

In our professional practice we have seen common isolation examples only within the home. For example menstruators share that they are not allowed to cook or touch the water pot, or go to the temple or to pray. This practice is common among Brahmins, Baniyas, Rajputs³⁵, and other castes groups such as Kumbhars, Suthars, Sunars³⁶ and others castes. Within Tribal communities such as Bhils and Garacias that Jatan Sansthan works with restrictions during menstruation do not exist at all. All daily actives are carried out without any form of isolation.

However across all groups we have seen that feelings of shame are common and there is silence on the subject, particularly when men are around. We have seen this shame directly reflecting in the use and care of menstrual devices. Shame directs users to select only certain colours of a reusable menstrual cloth. Women particularly prefer and select darker shades so that stains will not show. These dark shades of fabric are harvested from old saris, petticoats, turbans, towels and bed sheets. Since stains are not seen against dark fabric, it does not get fully washed out. This is unhealthy. Shame makes users dry their menstrual cloth hidden under larger clothing to conceal it, the cloth may still be damp when it gets reused. Refer Figure 2.33 (a), terrace of Pinky’s house at village Amor³⁷. She has put her menstrual cloth to dry under her salwar³⁸. Shame manifests itself even while storing where it has been done among cow dung cakes. Figure 2.33 (b) When asked why this was so, Pinky had this to say;

“The women in the family come to the shed to store cow dung cakes, so it is safe place, men rarely come here.”

Others studies in the Indian context Shah et al. (2013) (Yasmin, Manna, Mallik, Ahmed, & Paria. 2013) also point out that menstrual devices are hidden and are often stored in ‘a dusty and unhygienic space’.

³⁵ Upper caste groups

³⁶ Potters, carpenters, goldsmiths

³⁷ Village in South Rajasthan, name changed

³⁸ Salwar – pant like garment



Figure 2.33 (a) Menstrual cloth put to dry under larger garments in order to conceal it.
 (b) Menstrual cloth hidden in between cow dung cakes

Bharadwaj & Patkar (2004) have summed this well.

“Over decades, women have been taught that having periods is shameful. They have indirectly, if not directly, absorbed the messages that menstrual blood is dirty, smelly, unhygienic and unclean.”

Feeling “dirty” translates to many restrictions. We will find that young girls are not allowed to go to the temple or participate in religious functions during menstruation. (Garg & Anand, 2015) (Selvi & Ramachandran, 2012). Religious texts and faith influence the way menstruation is viewed. According to Guterman, Mehta & Gibbs (2007), “Some of the more consistent themes (religious text), include isolation, exclusion from religious services, and restraint from sexual intercourse. “ The word “unclean” is integrated into some religious texts. For example, The King James Version Bible, Leviticus 15:19-30, contains references to being unclean during menstruation:

“..... the uncleanness of her monthly periods shall last for seven days.”
 “Any bed she lies on in this state will be unclean”
 “If a man sleeps with her, he will be affected by the uncleanness of her monthly periods.”

The word “state” suggests a negative situation, the word “affected” suggests that “uncleanness” will be passed on to the man. Dr Norman Jeffcoate, author of the text book on Principles of Gynaecology calls this terminology “unclean”, a fallacy.

“One of the fallacies which carries the support of the Holy Bible is that the menstruating woman is unclean. This idea alone is enough to

instil feelings of shame, embarrassment and resentment”. (Jeffcoate, 1983)

In the same text book, he advises those in the medical practice, to actively discourage negative notions around menstruation.

Menstruation has a social aspect and this comes through in other religions. Notions of “unclean” is not just in the Bible, it appears in other religious texts such as in the Hebrew Scriptures, Laws of Niddah (n.d). The Torah has laws *Halakha or Halacha* for menstruation, forbidding physical (sexual) contact between male and female, which includes even basic contact such as passing objects to each other.

The notion that menstrual blood is unclean and that women are impure or dirty during periods resonates with other studies such as Chawla,(1992) who writes of how women feel “pollution” at these times. According to Chawla (1992), references to defilement or impurity during menstruation, appears in the Rig Veda, the ancient Hindu scriptures. She writes of how the text views women negatively, putting them in an inferior position to men, stating that the text presupposes that women have sinned and that menstruation is way that her body is purged of sin. Guterman et al. (2007) argue that religions such and Judaism, Islam, Hinduism reinforce negative opinions on menstruation. While the Islam does not forbid worship, there are many restrictions placed on menstruating women.

"..... 'It is harmful, so keep away from women during it. Do not approach them until they are purified of it, when they are purified, you may approach them as Allah has ordained.' (Qur'an 2:222) Qur'an on Menstruation (n.d)

We can see how places of worship isolate women at this time, an example can be noticed outside of a Jain Temple in Jaisalmer :

“Important Notice: Entrance of Ladies during monthly course period is strictly prohibited. They are requested to maintain the sanctity of the temples.” Agnes (2018)

The *Shabari Malai* shrine in Kerala is associated with menstruation in a negative way, with the temple authorities allowing no one of menstruating age to enter the temple. Despite the supreme court of India ordering an end to the ban, women continue be barred, citing reasons such as impurity. Agnes (2018) feels that laws cannot change faith,

“It is debatable whether the judicial decree can change religious rituals. The Supreme Courts decision is based on rationality, which has no place in matters of faith.”

Alongside the negative attitude toward menstruation, there are positive and powerful examples that celebrate the power of menstruation. The social dimensions come in many other instances. Hindus have a tradition of worshiping female power or *shakti* - the menstruating goddess, symbolically worshiping the power of the womb, the power of reproduction. The examples of these are the temples of *Kamakhya Devi* located at Guwahati, Assam (Kamakhya Dham, n.d) and Mahadevar temple, at Chengannur in Kerala, India, (Joseph 2014).

Newer religions such as Sikhism, faiths such as Bahai, appear to view menstruation positively imposing no restriction upon entering places of worship, (Bhartiya, 2013) (Guterman et al. ., 2007). They argue that the leaders of these newer faiths had more of a scientific view to menstruation.

2.4.2 Silence and Lack of Factual Knowledge

A factor we continually see in our practice is silence from men and no involvement of men during menstruation conversations. From an article, *Unlearning Menstruation (Uger & Ecofemme, 2018)* we learn the following from Indian men:

“Women never include us in menstruation matters. They talk in whispers and codes all the time”

“I only understood menstruation properly after I got married, when my wife explained things to me. I felt so stupid then that I had not made any effort to understand earlier.”

Typically information comes from peer groups who have limited knowledge themselves that is often factually incorrect. Murthy (2015) says that due to this silence, men are not sensitive to needs to menstruators, resulting in, for example, not creating facilities for women such as a private area to change, discussed in section 2.5. Silence around menstruation is not just an Indian phenomenon, Allen, Kaestle & Goldberg (2010), who conducted a study in the USA write about silence and how boys learn about menstruation in round about ways. Gloria Steinem in her article “If Men Could Menstruate” looks at what would have happened if men “magically” started their periods. She correctly points out that there would be no silence, as men would boast that they menstruate and there would have been many more devices and options for menstruation management, across class and caste groups (Steinem, 1978).

In the early 1900s, in the United States for example, advertising sanitary napkins was not an option due to silence (Gurowitz, 2008). Pads were sold in plain boxes so that women could both take this away discretely and subsequently store it discretely. This is still no different from today's context in our work area, while selling of sanitary napkins, shop keepers wrap the packet in a black plastic bag or newspaper. Women are hesitant to buy sanitary napkins from shops if men are standing around, they wait until people leave. To bring focus on these issues, there is a campaign on social media urging women to break free and not ask for a bag (Sharma, 2017).

The silence gives rise to a lack of factual knowledge about menstruation. Many young girls learn about this the first time at menarche (Narayan et al. , 2001) (Eijk et al. 2016). From a study from Rajasthan, Khanna, Goyal & Bhawsar (2005), it was reported that 92% of adolescents interviewed had no prior knowledge about menstruation. In Rajasthan, mothers typically never prepare their daughter as it is considered not appropriate associating it with *paap* or sin. Mothers have been interviewed in a UNFPA Training Film "Sumitra: Adolescent Peer Education. (Sumitra, 2003) In this film a mother says "Girls learn on their own, there is no need for us to get into it". Garg & Anand (2001) from a study in the slums of Delhi also report on lack of communication between mothers and daughter, very similar to our own experience in the field areas, where the *bhabhi*³⁹, a friend or a sister are the first informants.

Lack of knowledge has an implication on nutrition. A balanced diet is recommended for overall health, rural communities know this very well. However certain types of food are avoided by women at this time, this compromises a balanced food intake. Researchers have made connections between poor nutrition and vaginal infections (Neggers, Nansel, Andrews, Schwebke, Yu, , Goldenberg, & Klebanoff (2007).

In the study by Chandra-Mouli & Patel (2017) who have analysed data from 81 studies across low income countries, they recommend that prior knowledge prepares girls to manage their periods in a better way and " investment in private latrines with clean water" will improve menstruation management.

³⁹ Bhabhi – brother's wife

2.4.3 Other Dimensions of Menstrual Devices

Prestige and peer pressure are social factors that need to be considered when reviewing practice. When products have social sanction they are adapted easily. From a study on menstrual cup adaption in Nepal, Oster & Thornton (2012), report ‘strong evidence of peer effects’ where they found that friends can influence adaption of a new product. We found this during a personal conversation with women in our work area :

“My friend told me that she has used *TP* and it is very good and also very cheap and does not show any blood stains”.

“I bought myself underwear, only because I wanted to try *TP*.”

Not showing blood stains is a social requirement. Therefore managing is a social dimension that includes what to wear and how to wear. If a device is approved by another user, women will aspire for it. Typically users in our work area move from cloth to *TP* and finally to the next level of the perceived better product, the disposable pad, see Figure 2.34.



Figure 2.34 Menstrual Product Aspirations of users, from Cloth to *TP* to DSN

Aspiration, peer pressure, experiences that women share with each other, and the desire to be seen as moving with the times are the reasons triggering migration from one product to another. Murthy (2014) likens aspiration to a form of debris on society. The author feels that individuals and subsequently communities cause burden upon themselves in their anxiety to be seen by others in positive light. There are also individuals who reject products suggested by their peers as observed from this comment.

“Madam, I use cloth, as sanitary napkins do not suit me. I get a rash. But I tell my friends I use whisper pads, otherwise they will think I cannot afford it or they may say I am old fashioned to be using cloth”.
(From a personal conversation with a user)

Summarising, we have seen the social dimensions to practice, some of which are detrimental to a women's health and well being. These are the aspects that make the management of menstruation unstable.

2.5 Facilities for Managing Menstruation

Facilities for girls and women to manage menstruation typically have been limited. Mahon & Fernandes (2010) point out that in South Asia there is, "Lack of facilities, including safe water and clean private toilets..." further drawing attention to the fact that "many women and girls do not have anywhere to change their cloths and are not always able to wash themselves." A resource book on menstrual hygiene developed for menstruation management in developing nations, reports that in the absence of a household toilet, users use the bathing area, open field, cowshed, dark room and if there is one, a community toilet, House (2012). A space to manage menstruation is a basic need as menstrual devices require to be changed at intervals once it is soaked or filled with discharge. The frequency of changing varies from person to person,

"Woman with reasonable standards of cleanliness use 3 diapers (cloth) or tampons in 24 hours, 2 during the day and 1 during the night, making a total requirement of 12 -15, for the average menstrual period". (Jeffcoate, 1983)

The frequency of changing depends on many factors: (i) when the product is no longer able to hold the discharge, a fresh product is required, (ii) when individuals want to keep clean and fresh so change is made at intervals, irrespective of whether the product is full or not, (iii) in the absence of privacy, changing is postponed; this means that a user waits until she finds a space or privacy to change.

Privacy is thus an important aspect to menstruation, a space where there is no one else, but only the user, to be able to wear, change and manage menstruation. Additionally clean water is required for washing hands and washing out a menstrual device. In the areas where we work, many communities have no bathrooms, in such cases, spaces behind rocks or bushes or trees serves for privacy. Additionally changing is done at dusk and dawn when visibility is low. Figure 2.35 shows girls going in a group for urination at mid day. From our practice we have seen women and girls change their menstrual cloth at home when the men in the family are out at work. Alternatively they ask the men to wait outside while they change in the room.



Figure 2.35 Adolescent girls walking in a group for urination at mid day

Outside of home, for a women working on a construction site where there is no tree cover, it means it is a long walk to find a place to urinate or change a menstrual absorbent. Figure 2.36 is a MGNREGA⁴⁰ construction site outside Railmagra, Rajsamand District, an example of a workspace having no toilet or water facilities.



Figure 2.36 Women at a construction site, Railmagra

⁴⁰ MGNREGA - Mahatma Gandhi National Rural Employment Guarantee Act, a government programme that ensures “ Right to Work” giving 100 days of wage employment in a financial year to every household

Even at a government school, there are limited or non-existent facilities. According to Murthy (2015), when on a field visit, she found a government school at Rajsamand district with no functioning toilets, Figure 2.37. UNICEF commissioned studies have pointed out the lack of facilities for menstruation for girls. Roy (2011) points out that girls do not attend school during menstruation as they have no place to change their menstrual product, water or other facilities. Jewitt & Ryley (2014) in their study in Kenya found the same reasons for why girls miss school including other reasons such as sickness, household chores, a lack of sanitary towels, embarrassment and shyness. Education for girls is thus compromised because there are no facilities.



Figure 2.37 Non-functioning toilet at a government school in Rajsamand.

Aside from changing a menstrual device, menstruators need (i) a space to wash the device if reusable (ii) a space to bathe (iii) a for place throwing away a disposable product (iv) a space for terminal disposal of a reusable product. Many rural communities have no running water source at home, washing is done at demarcated washing areas within the home or at the back of their houses, these same spaces are also used to wash clothes of the family members and utensils. Other washing spaces include ponds, riverside, near the tube well at fields, spaces that are completely open compromising personal hygiene. Hence, it is common to bathe partially clothed, the lower part of the body is usually kept concealed, so cleaning of genitals is not completely possible. This is unhealthy and leads to an unsustainable practice.

When space or other facilities fail the user, it makes menstruation management unsustainable. This has a huge impact on health, no privacy means delaying changing the menstrual cloth, as a user waits until the end of the work day to return home to change. We will come back to health issues later in Chapter 5. During personal conversations with women they often tell us that motorcycle, mobile phones and television are given priority over toilet construction. Not having adequate water means compromising hygiene. What we are seeing is that infrastructure plays a role in menstrual hygiene management. Hence will the access to privacy and clean water make management of menstruation more sustainable?

The other side of practice is the disposal of used menstrual products. Cloth, *TP* or disposable pads are disposed in many ways.

- buried or burned in their own backyard
- thrown in the dumping ground, the garbage dump, dry river bed, into a water source, an open field, into a latrines, *nallah* or drain, or by the road side.
- wrapped in a news paper or plastic wrapper or bag and thrown in the open fields around the house.

Rural communities do not have a formal waste disposal system, unlike municipalities in metro-cities in India, where there is a solid waste management system that takes away garbage. Issues around disposal are discussed in detail in Chapter 6 where we look at environment issues around menstrual products, raw materials in products and their bio-degradable properties.

2.7 Research Questions Emerging from Literature and Framework for the Thesis

There are many factors governing menstruation management. The multi-dimensional nature of all aspects such as devices, practices and facilitates, has some impact in the lives of not just menstruators but the communities they are a part of. The dictionary definition of impact is: “to have an influence on something”, “a powerful effect that something, especially something new, has on a situation or person”⁴¹. An impact can either be long term or a short term, which determines its sustainability. Therefore, the term sustainable becomes central to the multidimensional scenario of menstruation. It is becomes critical to study this scenario from

⁴¹ <http://dictionary.cambridge.org/dictionary/english/impact>, <http://www.dictionary.com/browse/impact>

the point of view of sustainability to locate the gaps or the extent of gaps in management, so as to inform practice at the grassroots, the starting point of this enquiry. “Sustainable” is defined in dictionaries as “capable of being continued with minimal long-term effect” (Sustainable, n.d). So the question we raise, is, if devices, practices and facilities are not robust and long term, are there ways to address these aspects to make menstruation sustainable? From the previous sections, we have seen the multiple dimensions of menstruation management. We will now summarise the dimensions and lay forth their interconnectedness and influence of factors.

Fund availability, mobility (accessibility) and social sanction are some economic and social dimensions to menstruation management. From the examples of cloth and *TP* we have seen how a device has social dimensions. Selection of a device is made using resources already available – old cloth or using an affordable solution the *TP*. Bazaars, if not close to villages, means women cannot always have access to products, due to limited mobility. So any device, easily available, cloth (from home) and *TP* (sold by the itinerant bangle seller) is the easy option and at the same time an affordable option. **Is the management of menstruation sustainable by the use of these devices? Is one device better than the other and if so in what way?**

We have seen another example of the social dimension, aspiration, learning how users like to move forward to a perceived better product. To be seen as being one with the peer group, is a common social trait and these factors influence selection of a menstrual device. In terms of culture we saw from review that a tampon (any device for inserting) may not be acceptable for some users.

Lack of privacy such as having no toilets, is a situation that may have resulted from not having funds for construction an economic dimension. This could also be a social dimension because a family’s priority, as seen earlier, was purchase of a motor cycle over building a latrine. Not having enough water and, no proper method to manage menstruation are aspects to facilities seen from the example of a work place, the MNREGA construction site. Here we can infer that there is an economic dimension, the contractor wants to save money and is not interested in spending on creating privacy for workers. At the same time the social dimension could be that women have not raised their voices as they are shy, or that the contractor is

insensitive to menstruation issues. **How can we make management sustainable for menstruators?**

The way menstrual device are maintained is a key health dimension of menstrual products. We have seen how cloth is selected and why dark colours are favoured and why menstrual cloths are hung under larger garments. Hanging cloths in this way results in the cloth being damp which is a potential ground for infection. We will come back to this Chapter 5, when we report conversations with gynecologists. Storing cloth in dusty places, such as the cowshed as we have seen, is also not a good healthy practice. All these practices are suggestive of shame and embarrassment and lack of factual information (Mahon, Fernandes 2010). **If the selection of the device has a negative impact how can we make management safer over a longer term? Can we compare different ways of maintaining to assess which is more sustainable?**

We saw from literature that some disposable products are made from naturally grown material such as corn, water hyacinth or banana fibre. **Is there any impact on environment when resources are used for devices with a very short life span?** For the increasing use of DSNs in our area, we find that there are no solutions for disposing, hence are DSNs the appropriate product for rural areas? Barman et al. (2017), state that communities consume more than what is produced and warns that over exploitation of resources have to be stopped if we are to leave anything at all for our future generations. **Hence what are those devices and practices that are more sustainable than others?** We saw that there was lack of knowledge about menstruation and silence around menstruation. **How can interventions in communities be planned to achieve sustainable menstruation?**

From this review four dimensions of interconnected aspect are seen. These dimensions are social, economic, environmental and health. Three research questions (RQ) emerge.

RQ 1. How can we make the management of menstruation sustainable?

RQ 2. How can Menstruation Management Sustainability be measured?

RQ 3. How can we holistically compare for menstruation management sustainability between different menstrual products and management systems?

We also develop core work areas for this thesis based on the multi dimensions, social, economic, environmental and health. These four areas are:

- Sustainability
- Social Change
- Participatory Social Design
- Action Research.

Sustainability and its measurement and tool design PASS are described in Section 3. Social change and participatory social design are in Chapter 4. Action research and assessments are in Chapter 5 and 6.

In the next section 3, we detail the discussion on the first area of the thesis work sustainability, we then propose a definition for menstrual management sustainability. Based on this we develop an assessment tool called PASS, to assess the multi- dimensional nature. We propose that this tool not only will assess, but also it will allow for comparison and measuring for menstruation sustainability.

Chapter 3

The PASS Tool: Multi-Dimensional Assessments Of Sustainable Menstruation Management

3.0 Introduction

In the previous chapter we have seen that there are multidimensional aspects to the management of menstruation. These were social, health, economic and environmental aspects to devices, practices and facilities, the three interdependent dimensions of menstruation management, and within which were more dimensions. There are gaps in our understanding of the multi-dimensional aspects of menstruation management, based on the review from the previous chapter. For example, there are questions such as, which disposal system is better, which product has the least environmental impact and others. To analyse and understand these there is a need to measure or assess the multi- dimensions. For this purpose we had proposed three research questions. In this section, we address two of these, **RQ 2 and RQ 3, namely, “How can Menstruation Management Sustainability be measured?” and “How can we holistically compare for menstruation management sustainability between different menstrual products and management systems?”** We briefly examine the history of sustainability, visual presentations of sustainability, symbols, measures and tools that exist for sustainability. We propose and develop a tool called PASS, to assess these multi dimensional

aspects of the management of menstruation. The tool and its potential applications are described in this chapter.

3.1 A Review of Sustainability

We looked briefly at the history of sustainability to see how to place menstruation management in the context of various existing sustainability frameworks. During our review, we learned that initially sustainability was referred to only in the context of environment, with community aspects being added later on. The earliest known understanding of sustainability appears to have come from many years ago.

"The term was first coined several hundred years ago by a German forester, Hans Carl von Carlowitz, in his 1712 text *Sylvicultura Oeconomica*, to prescribe how forests should be managed on a long-term basis."(Scoones, 2007)

“Long term’ seems to have been the underlying core which is also reflected in the 1987, Brundtland report⁴², which coined one of the first well known definitions of sustainable development, which includes the term “future”.

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (WCED 1987)⁴³

Subsequently at the 1992 Rio conference⁴⁴, sustainability took on firmer definitions to include people, with the realisation that people are part of the ecology and cannot be separated from it. There are many debates around the definitions, Faber, Jorna & Engelen, (2005) say there are at least 50 definitions for sustainability as there are many perspectives to what constitutes sustainability as it is context dependent. According to Purvis, Mao & and Robinson (2017), “sustainability remains an open concept with myriad interpretations and context-specific understanding”- Hodge (as cited in Patera & Cristeab, 2016), defined sustainability as:

"Sustainability is defined as the persistence over an apparently indefinite future of certain necessary and desired characteristics of both the ecosystem and the human subsystem within”.

⁴² The commission chaired by Gro Brundtland, former Prime Minister of Norway, brought out a seminal report entitled “Our Common Future” in 1987.

⁴³ WCED – World Commission on Environment and Development

⁴⁴ United Nations convened the Earth Summit which was attended by representatives of 178 governments, heads of state, and more than 1000 NGOs, civil-society and campaign groups.

In the Indian context of public health interventions, the umbrella under which menstrual health interventions lie, we found no definitions for menstruation management sustainability, in fact it is unclear even in the recommended guideline of the Government of India's policy, Menstrual Health Management Guidelines (2015-16). There is no clear mention about ideal sustainable practices, it is left to interpretation of a state level implementer. However a definition can be derived, rooted from the many definitions we have seen thus far which we think is appropriate. We have seen the use of the word "future" in the context of "needs" and "necessary" in the definition. In the context of menstruation, time is important for menstruators, devices, practices and facilities cover at least a forty year time span and this will potentially impact the ecosystem in some way. The desired characteristics of systems (from the above definitions) can correspond to recommended practices around care and disposal of menstrual devices, which we will come to later in chapter 5 and 6. John Elkington in 1994, proposed three aspects to sustainability, a framework for business, commonly known as TBL or the triple bottom line, to include, P,P,P - people, planet and profit, (Alhaddi, 2015), using economic, social, and environmental for the three P's. Going by these three dimensions alone may not be enough in our context, however we see the TBL framework as somewhat suited for the menstruation scenario. We will come back to this as we develop a measuring tool, described later in section 3.4.

Another method to assess for sustainability is conducting an Environmental Life Cycle Analysis (E-LCA) study which will indicate all aspects to any product, from raw material extraction to procurement, to transporting right to the point of reaching the land fill (Guidelines S-LCA, 2009). Not only is E-LCA for products, it is applied to services. However when social and socio-economic life cycle assessments are made, it adds more dimensions around impact analysis, as it includes stakeholders groups such as workers, consumers and local communities. It also adds dimensions such as sustainable consumption and sustainable living. Social life Cycle Assessment (S-LCA) is:

“ a social impact (and potential impact) assessment technique that aims to assess the social and socio-economic aspects of products and their potential positive and negative impacts along their life cycle encompassing extraction and processing of raw materials; manufacturing; distribution; use; re-use; maintenance; recycling; and final disposal.” Guideline S-LCA (2009)

From literature in Chapter 2, we have previously indicated that the management of menstruation in its current form is not entirely sustainable. If it has to be made sustainable it must conform to some conditions or criteria. We propose the following points which we assume at this stage, will lead to menstruation management sustainability:

- Devices, practice and facilities should not cause any harm to the user or to the environment.
- There needs to be a supportive environment for menstruators to manage menstruation in a safe way without compromising on body shame, self esteem and restrictions.
- Users must have the resources they need to manage menstruation in a safe way
- Users must have facts to be able to select any menstruation management system through informed choice.

Based on our understanding, we propose and coin a holistic definition for **“Sustainable Menstruation Management”** as:

“Sustainable Menstruation Management consists of methods of managing menstruation, by the practice and use of devices and systems that maintain balance between environmental, economic, social and health aspects, causing no harm to the user or community in future.”

We use this definition and bring back questions we had previously asked, what device, what practice is ideal? Devices have environmental aspects – resources use during procurement, production and end of life processes. Costs of the devices and maintenance are economic aspects, while practice comes under the social umbrella. Impact of practice and impact from a device becomes a health aspect. It is apparent that social change is a factor that can lead to achieving menstruation sustainability. Dunfey (2019) in an article defines social change as:

“.... changes in human interactions and relationships that transform cultural and social institutions. These changes occur over time and often have profound and long-term consequences for society.” Dunfey (2019)

In a literature review of over 300 articles, Sablonnière (2017), has proposed a typology of social change to include four social contexts: stability, inertia, incremental social change and drastic social change. The author proposes definitions for each and while reviewing these, we found incremental social change to be a moderate stance which the author has defined as, “A situation where a slow event leads to a gradual but profound societal transformation and slowly changes the social and/or the normative structure.” This stance is steady, not harsh nor

forceful and therefore will not break the social fabric. In the context of menstruation management, we are left with many questions, what is the change that can be brought in to improve the current menstrual devices or practice? How can communities improve infrastructure? How can communities make supportive environments for menstruators? If these changes are made can communities reach an ideal situation of sustainable menstruation management?

This background forms the foundations of the measuring tool for measuring for sustainability which we later develop and describe in section 3.4. In the next section we introduce visual representations of sustainability developed by other researchers.

3.2 A review of visual representations of sustainability

It is important to review the visual representations of sustainability in the context of our practice area, as many of the stake holders are semi or non literate. In this scenario culture specific visuals have always been used and found to be very useful for communicating (Vikalpdesign, 2005). According to Moir & Carter (2012), “Images are often recalled more easily than non-image data and can reveal a conceptual tangibility that may be difficult to express concisely in words.” Other authors have argued in favour of visual representatives of ideas for sustainability, "Lozano (2008) states:

“Visual representations can help to communicate, generalise and make more tangible concepts that are difficult to express clearly and succinctly with words, such as sustainability. “ Lozano (2008)

In the context of our enquiry, we found no visual model or tool to represent menstruation sustainability; however the few visuals we reviewed, can be adapted. We found that the visual models for sustainability are represented commonly as the Venn Diagram, the Nested Concentric Circles and Three Pillars (Purvis, Mao & Robinson , 2017). The Venn Diagram model figure 3.1 (a) consists of three circles representing economy, society and environment with an overlap representing sustainability. The nested models represent economy and society within environment, figure 3.1 (b). The three pillars model has the pillars supporting the roof, denoting sustainability, figure 3.1 (c). Another model is the egg model of sustainability (Guijt, Moiseev & Prescott-Allen 2001) also called ‘egg of well being’ model where the white signifies the healthy eco system, supporting human wellbeing, the yolk, Figure 2.2. While we acknowledge that there are many representations, we have only reviewed few models.

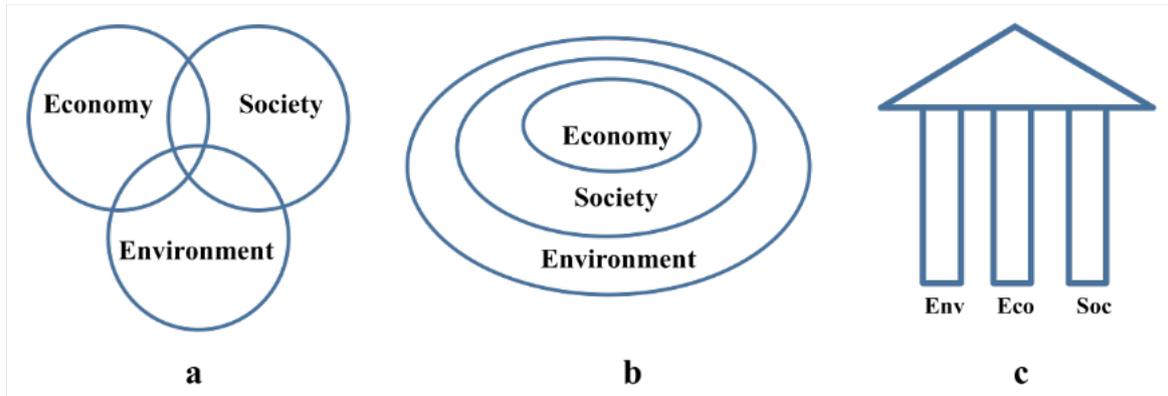


Figure 3.1 (a) Venn Diagram Model (b) Concentric circles (c) Pillar Model

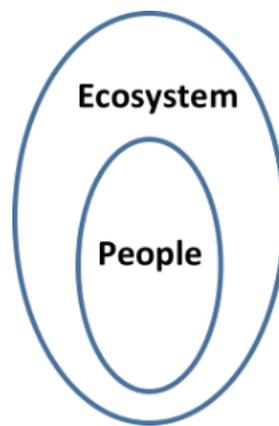


Figure 3.2 The Egg Model of Sustainability

We found the nature of the Venn Diagram model not suitable for our context. The dimensions of menstruation management have to be assessed separately and yet considered together as the dimensions are interdependent. Therefore, the area of confluence or overlap of the three circles to represent sustainability, is not appropriate to capture the inter-connected nature of menstruation management. In fact, this resonates with Lozano (2008) who says,

"This (Venn diagram) implies that sustainability is only those aspects where the three aspects are united. This is flawed since it considers sustainability to be compartmentalised and disregards the interconnectedness within and among the three aspects. Lozano (2008)

Given the multi-dimensional nature and the inter connectedness of menstruation management, we did not consider the concentric circle model figure 2.1 (b) and the egg model, figure 3.2,

as these do not communicate clearly the individual and yet inter dependent nature of dimensions.

The model of three pillar upholding a roof which posits that sustainability is achieved when all aspects, environment, social and economic work in unison, seems the most appropriate model to further work upon. We can consider another pillar as proposed by Hawkes et al (2001), who add ‘culture’ as the fourth pillar. They argue that culture is constantly changing in society to include beliefs, knowledge, aspirations, customs, faiths and others and that it needs to be considered as another pillar for sustainability. We come back to this in section no 3.4 where we use the pillar model holding up the roof to measure and assess menstruation management stability of devices, practices and facilities. In the next section we review how sustainability has been measured, by discussing a few examples.

3.3 A Review of Measuring for Sustainability

In the context of rural India we found very limited information on local specific ways of measuring within the public health domain (of which menstruation is a part). We found one example (Kapadia - Kundu & Dyalchand, 2007) from Maharashtra, in which the authors used currency notes and coins to measure emotions, attitudes to health and degrees of malnutrition. Use of such tangible items is known to be easier to visualize and compute. Another example was from Bwambale, Moyer, Komakech, Mangen & Lori, (2013) a study from Uganda, where community members used local beads to quantify household expenses.

With respect to devices, to the best of our knowledge, sustainability of cloth and *TP* has not been studied. However, the EDANA Sustainability Report of 2007- 2008, has determined the sustainability of children’s disposable diapers vs cloth diapers using the LCA or Life Cycle Assessment. This report states that while no LCA or Life Cycle Analysis has been conducted on sanitary napkins vs reusable cloth, LCA on disposable and cloth diapers can be considered to compare, as they have similar raw materials (we will come back to raw materials in Chapter 6). This is the stand of the EDANA Sustainability Report (2007-2008) on children’s diapers:

“There has been an ongoing debate about the relative environmental impacts of disposable and reusable cloth diapers. Independent consumer organizations in several European countries have evaluated

both diaper systems; cloth and disposable. They have concluded that both systems impact the environment, albeit in different ways and that the environmental superiority of any one diaper option over the other cannot be determined.” (Arquillos et al.,2007)

A study commissioned in UK, Aumônier, Collins & Garrett (2008) compares cloth diaper vs disposal diaper with washing and drying in the context of washing machines and driers, both using electricity. This report too comes up with the same conclusion that both systems impact environment. The above conclusions, suggesting that impact may be equal, needs to be re-examined in the rural context of India from these perspectives:

- The cloth diaper selected for managing urine of babies in a western context may not be the same cloth that users harvest from their homes for managing menstruation.
- Washing and drying in the European context, is through machines which use electricity - unlike Indian rural communities where hand washing is the norm
- As we discussed in Section 2.5, an environmental aspect is disposal, a large majority of rural households manage their waste disposal by themselves – either by burying the waste for compost or by burning it as fuel.
- The report is in the context of Europe with advanced waste disposal systems and in addition a lower population density.
- Affordability of store brought products is a privilege only a few in rural India have so if we are comparing devices for sustainability, we will need a comparison of cloth with other locally produced products. (This forms the basis for the cross trial which we describe in Chapter 5)

In our quest for understanding aspects to assessing for sustainability we found two opposing views. Some researchers state that there is nothing that can be done to make earth sustainable as humans consume much more than they can put back. This view suggests that no tool is required because the damage is already done. (Davidson, 2011)

“The use of non-finite resources cannot be sustained, renewable resources cannot be renewed fast enough to match consumption, nor are renewed resources adequate substitutes for what has been used, society cannot be sustained by economic growth and consumption alone. There is in essence no such thing as sustainable development.” (Davidson, 2011)

Davies (2103) has a more moderate stance. While accepting that consumption is enormous and that natural resources are not enough to keep up, he proposes that solutions are required for achieving sustainability and that there has to be a middle path or middle ground. This is

where aspects such as ‘less’, ‘more’, ‘partially sustainable’ and other ways of description are required and needs a numeric measurement to be able to review and make final informed selections. We agree with Singh, Murty, Gupta & Dikshit (2009) who say ,

‘There is a widely recognised need for individuals, organisations and societies to find models, metrics and tools for articulating the extent to which, and the ways in which, current activities are unsustainable.’

Measuring Sustainable Development (2014), a conference report, articulates the need for “.... a better statistical compass to measure sustainable development.... for making choices”. In the recommendations they propose many categories of indicators over 20 themes with sub themes such as human well being, consumption, nutrition, health, labour, education and others. They use three conceptual dimensions of sustainable development, human well-being of the present generation, the well-being of future generations (here and now) and the well-being of people living in other countries (elsewhere).” We quote three examples of how they recommend measurement through indicators: housing indicator by measuring urban population living in slums, land and eco systems by measuring bird species threatened and physical safety by death by assault/homicide rate.

Scoring is important, given the background of debates around “sustainable”, as sustainable is a contextual and a very relative concept. Terms such as weak / strong sustainability are often used in many contexts. For example, when resources are replaced by manufacturing (manmade items) it often requires energy and other resources, which is considered weak sustainability, (Hopwood, Mellor & O'Brien, 2005). When resources can be replaced by nature without huge human intervention, or use of energy or resources, this is considered stronger sustainability. Neto et al (2018) have reviewed many sustainability discussions and have proposed frameworks for strong sustainability as shown in figure 3.3. They propose eight interlinked ways to achieve strong sustainability within the frame work of environmental, economic and social: (i) Efficiency of resource consumption (ii) Limit the use of renewable resources (iii) Replace CGH emissions (iv) Replace non renewable sources (v) Replace toxic inputs (vi) Increasing sustainable manufacturing (vii) Increasing affordability (viii) Reuse of waste. We will see all these factors coming back in chapter 4, when we design a tool for sustainable menstruation management.

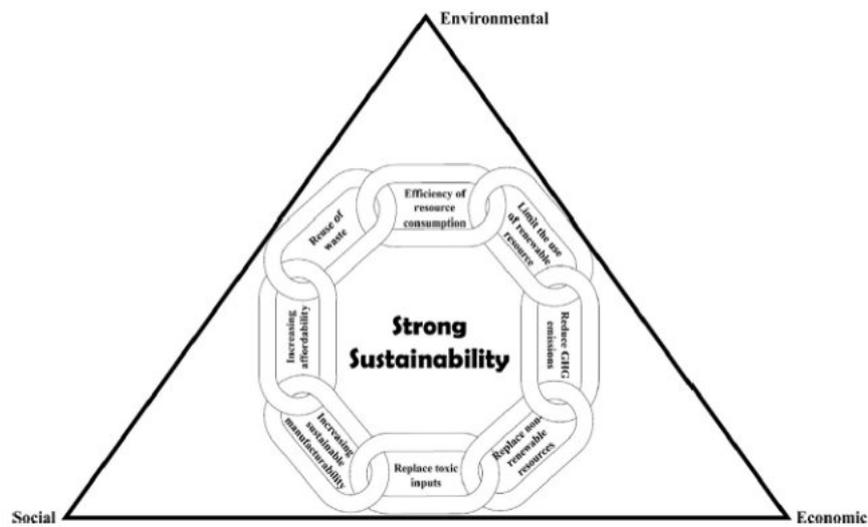


Figure 3.3 Framework with eight specific actions to promote strong sustainability, Neto et al (2018)

Scoring as been in place in developed nations such as Scandinavian countries, where “Ecolabelling” appears to be an established way to guide a consumer. The ecolabels grade environmental sustainability and these have been developed to encourage producers to declare what and how they manufacture or produce, to be able to give a consumer an option for making an informed purchase. A manufacturer can apply⁴⁵ for these certifications.

“Eco labeling is a voluntary method of environmental performance certification and labeling that is practiced around the world. An ecolabel identifies products or services proven environmentally preferable overall, within a specific product or service category.”
(Ecolabel Index, n.d)

According to Murthy (2015), scoring menstrual products from a holistic sustainability lens is relatively a newer area. For the context of menstruation management, if such a certification exists, it would help implementers and planners of community based programmes to select, for example, menstrual devices appropriate to the area of intervention.

We give some examples of labelling, the “Nordic Swan” for Scandinavian Countries, Figure 3.4(a) and the European Union Label, for Europe, Figure 3.4 (b). The Nordic Swan for instance, has been used on 63 categories of products and under the sanitary product listing; sanitary napkins, tampons, diapers, cotton buds, tooth picks and others. Words like “Better” also appear on labels, Figure 3.4 (c), The Better Cotton Initiative (BCI), a global effort promotes a comprehensive set of production principles and criteria for growing cotton in a

⁴⁵ There are application fees and a fee for licenses and renewals.

more sustainable manner: socially, environmentally and economically. In the context of India we found two labelling systems. One example is from The Central Pollution Control Board under the Ministry of Environment and Forests and the other the Ecomark, an image with an earthen pot, Figure 3.4 (d), to cover 16 product categories (Indian Ecomark,n.,d) (Eco-Mark Scheme, n.d). The other is the Green Signal, Figure 3.4 (e), started by IIM, Ahmedabad, (Green Signal 2012). However limited information is available about this. We have not come across products using this label; one can assume that since it is a voluntary initiative, industries may not have come forward to take it up, and subsequently there may not have been follow up since the scheme was launched.

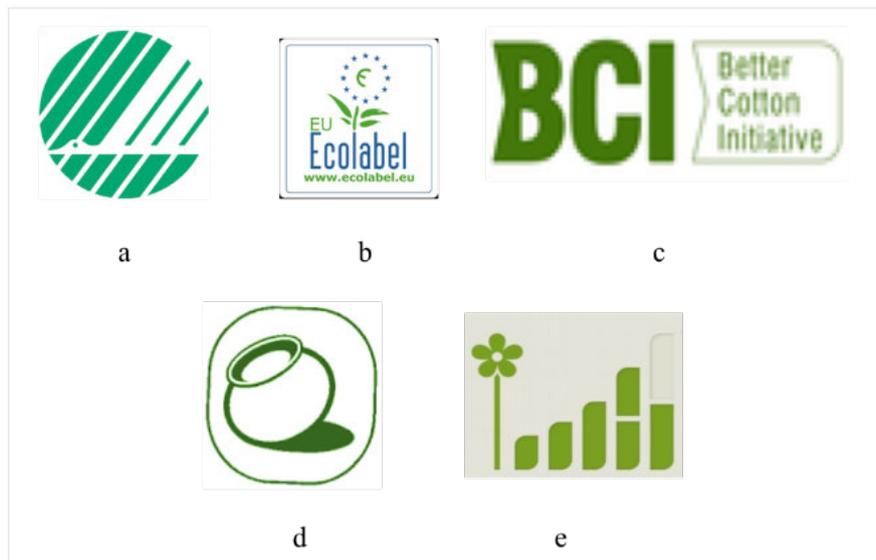


Figure 3.4 Eco-labels symbols, (a) Nordic Label, (b) European Union Label, (c) Better Cotton Initiative (d) India Eco Mark, (e) Green Signal

During our search for sustainability measuring tools we found a commercial website that has environmental measurements for consumer goods. Refer, Figure 3.5. The website site www.goodguide declares itself as:

“Good Guide is a comprehensive, authoritative resource for information about the health, environmental and social performance of consumer products and companies. Our goal is to help consumers make informed purchasing decisions that reflect their preferences and values.

Further information on the site tells us that scientists on *goodguide*, measure three aspects – health, environment and society, using a rating from 0 – 10, where 0 is worst and 10 is best.

Interestingly the health ratings are not listed for any of the sanitary products. This absence aligns with a discussion of how difficult it is to isolate the source of a health problem which we analyse later in Chapter 5. We assume that perhaps this is the reason for not assigning a health score. Barring the health aspect, *goodguide* identifies ingredients in the products, gives a score and an overall rating to help consumers decide if the product is right for them, depending on their need, preferences or philosophies. We found ratings for 146 tampon products and 204 sanitary pads on their website.

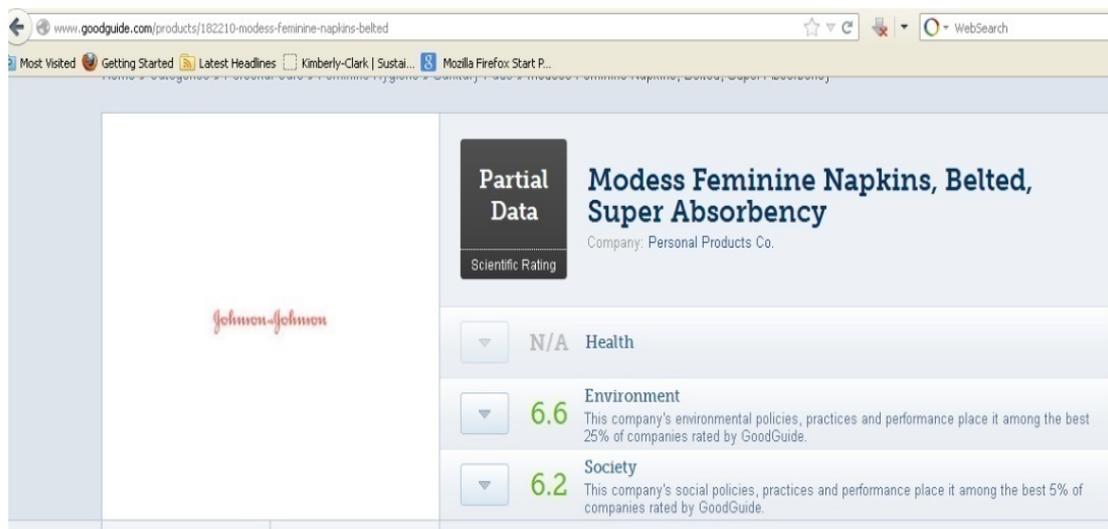


Figure 3.5 Screen shot from www.goodguide.com, showing ratings for a Johnson and Johnson product.

Further the website says that their ratings are determined by examining a company’s environmental policy. This can be contested: companies have been known to “green wash”, with-holding actual information on the damage created to the environment and then offsetting with other schemes (Gutman, 2019). Hence in our view, this type of scoring may be incomplete and unreliable, which may mislead the consumer who will not have holistic information during a decision process.

In the next section we describe the tool we develop for measuring for the multi-dimensions of menstruation management sustainability.

3.4 The PASS Tool for Menstruation Sustainability

In Section 3.1 and 3.2 we had discussed sustainability frameworks and visual representations of sustainability. Jon Elkington’s TBL model is partially appropriate as it considers three

dimensions of sustainability. Refer earlier figure 3.1 (c) where the three pillars representing environment, economy and social come together in a cohesive way under a roof, suggesting stability. We propose the use of this same model with an addition of the fourth pillar, to represent the health dimension of menstruation as health needs separate focus in the context of management of menstruation. We have previously described in the literature review, how health is impacted by the socially sanctioned ways of managing menstruation, such as hiding the menstrual cloth or selection of dark coloured cloth. Therefore the health pillar is a critical requirement which cannot be covered by the other three pillars, environmental, economic and social.

Thatcher (2013) rightly points out that pillars require parameters to define them. Parameters for measuring aspects of environment, economic and social have been proposed by Finkbeiner, Schau, Lehmann & Traverso (2010) which we feel are suitable for assessing menstruation management sustainability. For the environmental dimension indicator, Finkbeiner et al.(2010) suggests the life cycle perspectives which includes extraction of raw materials, manufacturing, transportation and others, use of resources, emissions to air, water, soil and waste. This aligns with devices used for menstruation where it will be required to assess the raw materials for bio degradability, the amount of debris if not bio degradable or if the devices are causing any pollution. For the economic dimension, Finkbeiner et al.(2010) have considered manufacturing costs and life cycle costs from the user's perspective. This aligns with economic factors around menstruation management, cost of the device, costs of maintaining it, health costs and others. The social dimension captures the acceptance of a practice; for example, is free flow acceptable? Is the design of a menstrual device appropriate for the community, does the design function according to social acceptance? For example, menstrual blood leaking on to outer clothing, being visible to others is not socially acceptable. Hence does a particular device manage the social aspect? The health dimension will measure direct impact on user health; for example, are the raw materials in products causing users harm? Do the users present with skin problems from the use of menstrual products? Health dimensions will need to be given an equal space and currently do not feature in the three pillar framework; environment, economic and social. We previously saw the addition of "culture" as a fourth pillar by Hawkes et al (2001), strongly suggesting that many dimensions can be added to sustainability frameworks depending on our context and these (contexts) do not necessarily have to fit into the three well known three pillars.

Thus we bring in a fourth pillar, health. The visual model we propose is four pillars corresponding to four aspects of menstruation sustainability, Environment, Social, Economic and Health with a roof, making up the model for ‘Sustainable Menstruation Management’. The tool has a stable roof which is fixed, with 4 pillars built up to reach the sustainable roof, refer figure 3.6.

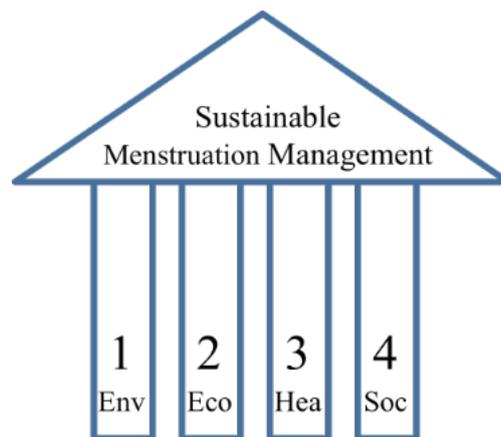


Figure 3.6 Four pillars of susutianbility making the roof stable

Taking away even one pillar will make that particular dimension of menstruation management unsustainable. Refer figure 3.7 (a) and (b).

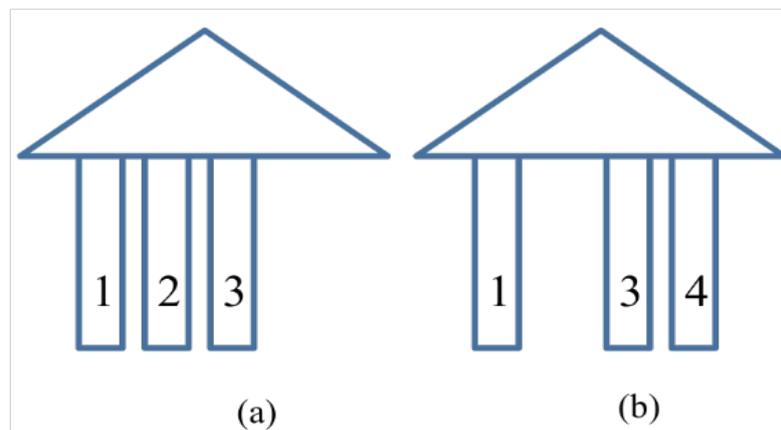


Figure 3.7 (a) (b) Taking away any one pillar will indicate instability, thus not sustainable.

To make the model relevant to the study area, South Rajasthan, each pillar aspect was translated into the Hindi language and renamed. See figure 3.8.

1. Environment Pillar - *Paryavaran* - named P, to consider impact on environment
2. Economic Pillar - *Arthik* - named A - to consider cost to user

3. Health Pillar - *Swasth* - named S to consider negative or positive health impact caused by the use of the product both on the user and on the community.
4. Social Pillar - *Samaj* - named S to consider social acceptance of a device, space or practice, any attitude having a direct or indirect bearing on individual user or community

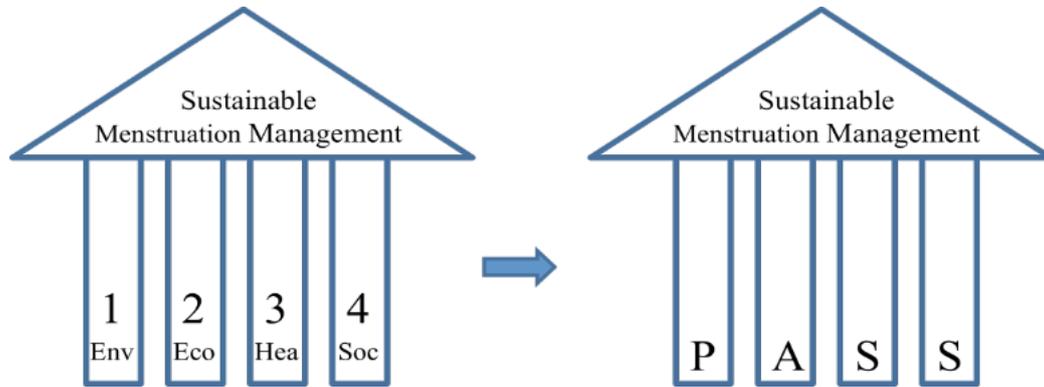


Figure 3.8 The 4 pillar Sustainable Menstruation Management Tool using Hindi language terminology

The words “pass” and “fail” are common English language terms used in the area where we practice, to sanction or reject anything, hence P,A,S,S coincidentally became an acronym. Further we can assign individual sustainability aspects to the roof, such as “sustainable menstrual device”, “sustainable menstrual practice” or “sustainable menstruation space”. See Figure 3.9. In these hypothetical assessments, all four dimensions of PASS in the device, practice or facility, is assumed to be sustainable.

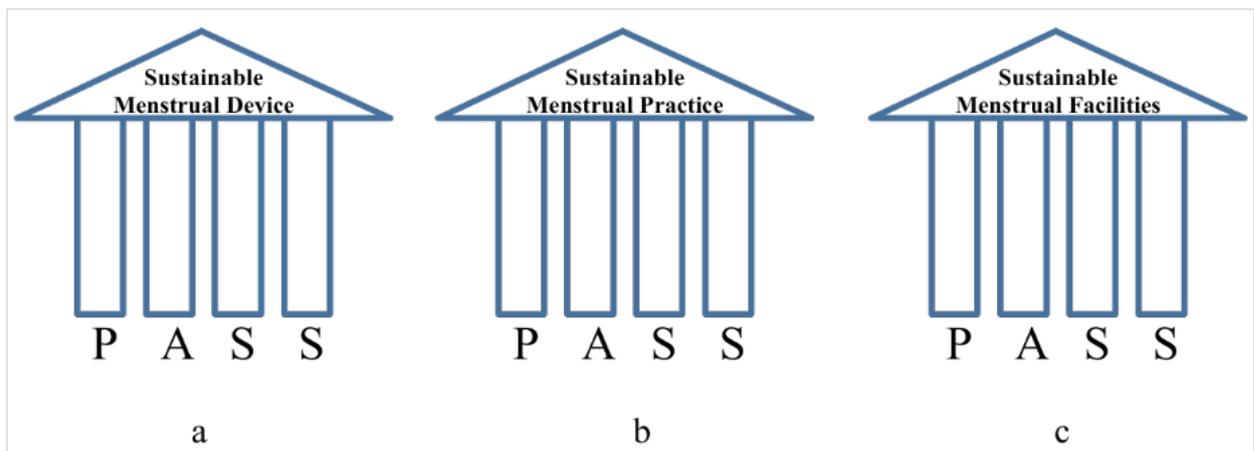


Figure 3.9 The 4 Pillar visual assessment assuming (a) sustainable menstrual device (b) sustainable menstrual practice (c) sustainable menstruation space

On the same lines other factors can be assessed; for example an individual menstrual devices; can be assessed for sustainability using PASS, Figure 3.10. Here we show the applications for 3 menstrual products from our study area, Cloth, *TP* and DSN, adding “Other” to mean any other menstrual device. In this example we have once again assumed that all four dimensions of PASS in the menstrual products are sustainable.

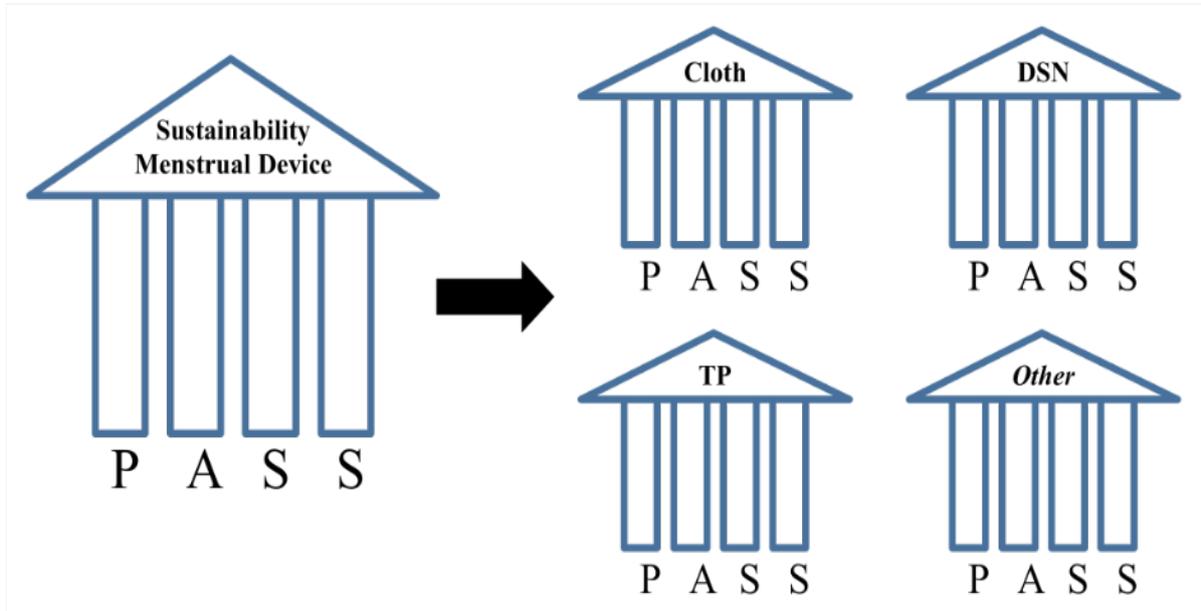


Figure 3.10 The 4 Pillar Tool, visual assessment for Cloth, DSN, *TP* and Other, assuming all dimensions to be sustainable.

Another example of application of PASS can be seen in Figure 3.11. We have shown the application on methods of disposing or discarding menstrual devices such as washing, throwing, burying and burning.

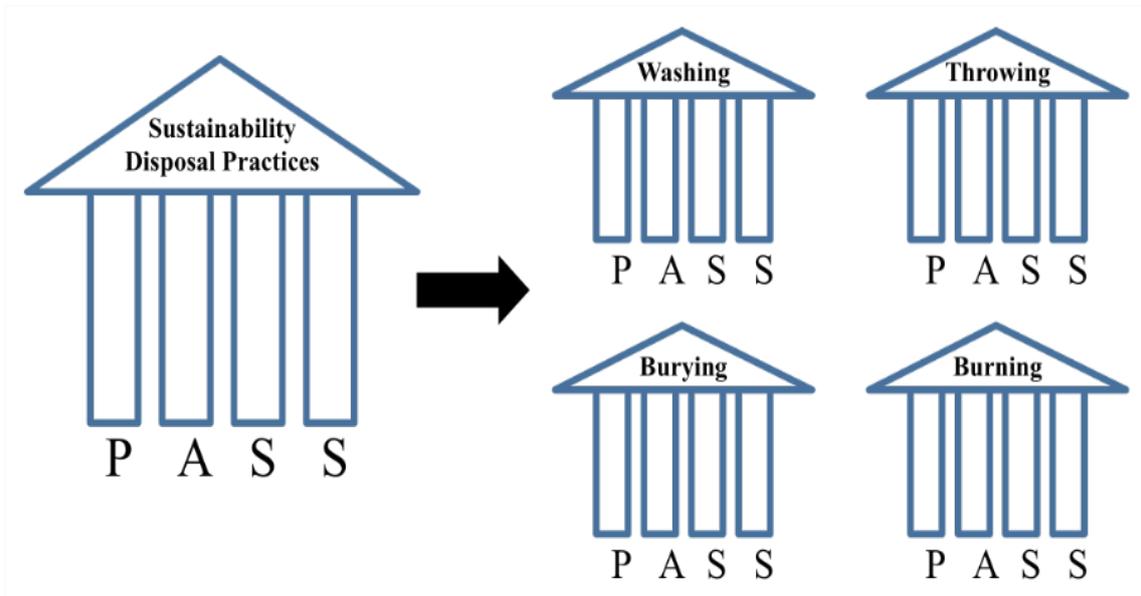


Figure 3.11 The 4 Pillar Tool, visual assessment for washing, throwing, burying and burning assuming all dimensions to be sustainable.

We can apply PASS to measure facilities of menstruation management in different contexts such as home, village, school or a bank. Figure 3.12.

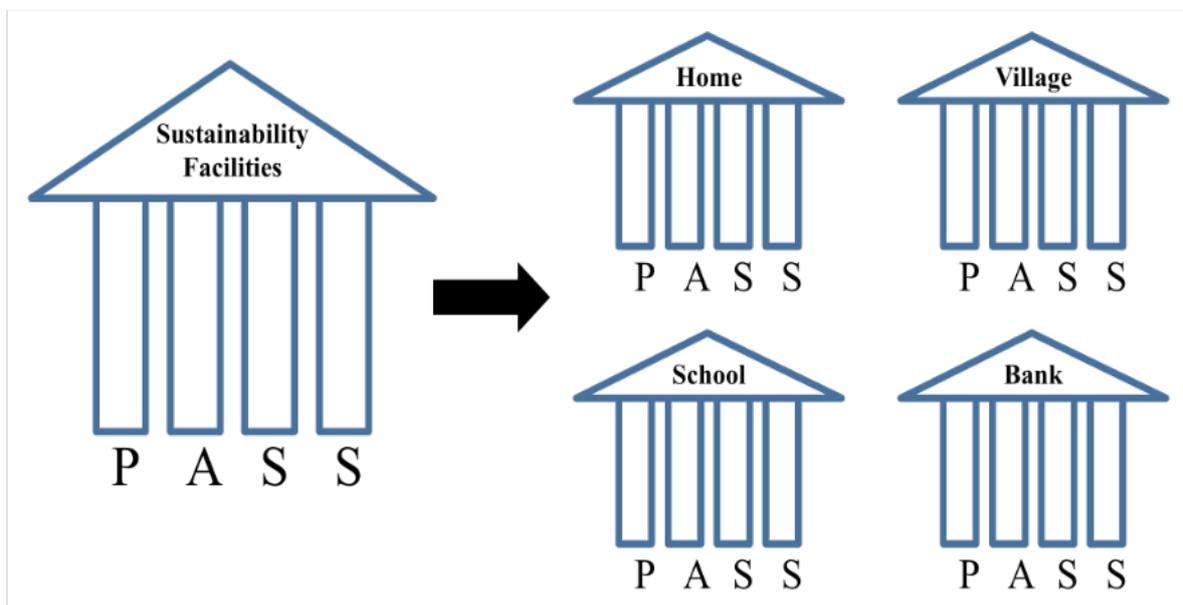


Figure 3.12 The 4 Pillar Tool, visual assessment for assessing infrastructure at home, village, school and bank, assuming all dimensions to be sustainable.

In these examples the single pillars of the tool denotes “sustainable” and an absent pillar denotes that the dimension is unsustainable. There are scenarios where a hybrid menstrual device has to be measured for sustainability, such as the Rwanda pad or the Ecofemme pad

with parts of plastic materials, or the Goonj pad with one part bio degradable but disposable . (These examples previously discussed in Section 2.3.3) Such a product cannot have a clear “sustainable” or unsustainable “ pillar, but will need an “in between” measure. These hybrid examples will then need to be located between "sustainable" and "not sustainable". In the same way there are many practices, facilities and infrastructures will require in-between pillar heights to be able to assess for sustainability. Scoring on pillars will enable this, which is described in the next section.

3.5 Scoring on the PASS Tool

We divide the pillars into three units. Assigning 3 units to any dimension (like environment) will correspond to highest score of 3, assigning 1 will correspond to the lowest with score of 1, with a score of 2 at the centre. A score of 3 units denotes sustainable, 2 units denote neither sustainable nor unsustainable and 1 unit, not sustainable. All 4 pillar sustainability heights are thus determined. See Figure 3.13. The measured units are coloured, a visual representation of scores. Figure 3.14.

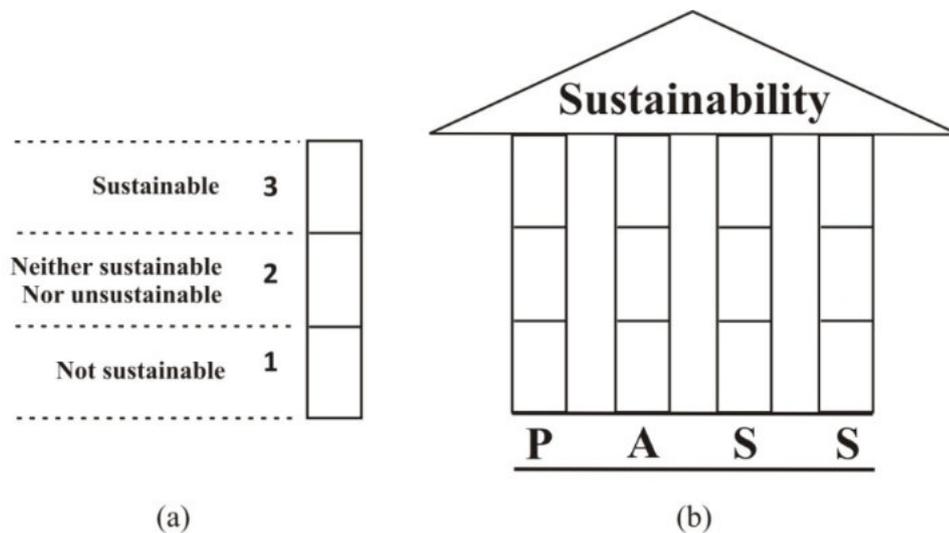


Figure 3.13 Levels of Sustainability can be plotted on each pillar

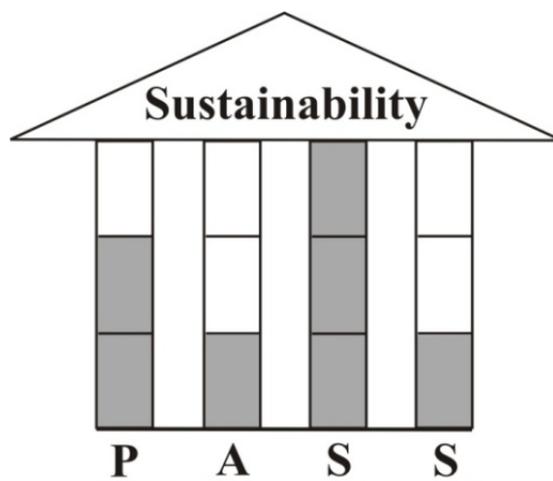


Figure 3.14 Levels of Sustainability can be plotted on each pillar

While all 4 pillars will give us holistic assessment, even single pillars can be used to measure and compare dimensions. The parameters for measuring are detailed in the next section.

3.3.3 Parameters for Measuring and Scoring

Parameters are contextual and there will be unique contextual requirements for measuring each pillar. Using menstrual devices as examples in our context of rural communities, we propose a list of parameters that can be used to determine scores on the different dimensions of the PASS pillars. The scoring on the pillars can be calculated in many ways, individually or holistically. Each of the pillars can be calculated separately, or pillars for different devices can be compared. For example, for menstrual products, the pillar P, *Paryavaran* or environment, can be compared with Pillar P of another device.

(a) Parameters for Pillar, P, *Paryavaran or environment*, can be:

- Measuring the amount of water required to produce a menstrual device
- Measuring the amount of water required to maintain a menstrual device
- Measuring the water and soil pollution at the time of washing by use of soap
- Measuring the soil pollution at the time of burying menstrual devices
- Measuring the air pollution at the time of burning menstrual devices
- Measuring the numbers of menstrual products generated at each menstrual cycle

(b) The parameters for Pillar A, *Arthik*, or economic, can be:

- Cost of production/manufacturing of menstrual device

- Cost to the user at the time of purchase
 - Projecting the cost for the user over a specified time period
 - Cost for maintaining a device - such as soap and water
 - Costs associated with menstrual waste removal, expenditure incurred by municipality
- (c) The parameters for Pillars, *Swasth*, the Health pillar can be:
- Measuring the relation between climate and menstrual device- which device in which climate?
 - Monitoring symptoms such as rash, itching, boils or abscess
 - Finding correlation between menstrual products and reproductive tract infections
 - Finding correlation between menstrual products, climate and user health: for example are there health problems in different seasons, monsoon, dry season or winter?
 - Finding specific health problems from each of the products, for example did the menstrual product cause contact dermatitis, itching or inflammation caused by lack of hygiene?
 - Was the health problem because the user did not change the recommended four times a day?
 - Aspects to comfort provided by a menstrual device that impacts health, such as leaking, comfort while wearing ease of use in removal and replacement with fresh device.
- (d) The parameters for Pillar S, Samaj, or Social can be:
- Acceptance of the design of menstrual absorbents, functioning and comfort
 - Maintenance of the product; ease of washing
 - Acceptance from community for drying menstrual product in the sun
 - Facilities for disposing the product
 - Priorities of communities
 - Aspirations of communities

In Chapters 5 and 6 we will come back to demonstrating how menstrual devices can be scored on PASS. In Figure 3.14 we show hypothetical visuals of PASS scores for 3 menstrual devices

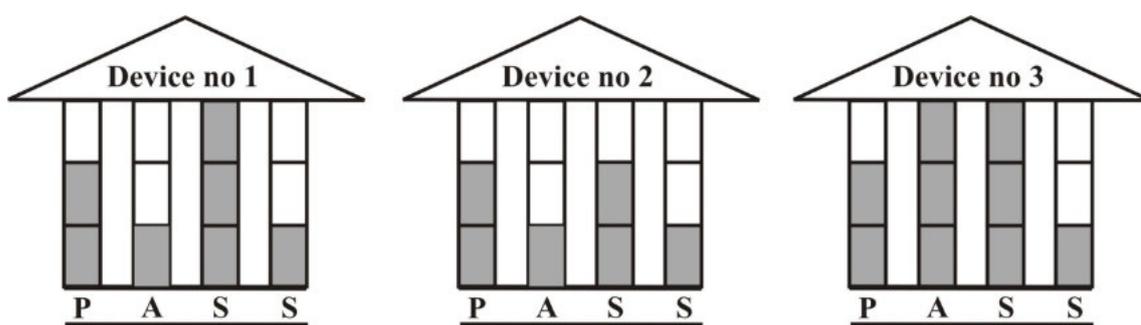


Figure 3.15 Three hypothetical devices with hypothetical PASS scores

From figure 3.15 we can see all three devices have similar scores for Pillar P, *Paryavaran*, Environment, with the same scores for pillar S, *Samaj*, Social. However the scores for Pillar S, *Swasth*, Health and Pillar A, *Arthik*, Economic differ. These holistic scores, we argue, will aid in developing strategies and implementation in MHM programmes.

3.3.4 Acronym PASS and Regional Applications

The acronym P,A,S,S is suitable for Hindi speaking regions. Nevertheless, the letters P,A,S,S can be used in other language contexts; like Bengali in which environment is *Priyabaran*, economic is *Arthanaitik*, Social is *Samaj* and Health is *Swasth*. The letters lend itself to Bengali, to form the acronym PAAS. In Table 3.1 we demonstrate how the acronyms P,A,A,S applies to few other regional languages.

Table 3.1

Regional acronyms of PASS

	Acronym	Gujarati	Marathi	Kannada	Telegu
Environment	P	<i>Paryāvaraṇa</i>	<i>Paryāvaraṇa</i>	<i>Parisara</i>	<i>Parisarālu</i>
Economic	A	<i>Ārthika</i>	<i>Ārthika</i>	<i>Arthika</i>	<i>Ārdhika</i>
Health	A	<i>Ārōgya</i>	<i>Ārōgya</i>	<i>Ārōgya</i>	<i>Ārōgya</i>
Social	S	<i>Sāmājika</i>	<i>Sāmājika</i>	<i>Sāmājika</i>	<i>Sāmājika</i>

3.4.5 Beneficiaries of the PASS Tool

A system of scoring menstrual management processes and systems, if available will bring about many benefits. The tool is very basic and simple can be used to inform practice. The tool can be used by funding agencies, government and NGO teams as they develop policies on MHM. Programmes for intervention and implementation will be better informed, more efficient and effective. The tool also can be used at the community level. During intervention programmes communities can use the tool to assess their current menstrual management systems and take action toward making informed choices.

We see policy makers as an important stakeholder. When we examine the government guidelines on Menstrual Health Management, MHM Guidelines (2015-16) we find that it does not lay any ground for issues around sustainability. In fact, it lists all menstrual product options some of which may be unsuitable to rural contexts. At the point of implementation, each state government interprets it in their own way; a very common interpretation has been pad distributions schemes (n.d). Pad distribution is often seen as an answer to keeping girls from missing school. Yet, while reviewing MHM policies in India and sanitation in the field, Murlidharan, Patil & Patnaik (2015) have pointed out many other reasons why girls are absent from school on period days. They have found that it includes period pain, lack of proper toilet facilities in school, having no separate toilet for girls and others. We can assume from this that if the MHM policy makers of 2015 – 2016 had a tool at that time, a sustainable policy could have been framed where implementers could:

- make environmental calculations for debris in advance, as there would have been an audit of the number of pads that potentially would be generated from a school,
- create facilities before pad distribution, a place to throw pads, enough water and soap, a good bathroom
- put in place appropriate disposal procedures and terminal disposal systems.

Since the years 2015-2016 to the best of our knowledge, there has been no update on the guidelines.

3.4.6 Generalizing Application of the PASS Tool

The PASS tool is flexible allowing for larger applications. We state that this tool can be used for other sustainable artefacts and products in human development, its application can go well beyond the proposed beyond rural sustainable menstruation contexts. The website of the United Nations on human development, About Human Development (n.d), speaks of well being of communities through three dimensions, people, opportunities and choice. Further, they state that “people” focuses on improving lives, not just from an economic angle but from a holistic perspective, “opportunities” focuses on giving people freedom to live as they wish and “choice” gives people options without forcing selection. We argue that the PASS tool, has the potential to be used as a generic tool for measuring and comparing sustainability.

An application for the PASS tool can be used at the start point of any project, for example while developing a design brief for a livelihood project involving rural producer group and an artefact. Artefacts examples could be a craft product, an everyday functional item, furniture, clothing and others. PASS in such a case, could be used for iterating for end to end solutions. However the tool will take on different set of dimensions for each pillar depending on the location of the community, the service the community will provide or the artefact in question. For example, if we are to look at “block printing and appliqué work for bed linen” as artefacts within a livelihood projects⁴⁶, the PASS tool will take on different dimensions to keep central the product, the service and the all stakeholders in the chain. We can explain this in this way For P – The Environment Pillar - Raw Materials – where are raw materials for block printing being sourced from? Which forest is the wood for the blocks coming from? Where are the textiles being sourced, from organic cotton farms or BT cotton farms? How much water has been used to manufacture and procure raw materials? Are these raw materials favourable toward environment? Cross checking through S-LCA will answer these questions. For A – The Economic Pillar - Cost factors, who is the target group buying the bed linen? What price range is the cost pegged at? Are the workers being paid a fair price for their labour?

⁴⁶ This textile handcraft has been used as an example of an artifact, as it forms the livelihood projects of two organizations, Sadhna (www.sadhna.org) and Avran (www.aavaranudaipur.com), both based in Udaipur district. The researcher was involved in both projects when it was initiated in the early years and continues the association till date.

For S – The Health Pillar– Health of workers during production – are facilities appropriate, is there enough ventilation at the work space, are there enough bathrooms, are there facilities for managing menstruation such as adequate water, menstrual absorbents.

For S – The Social Pillar - Has the livelihood project provided for insurance of workers in case of accidents? Have welfare schemes been put in place for the families of workers? Are there adequate benefits? Is there a sexual harassment committee in place?

With this example we have been able to give a perspective on how the PASS tool can be generalized.

3.4 Summary

We have demonstrated the possibilities of the PASS tool (i) a simple scoring method that can be used for measuring and comparing menstrual products (ii) the possibilities of the application in a regional context. (iii) the potential to apply PASS in contexts other than menstruation management. A composite scoring of PASS is also possible which we will come to in section 8.5. There are many limitations to PASS however, which we will discuss in sections 5 and 6 when we use the tool to assess menstrual products. Scoring menstrual devices from a sustainability lens is a relatively newer area. The PASS diagram in its current state provides that first step to assessing sustainability of the different dimensions. In the next Section, we develop a menstrual management device called the *Uger* pad which is subsequently tested through PASS in Section 5 and 6.

Chapter 4

Uger Cloth Pads

4.0 Introduction

In the previous sections, through literature review, professional practice and observations from our field area, we laid out the many aspects that contribute to unsustainable menstruation management from the points of view of device, practice and facilities. We had also proposed a tool to measure sustainability. In this chapter we propose a solution in the form of a tool to manage menstruation which can result in positive impacts on the health, environment, economic and social aspects of the user, answering the research question – RQ 1- “**How can we make the management of menstruation sustainable?**” We considered the multiple dimensions of the PASS tool as we developed the design brief. The menstrual management tool designed was named *Uger* pads, designed in a collaborative way and put through collaborative field testing. The pad development process was supported by Jatan Sansthan, the NGO with which that the researcher is associated. In this chapter we bring in the two areas of work for the thesis - social change and participatory social design.

4.1 Design Brief for Developing the Menstrual Management Tool

We listed a set of parameters that would serve as the design brief for the development of a sustainable tool for menstruation management keeping the dimension PASS central.

- The design has to respond to aspiration. Underwear use is seen as modern (learned from previous field intervention of the *Lace Walah Kapda*, discussed in section 2.3.1 hence the design should respond to this life style change. (Pillar S, *Samaj*)
- The design should be superior to or equal to existing devices, cloth from home, *TP* and *DSN*. Comfort and aesthetics is an important criteria. The tool or device must be comfortable to wear easy to remove and easy to replace with another fresh device. It must remain firmly in place not shifting while moving. (Pillar S, *Samaj*)
- Tool to be able to manage different types and different volumes of vaginal discharges; light and heavy blood flow, white or colourless. (Pillar S, *Samaj*)
- Tools to be made from materials that will not generate large volumes of debris (or just waste). Selection of all raw materials to be made in accordance with the impact of raw materials on the surroundings at the time of final or terminal disposable (Pillar P, *Paryavaran*))
- Raw materials in the device not to cause health problems for the user. Colour of the absorbent material touching skin to be of primary consideration – white colour is deal so that the user identifies abnormal discharges in time and seeks medical help. (Pillar S, *Samaj*)
- Tool not to cause body discomfort that will lead to health issues due to the nature of the shape of the device. For example, pinch, poke or cause abrasion from an edge of the pad or a button. (Pillar S, *Samaj*)
- Tool to be made affordable for communities; if not affordable, to be developed in such a way that a potential user can create the tool using locally available materials. (Pillar A, *Arthik*)
- Users from lower economic groups must be a part of the design team to include all perspectives of users. (Pillar S, *Samaj*)
- Manufacturing and production of the device must be able to generate on local livelihood. (Pillar S, *Samaj*)

4.2 Method

4.2.1 Collaborative Design Approach

As we approached the design exercise, we asked ourselves two questions. Who can best introduce a change in a menstrual device or make a new device? Who can promote better practices and provide supportive environments? We have seen in our practice that when working with communities, participatory research and subsequent action on the ground (as a result of the research), has been found to be sustainable as it actively involves people throughout the process. Smith et al. (2018), advocate for participatory design to make change that can have a long term impact. They introduce three dimensions of engagement while co-designing for change with communities: scoping, developing and scaling. We used scoping and developing as we worked with collaborators. As for scaling, we will come back to this in section 7.

According to Selener, D. (1997),

“Participatory research combines three principal activities: research, education, and action. It is a research method in which people are actively involved in conducting a systematic assessment of a social phenomenon by identifying a specific problem for the purpose of solving it. It is an educational process because researcher and participants together analyze and learn about the causes of and possible solutions to the problem addressed.”

The collaborative research approach to design development was found suitable, as collaborators, our future end users, are best suited to comment and advise on the products to be developed.

“Participants act as individual experts addressing design issues from their perspectives. Their expertise may change during a design session as their understanding is supplemented and they learn from their involvement.”
(Kvan, 2000)

“The collaborating designers bring their individual resources in terms of knowledge, experience, motivation, etc. into the design situation.”
(Bufardi, Xirouchakis, Duhovnik & Horvath 2005)

Participation and collaboration of future potential users creates a sense of ownership of the design and, lends credibility as users have been involved closely with the design process. To

this end the researcher built up a team along with the supporting NGO, Jatan Sansthan. and supervised a ten day design development workshop⁴⁷.

4.2.2 Forming the Design Team

The team consisted of:

- 5 women from a slum settlement Ramnagar Basti on the outskirts of Udaipur city,
- Two female staff members of Jatan Sansthan from rural backgrounds
- Four international student interns⁴⁸ (one male and three female)
- The investigator

The sequence followed was:

- a) Understanding the science of menstruation, health, social, economic and environmental aspects corresponding to the PASS tool. This was done through two orientation meetings.
- b) Design development of the pad
- c) Collaborators test pads
- d) Finalising prototypes
- e) Developing the batch production of prototypes
- f) Distributing prototypes to 38 women for feed back

4.3 Design Decisions and Design Process

4.3.1 Design Decisions

The first design decision was around insert able devices designs along the lines of a tampon or a cup were not considered as it is a device that needs to be inserted and has low acceptance (previously discussed in section 2.3.2). The second decision was around the aspect of environment, no PUL for the bottom layer of the pad would be used, neither would we consider plastic for leak proofing. We had previously discussed the negative environmental aspects around PUL in Section 2.3.3. The third decision was developing a reusable menstrual management tool that would cause insignificant menstrual debris as opposed to disposable

⁴⁷ Dates of the workshop July 2012

⁴⁸ Three students from the Intern Programme of the Foundation for Sustainable Development, USA, one student from the International Youth Voluntary Service, Germany

options. Cotton fabric therefore became the choice of raw material due to its bio-degradable nature. Rural communities are also familiar with maintenance around reusable cotton fabric. Another criteria was the use of locally available materials within the district where our practice lies.

The idea of a holder with a sleeve or towel from the *Lace Walah Kapda* (section 2.3.1) and the hybrid pad example from Rawanda (section 2.3.3) was the fourth design decision. The fifth decision was the feature of folding cloth, previously described in Section 2.3.1. The fourth and fifth decision were merged and modified during the prototype development, which we will come to later in this chapter. The wing advantage of disposable napkins was the sixth decision as it was seen as a good solution for fixing any menstrual management tool firmly to the underwear (discussed in section 2.3.2). The other element we considered was packing or wrapping of an individual device, as discussed in section 2.3.2, a system to conceal discharge after changing a menstrual device. This was the seventh design decision.

Summary of Design Decisions

- Comfort and aesthetics
- Colour of cloth, white colour for the surface in contact with vaginal area
- Devices for different volumes of discharge
- Re-folding of cloth and used for a longer length of time
- Fixing firmly to underwear
- Nature of cotton cloth, more suited to health and environment, economically viable
- Wings in disposable pads to manage side overflow on to underwear and outer clothes
- Wrapping system for carrying and concealing used pad
- Aspiration – must be superior to existing products
- Storage for future re-use

4.3.2 Design Process: Choosing Materials and Prototyping

Cotton fabric, poplins, brushed cotton and cotton casement was selected for sampling. Fabrics were purchased from local vendors in Udaipur City (who source their cotton fabrics from the neighbouring state of Gujarat. These fabrics were tested at the laboratory at Banasthali Vidyapeeth, Rajasthan, refer appendix I. Many shapes were created by the collaborators at the

Jatan centre at Ranmanagar Basti (a settlement of low income families) on the out skirts of Udaipur city, refer Figure 4.2. The collaborators rolled out pads of different shapes mimicking a generic branded winged DSN. The dimensions of existing DSNs were used as a basis for initial sizing, refer figure 4.2 for dimensions used for the samples.



Figure 4.1 Collaborators developing samples.

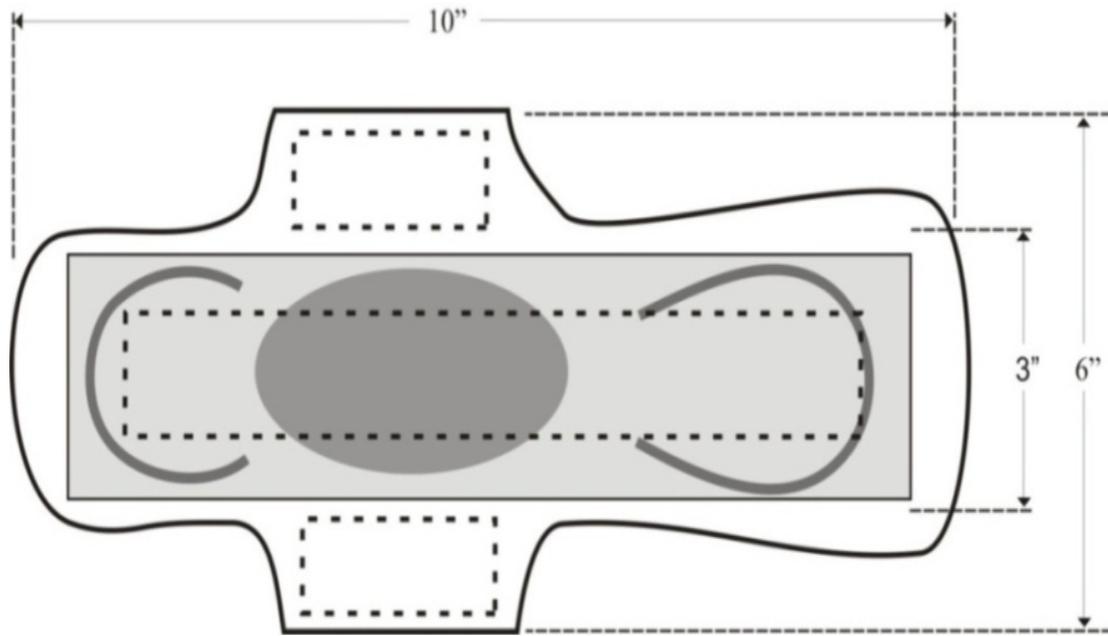


Figure 4.2 Dimensions in inches, branded disposable pad

Figure 4.3 (a) and (b) are the first set of samples. The inner core of these pads was made up of two layers of casement with the intention of creating a thin surface for wearing. The winged feature of the DSN was replicated, but instead of adhesives, we used press buttons for fixing. Figure 4.3 (c) and (d) are sample pads with slits at the bottom surface into which towels could be inserted, intended for heavy flow days of menstruation. (While we had taken the design decision to use white coloured fabric for the surface that comes into contact with the body, we used printed cloth to test for how blood would look on these surfaces but we were unable to take photographs). We experimented with button sets in different locations of the pads to test for comfort. All pads were designed to be worn buttoned down at the crotch of the underwear. Refer figure 4.4

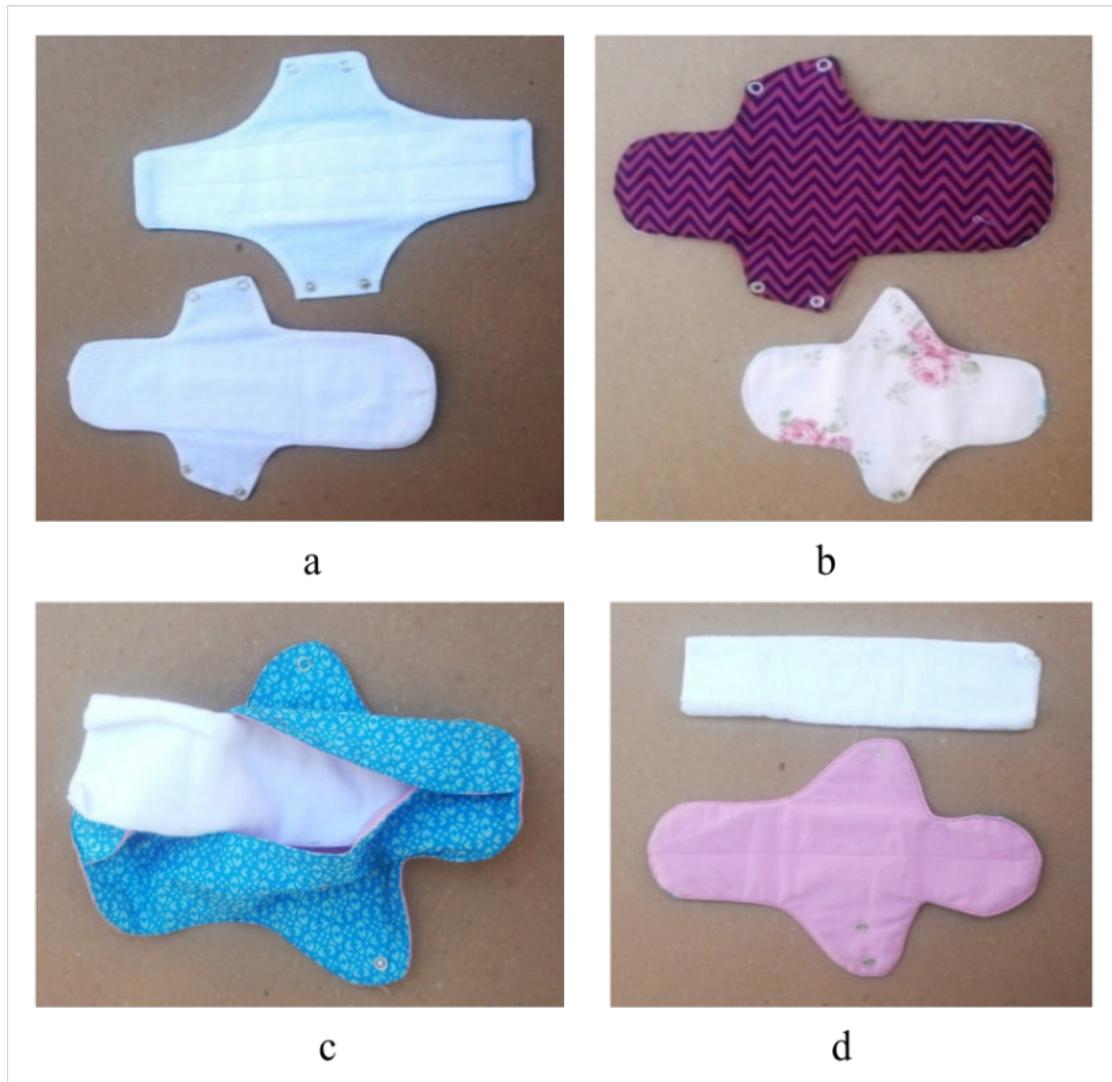


Figure 4.3 Developing different prototypes for the napkins (a) Pad with two button sets for fixing (upper side white) (b) Pad lower side, of printed fabric (c) A pad holder with a slit for inserting a towel, with one button set (d) Top surface of another pad holder with button set placed at an angle, with a width alteration, made narrower and made, with a slit on the underside for inserting towel



Figure 4.4 Pads button down to the crotch area of the underwear

Subsequently all 12 collaborators got two samples each of pad style (a) and (c). Each of the pads was tried for two cycles to finalise a variety of factors such as length and width, over all comfort, location of button arrangement, absorption factors and others.

4.3.3 Feedback from First Set of Samples

All collaborators rejected sample pads with slits for towels - sample (c). These were not found suitable by the collaborators who felt that both base pad (holder or sleeve) and the inserted towel would get soiled all at once, so another option was required. The angle of the button sets was causing discomfort while wearing. Sample 4.3 (a) while preferred in comparison to sample (c) also received negative feedback. The pads worked well only for extremely light flow, but leaked through for moderate flow. The inference from this was the two layers in the inner core were not sufficient. The other problem pointed out was that the pads had no strength, crumpling up and shifting as it was not staying firmly in one place. It was decided that adding more layers would solve both problems, strength and more absorbing capacity. In terms of pad length, collaborators decided to increase the length by one inch, for over all comfort. All collaborators agreed on the location of the buttons in sample (a) declaring it comfortable. Collaborators took photographs of the pads. Refer Figure 4.5 and 4.6. These samples gave the collaborators a sense of how the pads may look after washing and reusing.



Figure 4.5 Sample pad washed and reused five times

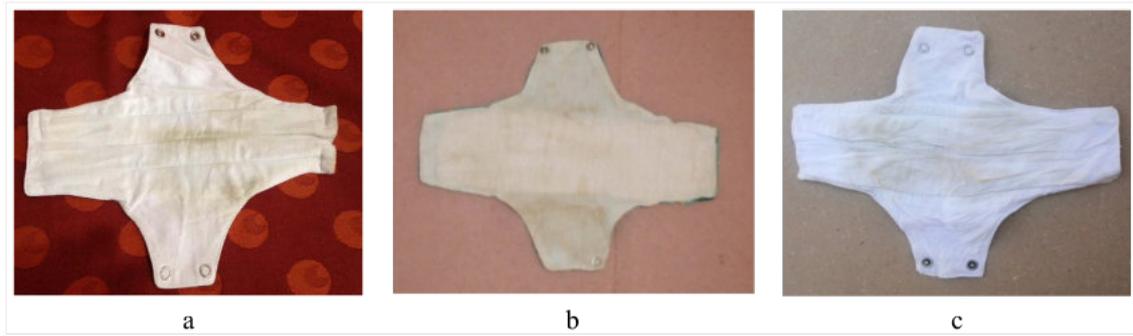


Figure 4.6 Sample pads washed and reused (a) 7 times (b) 4 times (c) 2 times

From these samples we can see that maintenance will vary with the way a user washes the pad, the type of detergent used, the amount of water available and other factors. We will come back to these aspects in the cross over trials detailed in Chapter 5.

4.3.4 Design Modifications, Making Prototypes and Testing

Next, twenty four samples were made using multiple layers of fabric, this time using four layers for the core, so that the total number of layers would be 6, adding firmness and managing leaking. Here again collaborators took two pads each to try. This time pads managed moderate flow for two hours and a maximum of three hours. The pad for light flow days was thus finalised consisting over all of 6 layers, refer figures 4.7 and 4.8. Refer figure 4.9 for the final shape for light pad.

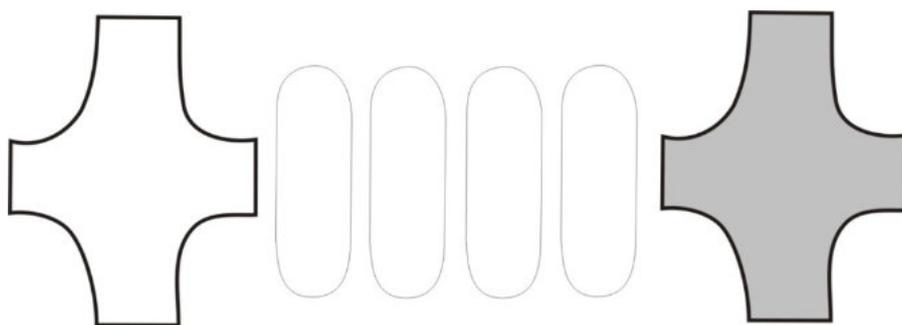


Figure 4.7 Six layers in the light flow pad, left to right : one white layer, four layers of casement cloth and one layer of printed fabric



Figure 4.8 Six layers in a light flow pad



Figure 4.9 Final prototype for pad with two button set for light flow days
 (a) Top colour white (b) Bottom view, printed

Simultaneously the collaborating team worked on the pad for heavy flow days of menstruation. For this we brought back the insert loop concept from the *Lace Walah Kapda* so that a towel could be accommodated.

The pad for heavy flow days was made exactly like the light flow pad with the addition of loops and insert holder pads refer figure 4.10 (a) (b) (c). Brushed cotton flannel was selected (based on common sense, as cotton flannel is known to be a good absorbent) for inserting towels. Here again the two button set was finalised.

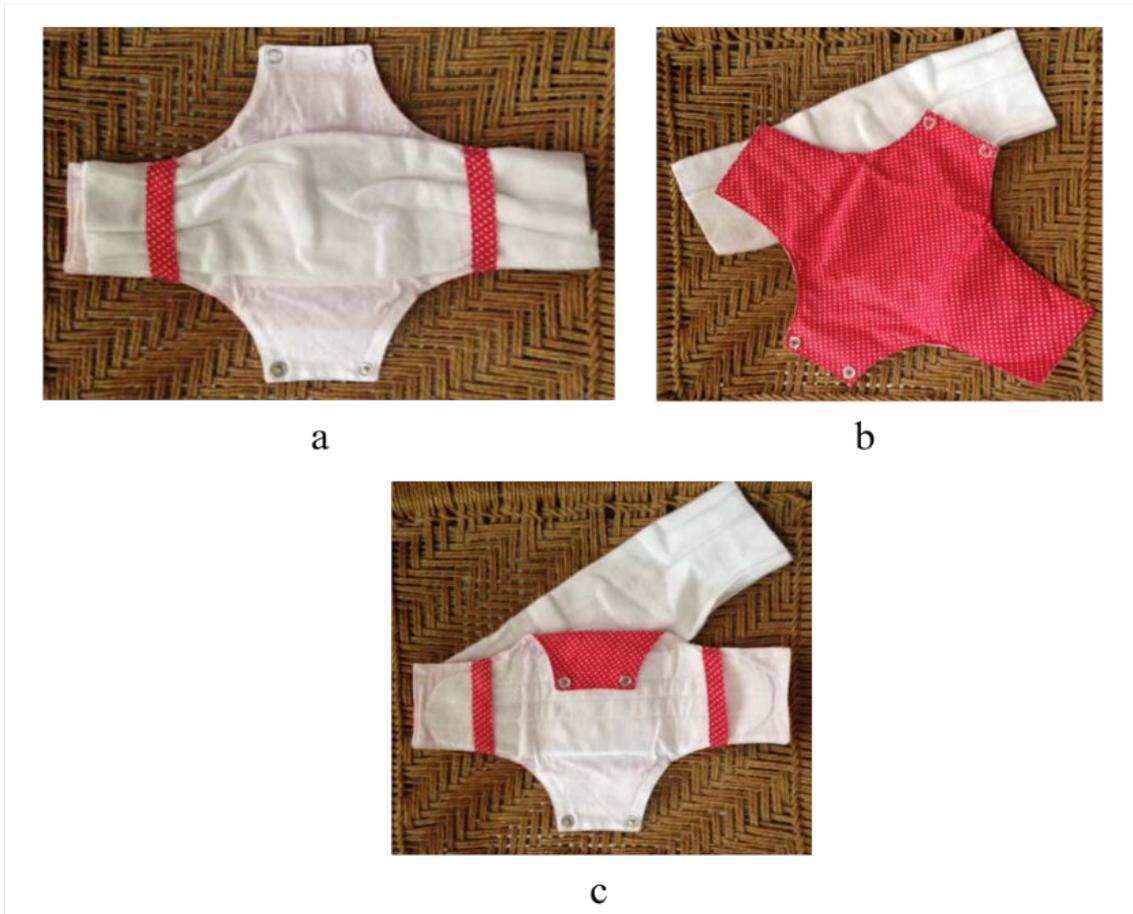


Figure 4.10 (a) Insert pad holder - pad with holder straps and buttons, with towel fixed into holder - top view, towel colour white (b) Bottom view of insert holder pad, printed fabric, towel on side (c) Insert pad with one wing folded

Each of the 12 collaborators took two samples each of the insert pads, (figure 4.7) and tested these on heavy flow days over their three cycles. These pads worked well for four to five hours, with users folding and refolding the towel, after which leaking occurred, with even the wings getting soiled. If we were to look at this from the perspective of hygiene, the wet part is not really touched as the folding is done by picking and manipulating the dryer parts of the towel. Users did not feel any discomfort while washing as 7 collaborators were previously using reusable and three (who had always used disposable up to now) were willing to wash. At this stage of testing we did not keep specific records for water use or detergent use for maintenance. This was subsequently done in the cross over trials which we describe in Chapter 5. We were able to photograph *Uger* insert pads that had gone through washing and reusing, refer figures no 4.11 (a) and (b).

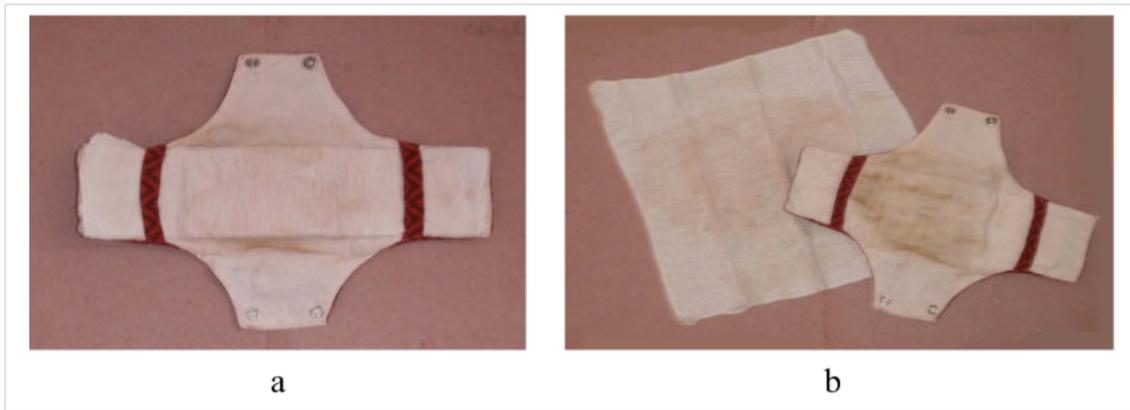


Figure 4.11 (a) (b) Insert pads washed 14 to 15 times estimated by the collaborator

At this stage of testing, three collaborators experimented with ways to dry *Uger* pads. Refer Figure 4.12 and 4.13. The drying style used in Figure 4.13 reduced drying time by half hour.



Figure 4.12 The bottom layer of the *Uger* pad is lifted and then pinned to the clothes line with pegs.



Figure 4.13 Pads were dried as shown

In section 2.3.2 we had discussed the plastic wrappings of individual DSNs where the wrapper is used for both carrying and discarding. In the case of the pad prototypes, the design lent itself to simple folds, buttoning up into a compact size, making storing easy. Refer figure 4.14. As the pads are reusable a user will need to bring home the pad for washing. Another advantage of the folding feature of the pad is that can conceal blood stains.

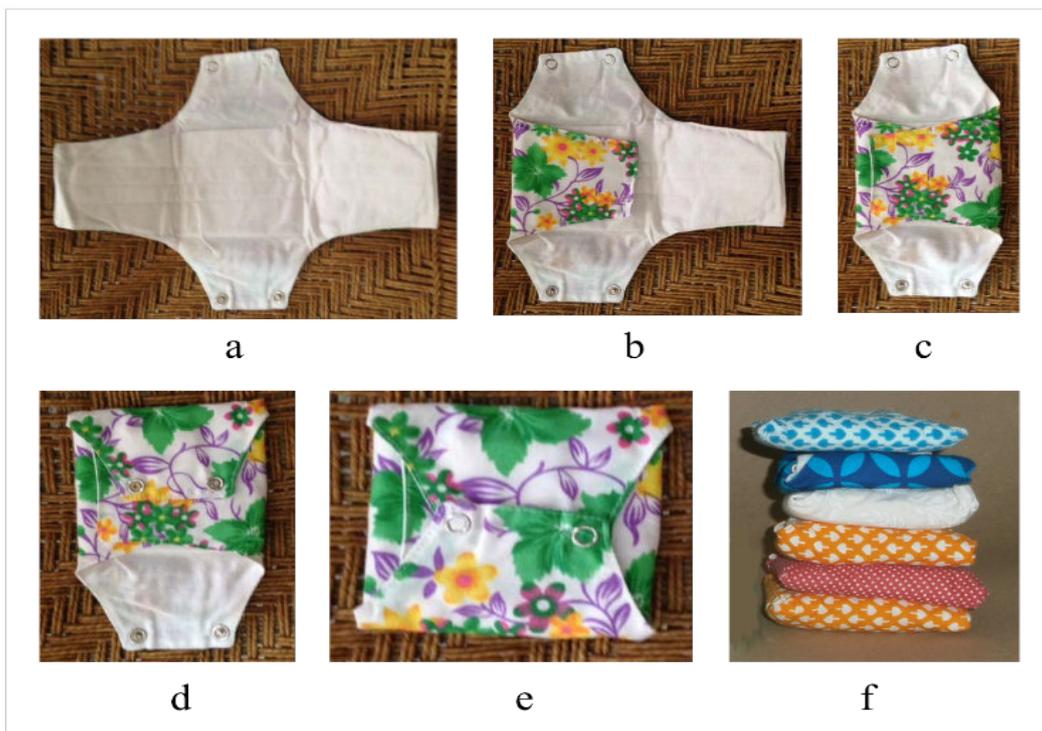


Figure 4.14 (a) (b) (c) (d) (e) Both insert pad and plain pad can be folded a neatly
(f) A pile of folded pads

Dimensions of the pads were now finalised. Refer Figure 4.15. These dimensions were used for the production of pads required for further testing during cross over trials which we describe later in chapter 6.

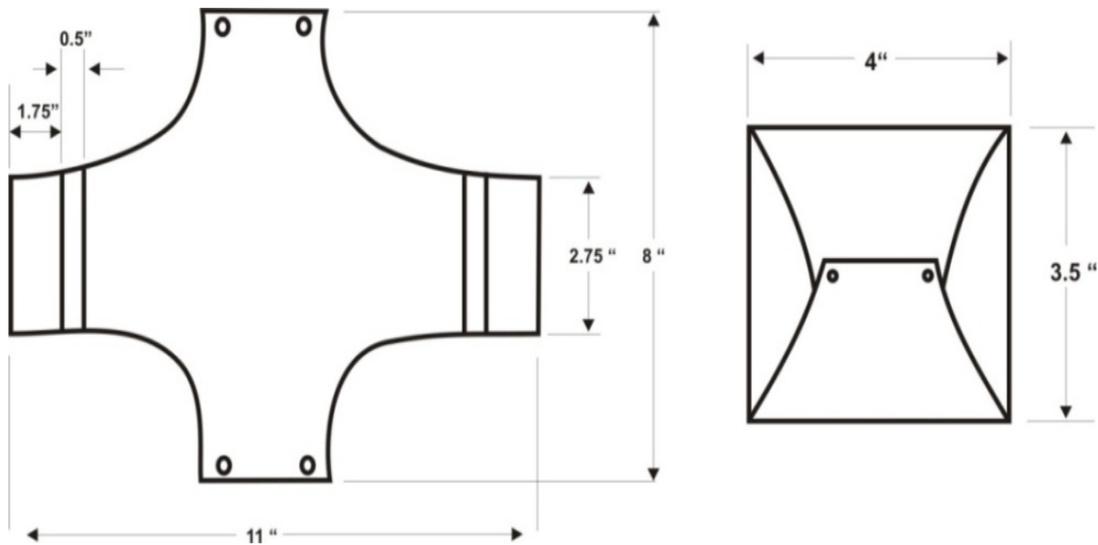


Figure 4.15 Dimensions of cloth pad – open and folded

While menstrual discharges consisting of light, medium and heavy flow can be managed by the light pad and the insert pad, a third product, the panty liner⁴⁹ was made to cover for white discharge or other lighter discharges. This product was developed and tested again by the 12 collaborative users and found suitable for normal days, that is on those days when there are minor vaginal discharges (such as clear or white).

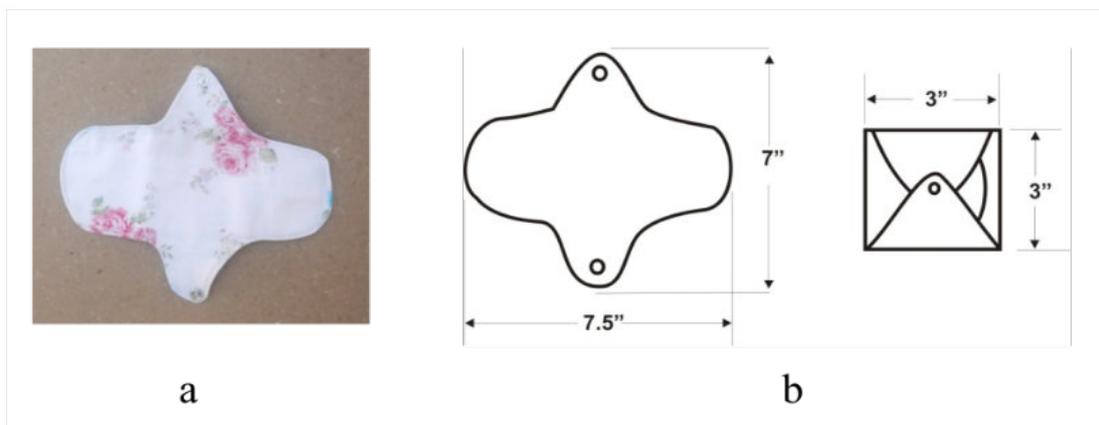


Figure 4.16 (a) Panty Liner (b) Dimensions Panty liner, open and folded

⁴⁹ A panty liner is worn in the crotch of an underwear. Uses include: absorbency for daily vaginal discharge, light menstrual flow, tampon and menstrual cup backup, spotting, post-intercourse discharge, and urinary incontinence. <https://en.wikipedia.org/wiki/Pantyliner>

4.4 Naming the Device

The name for the prototype was decided to be *Uger*. The word *Uger* means a “new beginning” in *Mewadi*, the local language in South Rajasthan. We saw this as a potential new beginning for rural women to manage menstruation through a trendy healthy choice while at the same time caring for the environment. We come back to health and environmental aspects in chapters 6 and 7.

4.5 Pilot Evaluation of *Uger* Pads

4.5.1 Method and Selection of Participants

We put *Uger* pads through a pilot user test to understand if the product was acceptable from the point of view of design and function, comfort, maintenance and other factors. The investigator approached 49 menstruating women. These women were known to the researcher, there were friends of the researcher at Udaipur, the researchers’ hostel mates⁵⁰, rural colleagues at the Jatan Sansthan office, neighbours of the researchers in Udaipur and domestic workers to the (who come from rural areas to work at Udaipur City). No specific economic or social background was considered. We kept only two factors at the point of approaching menstruators – one, were they menstruating and two, were they willing to help us to test the pads over their three menstrual cycles. The previous 12 collaborators decided on three cycles as. It had took them more than one cycle to adjust to *Uger* and felt that assessments of the product are best made after trying products over at least three cycles. Of the 49 women who were approached, 11 users after looking at *Uger* pads said “no” in the first instance as they were not willing to try the pad citing reasons such as “do not want to wash and maintain this”, “we have never used cloth before”, "cloth is unhygienic", "it is not sterilized “ , “I am a working women, how can I use this during my 9 am to 6 pm schedule” and “ I live in a joint family in a flat, where am I going to find the place to hang this”.

⁵⁰ Young women from IIT hostel who had participated in a self administered questionnaire at the time of the researchers’ course work, while she was investigating menstrual debris

38 users came forward and were willing to try the pads. These menstruators were in the age group of 16 to 50 years. We found that they could be divided easily into two categories: 20 menstruators previously using reusable products were put in group A and 18 menstruators who were previously using only disposable products were out in group B. We distributed 4 *Uger* insert pads to each user. No time frame was allotted and we asked the collaborators to try the pads for three to four cycles. We asked for feedback on the pads and requested them to show us the used products, (this was kept optional). We told users that we would contact them after 3 cycles and ask them about their experiences with *Uger* pads to cover the following questions in order to record their feedback.

- Was the pad able to absorb discharge, for long did you wear it?
- At what point did it begin to leak and stain outer clothing?
- Was the design comfortable? Did the button fixture work?
- Was the pad easy to remove, were you able to fix a fresh pad easily again?
- How did you wash and dry the pads?

We took the feedback in the following ways, through the telephone, by meeting users at their home at the researcher’s home and at Jatan Sansthan’s office and by email.

4.5.2 Findings

Table 4.1

Summary Group A – 20 participants previously using reusable; cloth or TP or a combination of cloth and TP, with one participant using cup.

Adherence to <i>Uger</i> Prototype (All are cloth and <i>TP</i> users barring only one who uses cup)	No. of Users
Continue using <i>Uger</i> beyond three cycles	10
Continued to use <i>Uger</i> in combination – 1 user in combination with menstrual cup, 1 user in combination with cloth	2
Tried only one cycle, discontinued	2
Very casual in giving feed back, gave vague answers about <i>Uger</i> use– researcher unable to infer anything	2
Discontinued	3
Never tried <i>Uger</i> pads even once	1
Total number of women	20

Table 4.2

Summary Group B – 20 participants previously using branded DSNs

Adherence to Uger Prototype	No. of Users
Said that <i>Uger</i> freed them from discomfort from DSNs – they had previously reported that they had faced problems with gel based products. Since using <i>Uger</i> no itching or irritation was experienced.	3
Use <i>Uger</i> pads in combination with disposable sanitary napkins	5
Gave up after either 1 or 2 days	6
Never tried <i>Uger</i> pads even once. Did not return the pads	4
Total number of women	18

Refer appendix II for details of participants. From this we can see that 13 users out of 38 were satisfied with *Uger* pads, continuing to use it well beyond the three cycles that had been requested. Of the 13 users, 3 who had been using DSNs and had experienced health problems. These 3 users found great relief from using *Uger* as, they experienced no itching or irritation, seeing this as a far superior product. We quote from feedback: *“What a god send this has been, what choice did I have up to now? I am finally free from all the torture of itching and boils.”* TP and cloth users found *Uger* pads *“bahuth badiya”* (very good) as compared to their existing product, some specific comments were *“It is cool and very comfortable unlike the warm TP”*.

6 out of 38 users gave up *Uger* after 1 or 2 cycles due to peri menopause issues, scanty bleeding and irregular period. 5 out of 38 users never tried *Uger* rejecting it for variety of reasons. One user from this group said that *Uger* pads were *“acha hai”* (good). In reality the user had tried the product even once as she wears no underwear and was shy to mention this fact at the time when the pad was given to her only confiding this after 6 months when she returned the unused pads. There was varied. Feedback for rejecting *Uger* was varied.

- *“ I cannot touch blood.”*
- *“ Cloth is not hygienic. “*
- *“It is too much trouble to wash. I prefer TP, its easier to manage.”*
- *“Not able to dry out in the sun, very shy to do this, father in law will see.”*
- *“ I want a pad to be white each time. There will always be a light brown stain on Uger pads. I know I have washed it well but still it makes me uncomfortable. Can you do something about that?”*
- *“I am frightened of leaks on my outer clothing, these pads don’t have any water proof arrangement.”*
- *“I cannot take this to work. How can I bring home a bloodied cloth in my handbag”*

“You have explained to us why the surface of a pad touching the skin needs to be white. Can you do something in the design that makes the top surface less white?”

7 out of 38 users, used *Uger* in combination with their previous product saying that combination works well for them as they can adjust depending on many factors, such as need to commute, going on outings, amount of menstrual flow and others. 5 in this group felt an additional comfort of contributing to the environment, lowering their use of resources through a reusable product.

Users reported that *Uger* pads typically begin to leak after two and half hours of heavy flow, after which the towel needs to be refolded. Once refolded it lasts for another two hours. The design was seen as comfortable and buttons were seen as easy to remove and take off. There were three users (they had larger bodies) who wanted the pads to be wider and longer.

Users washed *Uger* pads in three ways. One method was soaking in bucket of water and detergent for an hour and then scrubbing using a brush. Another was washing with bar of soap and clothes brush. Other users washed *Uger* pads in the washbasin, some rinsed out the pads and then put them into their washing machine. Users used a variety of detergents from expensive brands such as Ariel to cheaper brands such as Delite or Wheel. Pads were dried by all users on the wash line, some drying this directly under the sun, some hiding the pad under a larger garment.

We concluded the pilot evaluation at this stage. However we kept in touch with the 13 users who had been completely satisfied with *Uger*. Even a year and half later all users were still able to use the holder pads, estimating that they must have washed it over 60 times. They shared however that the towels had frayed after one year. Figure 4.17 shows an insert towel that has been washed and reused, estimated by the user as 45 times.



Figure 4.17 Insert towel washed more than 45 times as estimated by a collaborator

4.5.3 Conclusion

We have proposed that *Uger* Pad is a sustainable device for managing menstruation in answer to RQ 1 “**How can we make the management of menstruation sustainable?**” From the view points of collaborators feedback and experiences, we have seen that it is acceptable. Acceptance is higher among users who have earlier used reusable products and in the cases of users who made the switch from DSNs to *Uger* for health and environmental reason.

Action research is the fourth area of the thesis work. Research around *Uger* pads formed the next stage. We put *Uger* pads through two user trails where rural users compared *Uger* with other menstrual devices. We also assessed findings through the four dimensions of the PASS tool. This is described in Chapter 5.

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Chapter 5

Assessing Health and Social Aspects of Menstrual Devices through PASS

5.0 Introduction

In answer to the first research question, **RQ 1 “How can we make the management of menstruation sustainable?”** - we developed two tools, PASS a tool for assessing sustainability of menstrual management products and the *Uger* pad. The assessment is along the dimensions of environment, economic, health and social factors, while *Uger* is a reusable menstrual management device relevant to the modern context. We proposed the details of the PASS tool in chapter 3 and the design of *Uger* in Chapter 4. During the design process of *Uger*, we had conducted preliminary assessments of *Uger* with collaborators. Collaborators did not report any negative comments about *Uger* from health perspectives. It appeared that collaborators who had been using reusable products earlier found the use of *Uger* socially acceptable. However, all these users were either design collaborators or those who were known to the researcher. To that extent, they are favourably biased towards the use of *Uger*. We needed to conduct more studies to answer the research questions **RQ2** and **RQ 3**, “**How**

can Menstruation Management Sustainability be measured?” and “How can we holistically compare for menstruation management sustainability between different menstrual products and management systems? “

The fourth area of the thesis work “Action Research” was brought for measuring and comparing. Bell et al (2004) have compared differences between "action research", "participative research" and "participatory action research". According to the authors an enquiry using action research improves the quality of practice on the ground, and in the context of this thesis, improves menstruation management on the ground. For the action research study we selected three products.

The three devices were the reusable *TP*, a device already popular among users in South Rajasthan is reusable *Uger* the newly developed menstrual management device, and *Rutumitra*, a disposable sanitary napkin. (*Rutumitra* pads are detailed later in this section). We selected and included a disposable menstrual device for our studies for many reasons. Firstly, many rural women aspire for this as earlier discussed in 2.4.3. Secondly, we would be able to assess and compare two systems of management, reusable and disposable. We conducted studies around these three menstrual devices along the four dimensions of environment, economic, health and social. In this chapter we discuss our assessments related to health and social factors. In chapter 6, we will discuss our evaluations related to environment and economics. Figure 5.1 shows the PASS Tool, circling the two aspects social and health discussed in this chapter.

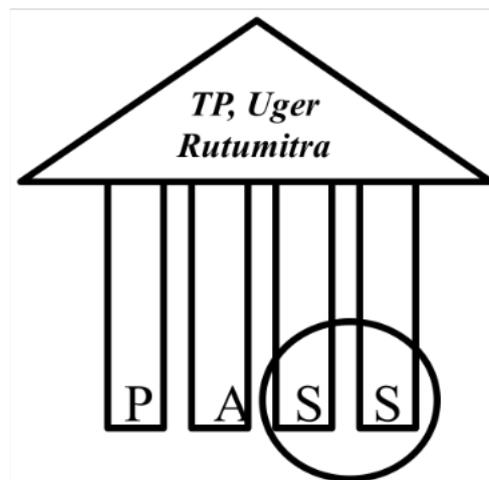


Figure 5.1 The PASS Tool, circling the two aspects, S, *Sawasthya*/Health and S, *Samaj* /Social

The assessments were done in the following way:

- A review of studies related to the health dimension of menstruation management products. (Section 5.1)
- Personal communication with gynecologists (Section 5.2)
- Personal communication with DSN users (Section 5.3)
- Cross Over Trial no 1 - In this, 13 rural users from South Rajasthan used and compared two reusable products *Uger* and *TP (TP)* over a period of 8 months. (Section 5.4)
- Cross Over Trial no 2 – In this cross over trial 51 users from a rural area in Karnataka used a disposable sanitary napkin *Rutumitra* pad and *Uger*, over a period of 8 months. (Section 5.5)

Based on five studies, we assessed *Uger*, *TP* and *Rutumitra* for their impact on health and social factors. The Design Innovation Center, IDC, IIT Bombay provided a research grant to conduct some parts of these studies. The two NGOs contributing and collaborating in the two studies were Jatan Sansthan – makers of *Uger* reusable pads and MITU Foundation, makers of *Rutumitra* disposable pads. We approached MITU Foundation as we knew of them earlier. We were looking for two aspects when we approached them, a study area at a location away from South Rajasthan and availability of locally made disposable sanitary napkins. MITU Foundation was a good fit with their SHG manufacturing DSNs at Turvekere, a village near Dodabellapura, rural Karnataka and their willingness to help with field based work. At the time we contacted them, they had begun to consider new villages to introduce *Rutumitra* and were also considering manufacturing reusable options. They welcomed the overall intent of research comparing their menstrual device with our new device.

5.1 Review of Studies

We reviewed studies from India, that have made correlations with poorly managed menstrual devices, UTI⁵¹ and RTI⁵² and other health problems. In a study conducted by Shanbhag et al. (2012) with 506 girls from four selected Government High Schools in rural areas around Bangalore City, the authors found that “Hygiene related practices of women during menstruation are of considerable importance as it affects health by increasing vulnerability to infection especially the infections of urinary tract and perineum”. Bathija, Bant & Itagimath, (2013) conducted a study with 100 menstruating women from Hubli in Karnataka. They

⁵¹ Urinary Tract Infection

⁵² Reproductive Tract Infection

found RTIs and UTIs higher among cloth users. Another study in India by Anand, Singh & Unisa (2015) collected information from District Level Household and Facility Survey-3 (DLHS). The authors while making the correlations between infections and unhygienic menstrual products are of the opinion, that there can be multiple factors that can lead to infections and abnormal discharges and it cannot be easily pin pointed to one single source. The reasons they cite are unhygienic living conditions, poor facilities for garbage disposal, not washing genital area and other. Another study from Karachi in Pakistan reports that the '*use of unclean material to absorb the flow*' can result in secondary infertility among women. (Ali, Sami, & Khuwaja 2007).

A study in rural Gujarat, was done with 164 adolescent girls over a 6 month period by Shah et al.(2013). They report that adolescents who were using cloth earlier, gave positive feedback on *Falanil* (this is *TP* in our area) , citing improved quality of life, referring to ease of maintenance of flannel as compared to plain cloth. The same study, however, says, “No significant reduction was observed in self-reported symptoms of reproductive tract infections”.

Aside from establishing correlations, to the best of our knowledge, no study has been done to establish the connection between the colour of menstrual cloth and poor health. The colour of discharge is indicative of a user's health condition. Principles of Gynaecology (Jeffcoate, 1983) says, “white, cream, yellow and greenish discharge loosely called leucorrhea” are signs of infection. A user may miss these visual indicators if using a dark coloured device and as a result, identification and seeking of treatment will be delayed, leading to avoidable complications. Hence, the selection of the right colour of an absorbent and the way it is managed (light coloured) and keeping it open (to sunlight) will potentially lead to less infections. However, there is social sanction for dark coloured cloth as we have previously seen in Section 2.4.1. Dark coloured cloth or the dark *TP* is preferred in order to conceal bloodstains. Menstrual cloth is hung out to dry in dark places or under larger clothing to conceal it. The result of this practice is that blood does not get completely washed out from cloth with dark backgrounds as residual stains cannot be seen, not hanging out in the open sun retains the dampness in the cloth and does not kill the bacteria. This way of maintaining reusable products becomes a potential ground for poor reproductive health.

When we looked for literature on negative experiences that users have had with DSN usage, we found that this has not been extensively documented. An instance of Contact Dermatitis⁵³ from the use of sanitary napkins was reported from Thailand in the Indian Journal of Dermatology.

“The patient noted that she had these symptoms every month on and off and she had even tested herself by using sanitary pads during the non menstruation period and experienced the same symptoms despite using the sanitary pads by various manufactures. This case was diagnosed to be sanitary pad dermatitis.” (Wiwanitkit, 2009)

Another researcher prior to this, Wakashin (2007) reports experiences of 6 Japanese patients with skin irritations in the vaginal area. He argues that the problems are not due to components in the pad but more due to friction while wearing the pad. According to him allergies can only be established with a “patch test”. The patch test is done by taping to the skin the item that is suspected as causing an allergy (Patch Test, NHS). In his opinion there is no other part in the body that can simulate vaginal conditions, hence correlating allergy or rash to pad components cannot be easily established. However, the Draft Resource Book for Menstrual Waste Management (MHM Alliance,2017-2018) acknowledges that there are health problems.

“Many women have health related problems due to presence of chemicals in sanitary napkins, information on which is not available in the public domain. Women often do not have information on hygienic use of products, leading to use of the same absorbent for long hours.”

From all the above discussions we can infer that infections can occur for a variety of reasons but it is difficult to trace or accurately pin point the source. Summarizing this the reasons could be menstrual products, personal hygiene practices of the user, how the user maintains a reusable product and other reasons.

5.2 Study 1 Personal Communication with Doctors

We held independent conversations with 4 doctors about menstrual products. These meetings were at the start of the Cross Over Trial no 1 which we will discuss in Section 5.2. The list of doctors with whom we had communication is in Table 5.1

⁵³ Eczema triggered by contact with a particular substance. <https://www.nhs.uk/conditions/contact-dermatitis/>

Table 5.1

List of Doctors, Qualifications, Location of meeting

No	Name	Details	Method
1	Dr Vinaya Pendse	Worked at the Government RNT ⁵⁴ Medical College and Hospital, Udaipur, for over 30 years, was the head of the Gynecology Department for many years until her retirement. Continues private practice.	Meeting at Consulting Chamber at residence at Udaipur
2	Dr Valleri Ramakrishnan	Consulting gynecologist to Parivar Seva Clinic at Udaipur, additionally running her own private hospital Shreyas Hospital at Udaipur, for over 30 years.	Meeting at Shreyas Hospital at Udaipur
3	Dr Dinesh Agarwal	Community Medicine, Worked at the RNT Medical College and Hospital at Udaipur for many years, subsequently worked at UNPFA, Delhi, until retirement.	Meeting at doctor's residence at Udaipur
4	Dr Subash Yadav	Community Medicine: Worked at the Government RNT Medical College and Hospital, Udaipur for over 30 years, retired as Joint Director of the Department	Meeting at researchers residence
5	Dr Veda Zachariah	More than 30 years of practice with resource poor women through the Sanjivani Trust, Bengaluru, was earlier in charge of the "Well Women Clinic"	Conversation at the a Menstrual Health meeting at Mumbai in 2013
6	Dr Taru Jindal	M.S (Obstetrics & Gynecology) Assistant Director Reproductive & Child Health Division, Bihar, Doctors for You	Email : tarujindal@yahoo.co.uk Refer Appendix III

The method we used was as follows:

- The *Uger* pads that were developed were shown to four doctors no 1, 2, 3 and 4
- We explained that the pads were made for rural communities in Rajasthan as a sustainable menstrual management option, sharing with them information about the raw materials that had gone into design of products.
- We informed all four of them that these products would be given to rural collaborators to try in a cross over pilot study over 8 months

Next we put forward these questions to all four doctors

Q1 What menstrual products have you seen your rural patients using?

⁵⁴ RNT – Rabindranath Tagore

- Q2 Can menstrual products cause problems such as infections or allergies?
- Q3 In your opinion what are the causes of infections and allergies?
- Q4 Do you see any potential health problem or negative impact that may arise from the use of this new cloth pad *Uger* we have shown you?

Responses were as follows: For Q1, doctors 1 and 2 said they have seen rural women using dark colored cloth and *TP* and on occasion *DSN*. Doctor no 1 said she had has come across two senior rural patients in their menopausal years, when she saw that they had used a rolled up a rag in the shape of a cigarette, mimicking a tampon. For Q2 and Q3 both doctors 1 and 2 said that UTI (Urinary Tract Infection) and RTI (Reproductive Tract Infection) are common, including fungal infections, itching, rash, chafing, allergies, boils and abscesses. They agreed that a menstrual product may be one of the many reasons for infections. What they both communicated was that the source of infection is very difficult to isolate as there are multiple reasons for infections. We summarize these reasons they gave us: as possible infection sources:

- wearing a menstrual device that is still damp - not dried out completely
- not changing menstruation products often, prolonged use of any menstrual device, be it reusable or disposable products
- skin reactions to raw material in the product
- not identifying in time any colour change in vaginal discharge

They pointed out other reasons such as poor hygiene of the user, not bathing or not washing genitals well. This point is important as we have seen from section 2.5 that if there is poor infrastructure within rural communities, there is not much privacy to wash, hence not having enough facilities come under two dimensions social and health. Doctors 1 and 2 also shared that their patients give them insights which they feel can lead to situations resulting in poor reproductive health:

- not being in an economic position to access adequate number of menstrual products
- elders not allowing them to spend money on menstrual products saying that anyway blood is dirty, use any thing
- bathing with clothes on as there is no private space, so genitals will not get washed thoroughly

Doctor 1 came up with different aspects on itching and irritation in the vaginal area. According to her, users wear leggings or tight jeans which allow no air to circulate unlike

loose clothing that keeps the body healthy. Thus, we can see from these conversations that, there are economic, social and health dimensions of managing menstruation. Doctors 3 and 4, who are in community medicine, are not in clinical medicine. Being in public health they confirmed that poor infrastructure, poor sanitation and poor garbage disposal have a negative impact on the health of community. This confirms that surroundings have an impact and the social issues around infrastructure (no private spaces) do not support good reproductive health. For Q4 after examining *Uger* pads, all four doctors felt that potentially they see no problem if we were to introduce the pad into the rural community.

When we spoke to doctor no 5 at Mumbai, we did not have the *Uger* pad with us hence we were able to ask her Q2 and Q3. Her responses aligned with Doctors 1 and 2. Doctor 6, working in Bihar, was looking for alternative menstrual absorbents for her personal use as she had had problems with DSNs. She had heard about *Uger* pads from a colleague. After using *Uger* she sent an email endorsing cloth pads and recommended this for use within rural communities, refer appendix III.

Summarising this section, we can see that all menstrual products have the potential to create a health problem in users.

5.3 Study 2 Personal Communications with DSN Users

In this section we report incidences of health problems some users have had with disposable napkins. All information reported here was collected over an eight month period between June 2013 to February 2014. A friend of the researcher, NT⁵⁵ working at the NGO Aajeevika Bureau in Udaipur was aware that Jatan Sansthan had started a cloth pad project. She contacted us for advice on how to manage her 16 year old daughter's "menstrual problems". We invited her to the office for a discussion and this was the gist of what she shared:

“My daughter M, uses disposable sanitary napkins. On day number two of my daughter's period, a reddish rash appears between the buttocks. This turns into a pimple and then becomes a painful boil. We tried changing napkin brands but the sequence of the health problems repeats. This has been going on for one year, and we have been managing with the application of creams, prescribed by the gynaecologist . This time she has developed a painful abscess, the

⁵⁵ Name with held

doctor has let out the puss and now my daughter is lying in bed, wearing no pad, bleeding on to the sheets. Maybe your pads will help her for the next time?”

Hearing this, we gave NT 6 pads to give to her daughter to use. M used *Uger* for her next cycle and reported no problems for her next period and continued to subsequently use *Uger* pads doing away permanently with DSNs. This one incident led us to consciously seek other menstruators who were facing problems with disposable pads. As a next step, the researcher made phone calls to her neighbours asking if they knew anyone who had problems with disposable pads. Two menstruators came forward. A⁵⁶ (age 32) on the phone said,

“I have terrible itching. I get this from Whisper and Sofy. The itching is less with other brands. I cannot bear to use cloth, so I continue to use disposable pads along with a cream”

The researcher found another menstruator, S (Age 30) a neighbor’s daughter living in Bombay with similar problems with all pads. Speaking to her on the phone we learned that being a working woman employed at an MNC⁵⁷ she uses DSNs and says she tolerates the inconvenience of itching. We met with two school teachers both working at an elite private school at Udaipur. Teacher P (age 26) said;

“I got my period when I was 15 and my mother bought me Whisper. Few hours into wearing, I had unbearable itching. My mother gave me cloth to wear since I was still unfamiliar with everything. I continued with cloth for my first period. The first instance of itching was so bad I was frightened forever and never used a DSN again. I use cloth from home and if I fall short I buy cotton saris which for me work very well.”

Another school teacher S (age 24) from the same elite school said, “*I have many problems with DSNs but I will never use cloth. Disposable is convenient.*”

We spoke to student designer D, (age 23) from Delhi, who said the itching was so unbearable she uses cloth, particularly saving her old T shirts for her periods. Another 30 year old NGO worker said “*I get very tiny blisters that hurt very much. These are filled with a clear liquid type substance, that burn when it bursts*”

⁵⁶ Name of menstruators with held

⁵⁷ MNC Multinational Corporation

During the researchers course work at the time of starting of the Ph.D, she had conducted an email survey at a girls hostel at IIT Bombay around knowledge, attitudes and practice around menstruation. Out of 42 respondents, 2 respondents had reported moderate itching and 1 respondent severe itching from disposable napkins.

Around this same time we were also studying the different raw materials in branded sanitary napkins and their packaging. (We will come back to this aspect in Chapter 6). What is relevant to mention in this section is Sofy brand was the only DSN packing with a health warning containing the following text.

“Stop using if irritation occurs. Customer care: For any questions related to Sofy or feedback, contact us at: + 91-9971988339 or email to customercare@unicharm.com”

From this we can infer that the company Unicharm, producers of these pads, admit to the possibilities of allergies from their DSNs.

While this study of DSN users was not a systematic study in the true sense, over a period of 8 months we found over all 19 disposable pad users (including the first case that triggered the search) who reported problems from disposable sanitary pads some of which we have described. From the experiences of 18 menstruators, (not counting the first case who had switched to *Uger* pads), one had moved to the tampon, 8 had switched to cloth from home, the remaining 10 users, continuing the use of disposables preferring the convenience. We did not seek out new cases, however over these past five years during this research, we have come across several users with problems. While this is a small record, any evidence around negative menstrual health is important and useful to acknowledge.

5.4 Study 3 Assessing Pillar S, *Swasthya/Health* and Pillar S *Samaj/Social* through Cross Over Exploratory Trial 1, *TP* and *Uger*

This study was around assessing the impact of menstrual products on health and social factors. Health impact includes the very evident /obvious aspects seen on the skin such as rashes, boils and infections. Social aspects include personal and community perspectives such as comfort of the user while using the product and cultural acceptability which has been discussed in Section 3.4.3. It also encompasses the availability of infrastructure (such as

disposal services for disposable products and washing and drying facilities for reusable services). The user is the best judge, to compare the sustainability of a menstrual product with respect to both health and social aspects. We know this from users we interviewed in section 5.3. While retrospective studies and interviews (such as the ones mentioned in earlier sections) give useful indicators, these cannot establish causality. The only way to assess causal effects of a product on health and social factors is to conduct a prospective controlled trial. In this section, we describe a study that aims to assess the effects of *Uger* and *TP* (a reusable product already popular in rural Rajasthan) on health and social aspects. This study was a pilot study done in our practice area with users associated with Jatan Sansthan. The trial ran for 8 months from December 2014 to August 2015.

5.4.1 Objectives

- To conduct a user trial to record experiences, assess and compare two reusable menstrual products, product 1 *TP* and product 2, *Uger* pads
- To assess social acceptance of *Uger* and *TP*, to establish if users have a product preference, to understand its functioning- absorbency, leakage, its maintenance such as washing, drying, storing, comfort of wearing, and to understand reasons for the choices users make.
- To assess health outcomes from the use of the two products – such as rashes and boils.

The two menstrual devices were assessed from two dimensions of the PASS tool, social and health. For Pillar S, *Swashthya*, the health pillar, we considered rash, itching, chafing, boils, and abscesses. For Pillar S, *Samaj*, the social pillar, we considered the following:

- Design and function of the devices: comfort while wearing, absorbing capacity, leakage. (In section 2.4.3 we have previously argued why these are social dimensions)
- Number of times the product was changed and location where it was changed
- Maintenance of devices: washing, drying and storing
- Accessibility and availability of devices
- Product preferences at the end of the trial

All these aspects were assessed by the user described in section 5.4.3

5.4.3 Method

(a) Trial Design

We designed a **Cross Over Trial** - over an 8 month period – covering 8 to 10 menstrual cycles. Participants used one product for 4 continuous cycles and then crossed over to the second product for the next 4 cycles. Users were divided into two groups. Separate orientation sessions were conducted at the Jatan office at Railmagra, Rajsamand District . Users in Group 1 used *TP* for 4 cycles and then *Uger* for the next 4 cycles. Users in Group 2 used *Uger* for 4 cycles and then *TP* for the next 4 cycles.

Table 5.2

Shows the cycle number and the device in that cycle, for both the groups.

	Dec 23 rd 2014 to August 23 rd 2015							
Cycles	1	2	3	4	5	6	7	8
Group 1 8 participants	<i>TP</i>	<i>TP</i>	<i>TP</i>	<i>TP</i>	<i>Uger</i>	<i>Uger</i>	<i>Uger</i>	<i>Uger</i>
Group 2 5 participants	<i>Uger</i>	<i>Uger</i>	<i>Uger</i>	<i>Uger</i>	<i>TP</i>	<i>TP</i>	<i>TP</i>	<i>TP</i>

One supervisor was assigned to this study and stayed in contact with these users through occasional home visits telephone conversations and monthly meetings at the Jatan office. On initiation, users in Group 1 were given 1 record file (described later in the section) and 3 *TPs*, refer Figure 5.2 at the start of the study. While *TP* comes in many colours, the most commonly available colour is maroon, which was selected for use in the trial. At the cross over point they received 2 insert pads, 4 towels and 1 light pad, refer Figure 5.3. Users were given “how to wear the device” instructions at the starting point for *Uger* pads. For the two styles of *Uger* pads (light and heavy flow) users were told that they could use either style of pad, depending on their flow. Similarly, Group 2 was given a record file, 2 insert pads of *Uger*, 4 towels and 1 light pad upon initiation and 3 *TPs* at the cross over point.



Figure 5.2 Users received three TPs



Figure 5.3 Users received (a) One plain pad (b) Two Insert pads (c) Four towels

Each user was given a record file. This was an ordinary office file with a set of empty A 4 sheets. There was one page with ten questions. Users were to fill out answers to this set of 10 questions at the end of each cycle, for both the menstrual devices. The set of 10 questions corresponded to the aspects we were assessing for the two pillars. The supervisor upon meeting the user after each cycle would reconfirm and clarify responses, refer Table 5.3 for questions.

Table 5.3

Showing dimensions and corresponding questions for assessing

Dimensions	Questions for participants
For Pillar S, <i>Samaj</i>, the social pillar	
Design and function of the devices: comfort while wearing, absorbing capacity, leakage	1) Was the product comfortable to wear? Did the product function as it has been intended to – that is manage menstrual flow? (absorbency, leakage)
Number of times the product was changed, location where it was changed	2) How many times did you change the product? 3) Where did you change your product?
Maintenance of devices: washing drying and storing	4) How much water and cleaning agent was required for each wash? 5) Where did you wash the device and how did you wash the device? 6) Where did you hang out to dry
Social acceptance	7) How easy or difficult is it over all to maintain - washing, drying, reusing, storing? 8) Is the device socially acceptable?
For Pillar S, <i>Swashya</i>, the health pillar	
Health problems from use of product	9) Did you face any problems with the products with respect to health, such as itching or rash?
Device preferences at the end of the trial and over all feed back	
10) What are the overall advantages and disadvantages of this product? Which of the two products will prefer if you had a choice? Please give us feedback.	

We also requested all participants to show us, if they were willing, their used menstrual devices and allow us to photograph them. We also requested them, if they were willing to allow us to come into their homes to take pictures of their dwellings and surroundings with reference to menstruation management care and maintenance.

(b) Selection of Participants

17 women were recruited; they were *anudeshaks* (educators), volunteers and women working with or associated in some way with Jatan Sansthan, the NGO supporting the study. All participants were from Railmagra block. We accept that this could cause a bias toward Jatan Sansthan's products, but it was a conscious decision to include women associated with the NGO as we were testing the product for the first time in our field area. We had to include women who understood the larger future intentions (sustainable menstruation management) of Jatan Sansthan's reproductive health initiatives. Our users were in the age group of 16 years to 40 years, with at least two years of menstruation experience. 40 years was kept as the upper limit so as to exclude those women who were at the peri - menopause phase. None of

the users were pregnant at the time of recruitment. We were initially hesitant to recruit a 16 year old being a minor, however, we included her as she was associated with us for over two years as peer educator. Verbal consent was taken from all participants. For the 16 year old⁵⁸ recruited, we contacted her mother to explain the trial and got her verbal consent for allowing her daughter to participate.

At the orientation there were initially 17 participants, put into 2 groups of one group with 9 participants and one group with 8. Two orientation meetings were conducted; one for Group no 1 and one for Group no 2. All users were specifically alerted that they could leave the study if the product was uncomfortable and causing them any health problem.

When the study began, 5 users dropped out. In group 1, one participant dropped out, in group 2, 4 dropped out, citing different reasons, not wanting to keep records, not sure if she could be associated for 8 months, not interested, got a job at another location and other.

(c) Method of Data Collection

We recorded the previous menstrual products used by the 13 participants who agreed to stay in the trial. Of the 13 participants, 9 were married. 4 participants were previously using a combination of *TP* and cloth, 5 were using only *TP*, 2 only cloth and 2 a combination of cloth and the Oxfam Pad (previously described in section 2.3.1). Only one user had access to a latrine and an enclosed bathing area.

In table 5.4 we show an example of the menstrual cycle record for group no 1.

⁵⁸ Five years prior to joining as *anudeshak*, she was a member of Jatan Sansthan's adolescent girls club

Table 5.4

Example of Menstrual cycles record kept by the supervisor.

Group 1 - TP	Dec	Jan	Feb	March
Name	Cycle 1	Cycle 2	Cycle 3	Cycle 4
A S	NA	30/1/14	04/02/2014	09/03/2014
T D	29-12-13	29-1-14	28-2-14	31-3-14
S S	22-12-13	22-1-14	22-2-14	22-3-14
S D	27-12-13	30-1-14	नहीं आया*	5-3-14
Y V	NA	25-1-14	20-2-14	15-3-14
S S	7-12-13	7-1-14	7-2-14 petticoat cloth	7-3-14 petticoat cloth
S J	NA	27-1-14	26-2-14	21-3-14
L L	NA	12-1-14	12-2-14	10-3-14

*period did not come, user SS switched to petticoat cloth due to itching and rash, reported in the next section

5.4.4 Findings

The record file did not seem to work. Of the 13 participants only two participants kept notes for two cycles and then gave up as they saw that the rest were not writing. The reasons given by others for not recording were – “you will correct our spelling mistakes”, “I cannot write well”, “I cannot write at all”, “You will hold us responsible for something we have written”, “not comfortable about all this record keeping”. Upon hearing remarks from these participants, the two users who were keeping notes in the record file stopped writing. All findings reported here are from both groups collected mainly from conversations between the user, supervisor and investigator.

Findings: Social Aspects

(a) Design and Function

For Q1; Was the product comfortable to wear? Did the products function as it has been intended to – that is manage menstrual flow? (absorbency, leakage). No one reported any leaking for both devices. The inference from this is that all users in group were familiar with managing fabric- based menstrual products and manage to the change on time. As explained previously in section 4.3.1, refolding fabrics to bring up the unsoiled parts which can be considered a change, was followed by all women. In terms of comfort, Uger scored higher than TP. Of the 13 women in the study, 11 users showed a preference for Uger pads from the points of view of comfort, not poking or pinching, convenience of wearing and taking off and

cool to skin. The aspect “button down under the crotch of the underwear” was seen as the best feature, reducing shifting of menstrual product.

(b) Number of Times Product was Changed and Location of Change

For Q2 and Q3, How many times did you change the product? Where did you change your product? Users reported changing twice a day, and on occasion three times during heavy flow for both products. We found that users live in small homes, typically two rooms, consisting of a common space and a sleeping area/bedroom. Of the 13 in the trial, only one user had latrine facility, while others went out into the jungle or field or in a partially enclosed bathing area for urination and defecation. All changed the menstrual products at home, as this has always been their practice. “At home” is the room where they sleep. If male members are present at home, they request them to wait outside, giving some excuse or the other while they change their cloth.

(c) Maintenance of Products: Washing / Drying

Q4 Where did you wash the device and how did you wash the device? Q5 How much water and cleaning agent was required for each wash? Q6 Where did you hang it out to dry? Many factors are interconnected while maintaining a reusable menstrual device, water, soap, a brush for scrubbing, a place to wash and a place to hang out the device to dry. Participants reported that washing was done in a washing corner at home. Water to wash menstrual products was taken from the stored water storage tanks of cement or from plastic drums. There is no running water facility, users fill their individual containers from the village water tanks and replenish when exhausted. Water was scooped out from a plastic *lota* (container) into a bucket. If cement tanks have taps water is drawn out from this into a bucket. The investigator was able to collect some pictures of where users wash as well as the products they used for washing refer, Figure 5.4 a. The other area where menstrual devices were washed was at the *Nyora* or *Wadi* (barn), figure 5.4b where animals are tied. This space affords them the most privacy as livestock is managed by women and men do not come here as often. However, only 5 participants out of 13 have a *Nyora*.



Figure 5.4 a Washing area within the participants home.



Figure 5.4b Washing area within the participants home.

In terms of washing, *TP* needs less than half a bucket of water reported as 4 litres to 7 litres of water, as compared to *Uger* pad that needed half a bucket, around 8 to 10 litres. The soaps and

detergents used are local brands such as *Amber*, *Chandraprakash*, *Nirma*, *Doctor* and *Delight*. Figure 5.4 (a) shows a packet of Delite detergent in the washing area, the photograph was taken by the supervisor during a field visit to a participant's home. Figure 5.5 (b) shows two varieties of cloth brushes, one with a plastic base, one with a wooden base along with a cake of Nirma Soap. The soap requirement for *TP* was estimated by users in two ways. Half a cake of soap or 5 gms of detergent described as one rupee worth of powder for the complete cycle. For *Uger*, more detergent requirement was reported – described as "*thoda aur*" (a little more). This was approximated at 10 gms. We will come back to this when we assess soap used in the economic assessment in section 6.3.2. *TP* wears out at each wash as the fibres in the fabric keep coming out at each time, so some users reported that they stopped using a brush and instead rubbed the *TP* by hand. Brushes were used for washing *Uger* pads.



Figure 5.5 (a) Delite detergent next to a plastic *lota* (mug) (b) Washing soap, Chandraprakash/Nirma; clothes brushes with plastic bristles, wooden and plastic base

Users took 5 to 10 minutes to wash out the *TP*, 15 to 20 minutes to wash out *Uger* pads.

One user reported at a meeting, “It requires more physical effort to wash out blood and stains in *Uger*, as the top surface of the pad is white. *TP* is so easy to manage”.

Menstrual devices were dried at the *nyora* or *wadi*, hung over a tree or tucked into the bamboo slats of the roof. They hung this out in way that it would not be visible easily.

Another place reported was the corner of the wash line in the terrace. Method reported was placing the devices under larger clothing (hiding) similar to what we earlier reported in literature review.

Users reported that drying out *TP* openly was much easier as compared to *Uger*. *TP* dries out in the hot sun, 38 – 40 degrees C within 40 minutes, longer on days when it was cooler. In the rainy season – it dried in 1 to 2 hours under a ceiling fan. *Uger* took two to three hours to dry in 40 to 45 Centigrade in summer, longer time at 38 – 40 degrees C and in the shade 6 – 10 hours depending on heat outside. When it was raining and *Uger* was hung indoors it took up to 48 hours to dry. Hanging out *Uger* openly on the clothes line or terrace had caused less embarrassment.

We had asked users to bring their menstrual devices at the cross over point. There was a lot of shyness associated with showing the product. Some users brought their used *TP*'s and *Uger* pads to show us but did not allow us to photograph. For *Uger* pads, the devices looked very similar to what we have previously seen, refer figure 4.6. In terms of colour of *TP* after use, *TP* looked almost exactly like the one handed out at initiation, however the overall appearance appeared faded from washing.

We saw that the use of the locally available brand Delite caused the cloth to become rougher in comparison to the *Uger* pad washed with Ariel detergent by collaborators in Section 4.2.2. We can assume that this detergent is harsher.

(d) Social Acceptance

Q7 How easy or difficult is it over all to maintain - washing, drying, reusing, storing?

Q8 Is the device socially acceptable? Washing out the cloth was not seen as a complex exercise. In terms of maintenance, *TP* was reported as “easier to manage” as washing, drying and hanging out in the open (due to colour of device) is not such a challenge as compared with *Uger*. This aspect is both social (a practice) and environmental (the impact of action) While we describe it here, it will be assessed in chapter 6 as a dimension of environment. When the study was completed, users had used the *TP* and *Uger*. At the final common meeting between the two groups we asked how these two products would be eventually disposed as users still had both products with them. Users shared that *TP* was in a condition to be used two more cycles after which they would either bury it in their fields or burn it along with other garbage that gets generated from their homes, a system they have previously used for menstrual devices. For *Uger*, the users estimated that they could use this many times

roughly calculating that it will be good for the next one year. They said they would manage the disposal of *Uger* in the same way, burying or burning

The price of *Uger* pads was shared at the end of study. At the time of the study the insert pad was Rs 100 and *TP* was between Rs 10 to Rs 15. When asked if they could purchase these products in future, users said they will be able to buy *TP* easily without having to consult anyone in the family, the price was low and would not disturb the family budget. Users expressed inability to invest in 3 to 4 *Uger* pads for future. We will come back to this in Chapter 6 when we assess economic aspects to menstrual devices and in chapter 7 where we will discuss dissemination efforts.

Findings: Health Aspects

Q9 Health Problems: Did you face any problems with the products with respect to health, such as itching or rash?

4 women reported itching and boils from the use of *TP* in group no 1. A user who received *TP* at the cross over point (after she had used *Uger* for 4 cycles), telephoned to say she had terrible itching and could no longer bear the heat from *TP* and hence had stopped using *TP*. Another user, a 16 years old girl, presented with boils after two cycles of *TP* use; thinking she was the only one with problems, she was afraid to report it in the first instance. She had to go to the doctor at the health centre where she was prescribed an anti fungal cream *Surfraz N*. When she reported this at the monthly meeting, other users also said that they had previously heard about this cream as the same had been prescribed for a neighbor or a relative. With *Uger*, no one reported any negative health related problem.

Findings: Device Preferences and Feedback at the End of Trial

In the common final meeting for overall feedback, answers to *Q 10 What are the overall advantages and disadvantages of this product? Which of the two products will you put one above the other if you had a choice? Please give us feedback.*

One participant of the 13, who had never used *TP* even once before and did not use it at cross over point (reported earlier) said “I will continue to use *Uger* now and I am also going to stitch new pads for myself, the design is very good”. One participant said, I will use *TP*, that

is the best for me, I will not use *Uger* any more. 3 users said they will use a combination of both products for future.

All participants who had used *TP* said, it is far easier to wash and dry, causes less management stress over all, as it is easy to hang out in the open and dries quickly. However all 13 participants preferred the insert towel style pad. The reason cited was “discharge on towel is preferable to discharge directly on pad wings”. 5 users said they would continue to use the *Uger* pads by putting into the *Uger* loop their own cloth.

5.1.7 Summary Study No 3

From the perspective of health, *TP* scores lower than *Uger*. More users (four) had health problems as opposed to no health issues with *Uger*. Cotton fabric in *Uger* pads was seen as more comfortable as it was cooler than *TP*, a polymer based product. The *Uger* pads were found to be more comfortable because they did not shift. Users saw the potential of continuing to use *Uger* pad holder with their own home-based insert towels, which points to sustainability of the device. In answer to **RQ 2**, we have *Uger* as a device which has measured “sustainable” in comparison to *TP*.

While *Uger* with its white surface provides a sustainable solution for health, some users still prefer *TP* for convenience and the social aspects around drying of menstrual devices. The multi-dimensions of social aspects comes through from this example. Another social aspect that emerged was the absence of a private place to change, only one women among the 13 had access to a latrine and a closed bathing area. When accommodation is limited women need to create a space for themselves. Each time they need to change, they asked men to move out of the room. Women have always seen this see this as cumbersome. We can speculate from this that some users may have had to postpone a change until they found an opportunity to get an empty room. This is an unsustainable situation in the absence of any infrastructure.

Another aspect that emerged from this study was the desire to learn how to stitch *Uger*. We come back to this in Chapters 6 and 7 when we discuss economic issues.

We have inferred from the multi-dimensional aspects of this study that while we may have come up with a solution in the form of a sustainable menstrual device, the device on its own is not enough to make management sustainable. Interventions in behaviour are required if users have to make the switch to the inconveniences of *Uger*. This will involve creating conducive social environments where users make informed choices based on analyzing their own current behaviors and developing an understanding of health aspects and other social co-relations. If we were to create awareness within communities about these co-relations (example action such as making a bathroom) the shift toward sustainable menstruation management is possible. These aspects to behaviour change are described Chapter 7.

There were many factors in terms of the limitations of this study. For example, there was attrition even in such a small sample. If future studies are to be conducted, selection of sample sizes must be made considering attrition due to the length of the trial. We tested the devices over 8 months from December to August. Testing it across 12 months would have given us a better understanding of how the products function through out the year through the different weather cycles. Sustainability of the product through different seasons, sustainability while travelling and other factors could have been studied. These factors are suggested as future research areas in concluding Chapter 8.

5.2 Study No 4 Assessing Pillar S, *Swasthya*/Health and Pillar S, *Samaj*/Social through Proof of Concept Study, comparing *Rutumitra* and *Uger*

The study described in the last section compared *Uger* and *TP* on health and social aspects of PASS. However, we found it relevant to conduct a similar study with disposable sanitary napkins (DSNs). There were many reasons for this decision. The first is that life styles are changing and the use of DSNs are getting popular. The second reason is that rural Rajasthan represents a cultural context the researcher is familiar with. It is relevant therefore to conduct the study in a completely different cultural and climatic zone if we are to assess the social and health aspects around *Uger* pads without bias about the geographic area. The third reason was there were several limitations in the previous study. The sample size was small and all participants were associated with Jatan Sansthan in some way, which can bias findings. There was attrition even in this small sample during Study 1. At the time of the first study our focus

was only on testing *Uger* in our work area , thus an important process was missed the lack of a baseline questionnaire (pre recruitment) that would give us aspects to knowledge, attitudes and practices, setting the ground for assessing dimensions of menstruation management. In this second study we covered the previous limitations and at the same time found answers for **RQ 2** and **RQ 3**.

5.2.1 Objectives of the Study

- To conduct a user trial to record experiences, assess and compare a reusable menstrual product - product 1 – *Uger* pads with a disposable menstrual product 2, *Rutumitra*
- To assess social acceptance of *Uger* and *Rutumitra* , to establish if users have product preference, to understand its functioning- absorbency, leakage, its maintenance such washing, drying, storing, comfort of wearing, and to understand reasons for the choices users make.
- To assess health outcomes from the use of the two products – such as rashes and boils.

5.2.2 The Hypothesis

Hypothesis 1

Health outcomes are not significantly different for rural women when they use two types of menstrual products, *Rutumitra* and *Uger*.

Hypothesis 2

There is no significant difference in preferences made by rural women between the two types menstrual products, *Rutumitra* and *Uger*.

The two menstrual devices were assessed from two dimensions of the PASS tool, social and health. For Pillar S, Swashthya, the health pillar, we considered rash, itching, chafing, boils, and abscesses. For Pillar S, *Samaj*, the social pillar, we considered the following:

- Design and function of the devices: comfort while wearing, absorbing capacity, leakage.
(In section 2.3.7 we have previously argued why these are social dimensions)
- Number of times the product was changed and location where it was changed
- Maintenance of devices: washing, drying and storing
- Accessibility and availability of devices

□ Product preferences at the end of the trial

5.2.3 Sequence for Study

We used the following sequence:

- Survey design and submitting proposal to the ethics committee (Section 5.2.4)
- Selecting location and field supervisors (Section 5.2.5)
- Introducing the study to potential participants. (Section 5.2.6)
- Consent for administering the pre-recruitment questionnaire, administering the Pre-recruitment questionnaire (Section 5.2.7)
- Collating findings from the questionnaire (Section 5.2.8)
- Selection of participants for the study taking consent, orientation, distribution of products (Section 5.2.9)
- Method used for data collection (Section 5.2.10)

5.2.4 Survey Design and Proposal to Ethics Committee

We designed a Proof of Concept Study, comparing *Uger* pads with *Rutumitra*. In March of 2015, we appeared before the IIT Research Ethics Committee, to present our proposal and methodology, which was subsequently approved on June 22, 2015. A consent form was designed for pre-recruitment, refer appendix IV. A pre-recruitment questionnaire was designed, refer appendix V. All these were translated into Kannada, and then translated back again into English to ensure for accuracy of content.

At the time of recruiting respondents for the pre-recruitment questionnaire we kept no age limit; the criteria was the respondent should be currently menstruating. The study was done using the Cross Over Trial method. The participants were divided into two groups, Group A and Group B. Users in Group A would use single use *Rutumitra* pads for up to 4 cycles and then move to *Uger* reusable pads for the next 4 cycles. Users in Group B would use *Uger* pads up to 4 cycles and then move to *Rutumitra* pads. At the end of the 8 cycle study, all users would have used both the reusable product and the disposable product. Inclusion and exclusion criteria for participants was formulated

Inclusion Criteria

- Users were to be selected in the age group of above 18 years and under 40 years.
- 40 years was kept as the upper age limit to exclude those at peri - menopause phase.
- Selected girls/women had a minimum of two years experience of menstruation.
- Users were non pregnant women.

Exclusion Criteria – the Following were Excluded

- Women who were pregnant were not included in the study
- Users suffering from menstrual problems at the time of recruitment
- Users who have been through recent abortions (as it would have a bearing on the menstrual product that would be used, example excessive bleeding post abortion)
- Those with irregular menstrual cycles
- Those recently married – young girls visit their parental homes often when recently married so may not be available for monitoring for the 8 month duration of the trial

5.2.5 Selecting Location and Field Supervisors

The geographical area of the study was rural Karnataka, with a moderate climate typically not crossing 39 – 40 degree centigrade, as opposed to the study area in Southern Rajasthan where temperatures reach 44 to 45 degrees in peak summer. Two field supervisors previously associated with MITU Foundation were inducted and oriented to the study. Additionally one ASHA worker and two *Anganwadi*⁵⁹ teachers were also oriented who remained associated both as helpers and participants throughout the duration of the study. The study areas selected were in *Doddabellapura* district, Karnataka - the two villages were *Chenaveerana Halli* (CVH) and *Sulekunte* (SK). Both these villages are at 3.5 kms distance from each other.

5.2.6 Introducing the Study to Potential Participants

Two separate village meetings were held, at the government school at CVH (15 women were present) and *Anganwadi* workers house at SK (8 women were present).⁶⁰ Women were explained the objectives of the proposed cross over study. They were asked if they would like to participate and, if agreeable, they were told that they would have to first participate in a pre

⁵⁹ *Anganwadis* are centres run by the government of India in villages. The centres provide basic nutrition and care for children,

⁶⁰ Meetings were held on August 2, 2015.

recruitment survey. At this meeting, the questions that would be potentially asked in the pre-recruitment survey were also shared. It was made clear that at the end of the pre-recruitment survey, they were free to opt out of the study. They were requested to share all this information with other women in the village so that more women could be informed about the study and join if they desired.

5.2.7 Consent for Administering the Pre recruitment Questionnaire, Administering the Pre- recruitment Questionnaire

The pre recruitment consent form was shared with potential participants from both villages. Potential participants were asked to take home the forms for the day, they were asked to examine it closely and then sign before agreeing to answer the questionnaire. 67 women agreed to participate in the pre - recruitment questionnaire

A set of structured interview questions that served as pre-recruitment questions was administered. The questionnaire covered health and social dimensions so that we could assess these through PASS. The questions covered:

- General information about participants such as age, occupation
- Facilities and other infrastructure that participants have access to
- Awareness about menstruation, levels of knowledge
- Practices, beliefs that are followed by the community that have a bearing when we assess for health and social dimensions
- Other reproductive health related information about users

The method followed was the investigator conducted the interview at the home of the respondent or called the respondent to the school or to the house of the Anganwadi worker or the house of the anganwadi helper. The investigator would ask the question and record the answers. Findings from the pre-recruitment questionnaire for both villages were consolidated.

5.2.8 Collating Findings from the Questionnaire

A total of 67 answered the questionnaire, 33 from Village Sulekunte and 34 from C.V. Halli. The age group was between 21 years to 48 years. All except 2 respondents were married. It was found that for family income, most work on their own farms, or are wage laborers on others farms while, one was working in school families, one was an anganwadi worker, 7 have livestock, one was petty shop owner, one a TV cable supplier, and one working at a hotel.

Findings for social and health aspects were consolidated for both villages

(A) Social Aspects

(i) Facilities/Infrastructure

From the 67 respondents we between the two villages, 19 persons reported owning latrines. Even among people who had latrines, users admitted to defecating and urinating in the fields on many occasions as they did not want to keep filling water in the water tank outside the latrine. 13 respondents have a private bathing area, others bathe at the pond or *kerey*. Washing of family clothes is done at the *karey* or in the bathing area at home. Drying of family clothes and menstrual cloth is at the *keray* for a few hours until they return home. If the menstrual cloth still has not dried it is put on the boundary or the line near the home hidden under larger garments such as a petticoat. Both villages do not have 24 X 7 running water, instead participants collect water from the water tank provided by the government for drinking and cooking.

There is open drainage with all the waste water flowing openly in front of homes. All houses have electricity. All participants have access to a mobile phone – either it belongs to them, their husband or a family member, but be able to use the phones, is not consistent. For example, there if there was no money to recharge the phone the participant stayed disconnected until the investigator met her in person.

(ii) Awareness about Menstruation

Awareness about menstruation before menarche is very low, only 11 out of 67 participants were aware that they would be getting their periods. They learned about this in passing, from

an older sister, a friend, a teacher, recalling that they must have been 10 – 12 years old. Giving young girls information about periods and its management is considered inappropriate in the community. When asked the question is “menstrual blood clean or dirty” - 6 women thought menstrual blood is dirty, 8 thought it to be clean while the rest were not sure or did not want to give an opinion.

When faced with menstrual problems, 20 ignore it, the rest share with their husbands, a friend or a neighbor. Women go to the doctor at the nearest town Doddbellapura only when there is a lot of discomfort. Problems during menstruation or by the use of menstrual product have been reported such as wounds, irritation and itching – reported by 3 from disposable pads. Rashes near the thigh and other irritations were reported by 6 cloth users.

(iii) Practices

6 respondents used DSNs, 10 used a combination of cloth and the rest used old cloth harvested from *panchays*, *seeray*, *maney lay ero halay battay*⁶¹ to manage menstruation. The menstrual cloth is kept hidden from the eyes of men, hung out in a dark corner of the bathing area. If the cloth is hung out in the open it is hidden under other clothes, such as petticoats, saris or towels. To manage periods, cloth of any colour is used, whatever is available at home. Women change their menstrual cloth twice a day, when there is heavy flow, they change 3 times. 24 out of 67 respondents wear underwear every day, while the remaining wear only during their periods. The latrine is not the preferred place for changing menstrual products – it is done in the bathing area or in a room at home, only 3 women reported changing in the latrine.

(iv) Beliefs

There are many practices around menstruation that were collated from this section. Girls who get their periods for the first time are kept indoors for a month. The belief is that the *Pishachi* or devil will cast the evil eye and bring bad luck. Going to the temple, touching sacred books, touching or watering a *tulsi* plant or anything auspicious is avoided during this time with the notion that one is impure and cannot touch anything that is holy considering themselves as impure. *Nagadosha* or “curse of the snakes” appears to be a widely held belief. It is considered bad luck if a snake were to touch or crawl over menstrual blood. Women reported

⁶¹ Loin cloth, saris, old clothes, available at home. (In Kannada language)

that a lot of care is taken to safeguard against bad luck, hence menstrual blood is washed out from the cloth even at the point of terminal disposal. In one case a respondent reported washing each DSN before disposal. The other belief is that if worms get on to menstrual products of unmarried girls, they will not be able to have a child later on. Eating pickle, curd or sour food items are avoided during this time as it is felt that the menstrual blood will smell very bad. Papaya or *parangi hannu* – is believed to stimulate the flow of periods. Those who have not got their periods on the expected date eat a lot of this fruit. This method also is used for a pregnancy that is unwanted or suspected.

(B) Health Aspects

9 persons in 67 reported routine rashes on the inner thigh from the cloth they were using and, previous instances of itching and burning in the genital area, which were resolved either because it went away on its own, or in one case, by taking medication. 2 persons out of 4 who have reported using disposable pads have complained of irritation and itching. Headaches, leg pain, stomach cramps, nausea are some reported pre-menstrual symptoms. Cases of irregular bleeding, scanty and excessive, were reported, 2 persons reported spontaneous abortion a few years ago, 5 persons reported previous (estimating it to be 1.5 to two years ago) induced abortion.

(C) Inferences from Findings from Pre- recruitment Questionnaire

From the findings from social dimensions we can see that there are many factors corresponding to the social Pillar of PASS. For example, the lack of infrastructure to manage menstruation and open drainage that compromises washing of the bloodied period cloth. It cannot be done at home during the day (at their washing area near outside their home) as blood will be visible. Instead they wait to go to the *keray* or pond where there is some privacy. We can only assume that if a 24 X 7 water source such as a tap at home within a closed space was available, it can allow for more efficient menstruation management. This would mean that a menstruator would be able to change as many times as desired, wash a device at any time convenient, without having to time it, as it is done currently. Another social dimension is very limited communication about menstruation issues, resulting in lack of awareness about menstruation facts. Superstitions prevent women and young girls from managing their menstrual cloth in the recommended way, cloth is hidden rather than hanging out in direct sunlight to sterilize it. We also saw that certain types of food such as papaya are

avoided during menstruation. Refer section 2.2.4. Health issues came up during the pre recruitment questionnaire. If scientific information was available, practices such as these will not be followed. We will come back to these social dimensions later in this chapter.

5.2.9 Selecting Participants for the Study, Taking Consent, Orientation, Distribution of Products

All 67 participants who had participated in the pre-recruitment survey were invited to come to the orientation, we conducted two orientation sessions, one in each village of the 67 women, 1 was an ASHA worker, an Anganwadi teacher and an Anganwadi helper, a conscious decision as we wanted community leaders also to be a part of the study; which would give the other participants a sense of solidarity and confidence. Of the 67 women who participated in the orientation, 16 participants dropped out for various reasons. Refer to Table 5.5. Only 51 participants remained in the study throughout all 8 menstrual cycles.

Table 5.5

Reasons for leaving the trial

Number of drop outs	Reasons for leaving the trial
12	Not comfortable about participating
1	Got pregnant at cycle 3
1	Did not want to answer the supervisors questions
2	Took <i>Rutumitra</i> pads at the orientation before their Cycle 1 and when the supervisors returned to them for feedback they said they had not got their periods and that their periods were irregular (the same two women had reported regular periods in the pre-recruitment survey) Discovered much later We later that the women just wanted free pads for their daughters.
Total 16	

A second consent form for the user trial was distributed before the start of the study. Here again the participants were allowed to keep the form for a day, to fully understand what the study entailed before signing; additionally, they were encouraged to share information with their partners and members of their family if they wished to. After signing the consent forms, participants were thoroughly briefed about the objectives of the trial. Figure 5.6 (a) and (b) shows participants being briefed. In terms of the *Uger* pads that were distributed, there was one difference between the previous trial and this current one. Since light flow pads were not

preferred by participants in the previous trial, only insert pads (pads with towels) were distributed in this trial.



Figure 5.6 Participants being briefed (a) Village SK (b) Village CV

The study commenced in the month of August 2015 and concluded in April 2016. For the first phase that is the first 4 cycles - 3 *Uger* insert pads and 6 towels figure 5.7 (a) and (b) were given to group 1, consisting of 30 participants from village CV. These pads were for use throughout the 4 cycles. 16 disposable napkins were given to group 2, consisting of 34 participants from village SK. Members in group 2 were given the next set of 16 disposable pads, figure 5.6, before the start of their cycles 2, 3 and 4.

Table 5.6

Shows the cycle number and the product in that cycle, for both the groups.

	August 2015 to April 2016							
Cycles	1	2	3	4	5	6	7	8
Group 1	<i>Uger</i>	<i>Uger</i>	<i>Uger</i>	<i>Uger</i>	<i>Rutumitra</i>	<i>Rutumitra</i>	<i>Rutumitra</i>	<i>Rutumitra</i>
Group 2	<i>Rutumitra</i>	<i>Rutumitra</i>	<i>Rutumitra</i>	<i>Rutumitra</i>	<i>Uger</i>	<i>Uger</i>	<i>Uger</i>	<i>Uger</i>



Figure 5.7 (a) Participants were given 3 Uger insert pads (b) They were given 6 towels



Figure 5.8 Participants were given 16 Rutumiitra disposable pads

5.2.10 Method Used for Data Collection

All users were briefed that for 4 cycles they must use the product they have been assigned and no other. Information was initially planned to be collected in two ways;

- Record diary

Participants were given a record diary, refer Figure 5.9, refer appendix VI, for sample pages of the diary. This was a palm sized booklet with basic information about the two types of menstrual products. The diary was to write down the dates of their periods, and to write down any experiences they wished to share when using the two menstrual products, no specific format or structure was prescribed.

- Individual interviews conducted by the investigator. The field supervisors had their own set of questions, Table 5.6, for noting observations and recording information shared by

users. The two methods were used to cross check answers for accuracy. No monetary incentive was given for participating in the study.

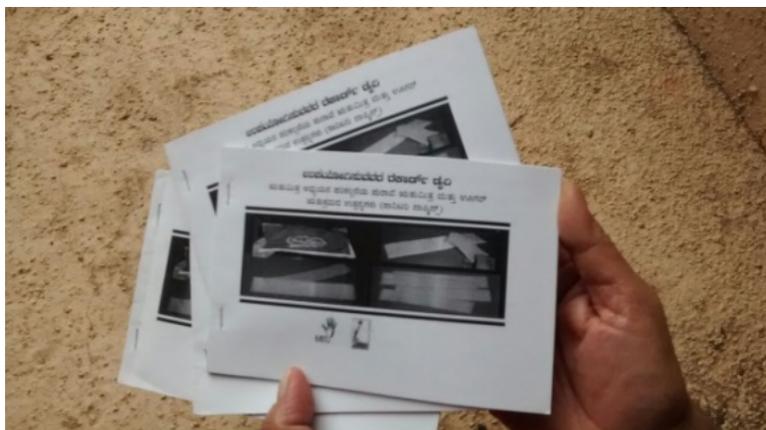


Figure 5.9 Record Diary

The experiences and observations of the participants were categorized into the dimensions of PASS.

Table 5.7

Showing dimensions of PASS and corresponding questions for assessing

Dimensions	Questions for participants
For Pillar S, <i>Samaj</i>, the Social Pillar	
Design and function of the devices: comfort while wearing, absorbing capacity, leakage	1) Was the product comfortable to wear? Did the products function as it has been intended to – that is manage menstrual flow? (absorbency, leakage)
Number of times the product was changed, location where it was changed	2) How many times did you change the product? 3) Where did you change your product?
Maintenance of devices: disposable	4) How did you manage the disposal?
Maintenance of devices: washing drying and storing	5) How much water and cleaning agent was required for each wash? 6) Where did you wash the device and how did you wash the device? 7) Where did you hang out to dry
Social acceptance	8) How easy or difficult is it over all to maintain - washing, drying, reusing, storing? 9) How easy for difficult was it to dispose the product 10) Is the device socially acceptable?
For Pillar S, <i>Samaj</i>, the Health Pillar	
Health problems from use of product	11) Did you face any problems with the products with respect to health, such as itching or rash?

Device preferences at the end of the trial and over all feed back

12) What are the overall advantages and disadvantages of the two products? Which of the two products will you put one above the other if you had a choice? Please give us feedback.

Some instructions were deliberately not given to the users at the start.

- The frequency of changing menstrual product was not advised - because the study wanted to capture menstrual management behaviors, blood absorbing capacity of the two products, leakage if any from each of the products and others.
- How to dispose of the menstrual product also was not advised for the same reasons in order to assess what users do.
- The only instructions given was how each product had to be worn and that the *Uger* pads needed to be washed and dried like cloth and that *Rutumitra* was one time use and can be thrown.

Supervisors met with each participant at the end of cycle 1. They found that while users recorded menstruation dates in the record diaries that were given to them, refer figure 5.10, recording of experiences was not systematic. Only 5 women had made any written entries, refer Figure 5.11, preferring instead, to speak directly to the supervisors. The reasons cited for not recording was fear of writing something down and being reprimanded later and anxiety about writing badly due to limited writing skill; very similar to the experiences we had in study 3. Refer to appendix VII for examples of writing in the record diary.

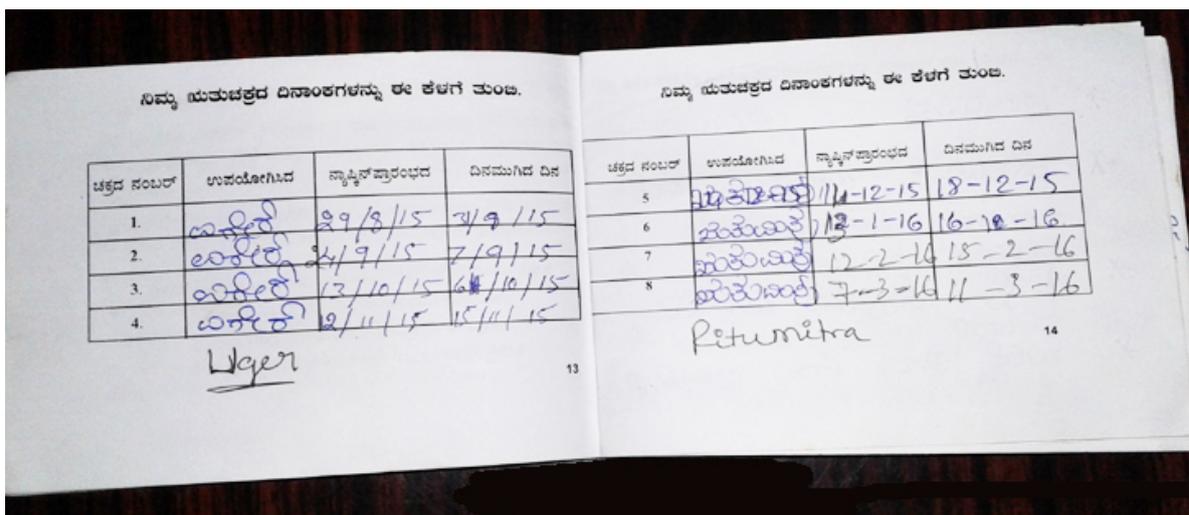


Figure 5.10 Example of a page in the record where the participant has filled the menstrual cycle dates

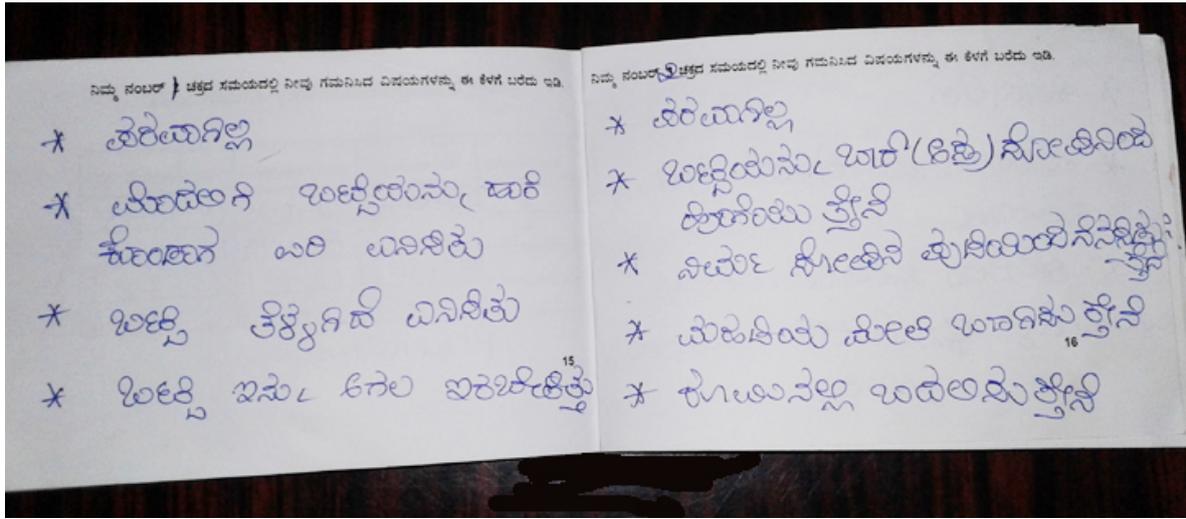


Figure 5.11 Few users recorded their observations

Table 5.8

An example of recording done by participants

Participant	Cycle date	Comments	Cycle date	Comments
A	4.8.15	I liked it. I feel it is too small. Because of buttons it is comfortable to use	4.9.15	I will soak it with Nirma Powder & washed it with Bar Soap. Dry on the terrace or near the lake. I will change the cloth at bathroom. Wash it at village lake
B	10.9.15	I liked it. I feel it is too small. I washed it at the village lake very neatly. I will dry near my home on the wire. I washed it with Nirma Powder & Saval soap.	12.10.15	Its Good, I will wash it at village lake. I will change it at room. Every day I will wash it

Supervisors then asked the respondent a set of questions as per table 5.7 and recorded the answers. Findings were later categorized into the two dimensions, health and social.

5.3 Findings Social Aspects

Findings Social Aspects

(a) Design and Function

For Q 1; Were the products comfortable to wear? Did the products function as it has been intended to – that is manage menstrual flow? (absorbency, leakage).

Table 5.9

Table showing responses to comfort

Comfort			
	Not at all comfortable	Neither Comfortable nor uncomfortable	Very comfortable
<i>Rutumitra</i>	1	11	39
<i>Uger</i>	1	1	49
Absorbency			
	Is not able to absorb	Somewhat able to absorb	Is able to absorb well
<i>Rutumitra</i>	1	8	42
<i>Uger</i>	5	4	42

“Was the pad comfortable to wear” was further probed by questions “ Did the pads pinch or poke you in any way when you wore the pad, how did it feel while you were walking?” More women found *Uger* more comfortable than *Rutumitra*. 39 out of 51 respondents – 76% - found *Rutumitra* comfortable while 49 – 96% found *Uger* comfortable. Those who reported “neither comfortable nor uncomfortable” for *Rutumitra* pads said that pad was not firmly in place and kept shifting, the adhesive was not sticky enough when pasted on to the underwear. This same group said *Rutumitra* was too narrow and not wide enough and that the absorbent parts of the pad bunched up in one corner. Those in the sample who had earlier used disposable pads with wings (prior to the study) criticised the overall quality of *Rutumitra* also suggesting that *Rutumitra* should be made with wings. The one respondent unhappy with *Uger* found it to be very bulky.

Absorbency was investigated further by the supervisor with the question: “Was the pad enough for you, was it able to soak your flow without staining your outer garments?” An

equal number (42 participants) appeared to be satisfied with both *Uger* and *Rutumitra* in terms of absorbing function of the two devices.

(b) Number of Times Product was Changed and Location of Change

For Q 2 and Q 3, How many times did you change the product? Where did you change your product?

Table 5.10

Frequency of change

How often did you change your menstrual product?			
	Changed 2 times a day	Changed 3 times a day	Changed 4 /above times
<i>Rutumitra</i>	9	35	7
<i>Uger</i>	30	17	4
Where did you change your menstrual product?			
For both devices	In the latrine	In the bathing area	Room at home
	0	9	42

Of 51 participants – 35 persons changed *Rutumitra* 3 times a day – 68%, only 7 persons changed 4 and more – 13 %. 17 participants – 33% – changed *Uger* 3 times a day, 4 participants – 7.8 % changed more than 4 times. Those who changed 4 and above number of times, cited the reason as – “we have heavy flow”. *Rutumitra* was changed more of times than *Uger*. 17 persons reported changing *Uger* three times a day as opposed to 35 persons for *Rutumitra*. 30 respondents changed *Uger* pads two times in the day. Users managed through the action of refolding, previously described. We estimate that changing the towel two times a day in actuality will amount to changing at least 5 times through the act of folding and refolding towel. *Rutumitra* pad on the other hand allowed no scope for folding and hence more changes were reported.

Women reported that the menstrual products were stored in the same space as their clothes and other household items are stored. The preference is to change the menstrual product in their room as the bathing area is outside, away from the house. 39 of 51 have reported this, while only 9 report changing in the bathing area.

(c) Maintenance of Devices: Disposable

Q 4 How did you manage disposal?

Table 5.11

Managing the soiled product

How was the soiled menstrual product managed?		
<i>Rutumitra</i>	Burned	Thrown in Garbage
	46	5

For disposing *Rutumitra*, 46 participants burned it in the *hande*. We return to this in chapter 6. Used *Rutumitra* pads are burned at the *handey volay* – or stove that is used for heating hot water for bathing, Figure 5.12. Used pads are stuffed into the chamber where coconut palm fronds are placed to which a fire is lit. Two participants reported washing out the disposable pad before burning. Of the 5 persons who threw the used pads in the garbage heap – one user washed out the pad before disposing, with the beliefs reported earlier that menstrual blood should not be stepped upon. No disposing for *Uger* pads was required to be done during the duration of the trial. However we have made calculations for this in table 6.5 in chapter 6.



Figure 5.12 *Handay volay* or stove for heating bathing water, *Rutumitra* pads were burned along with palm fronds

3 persons found *Rutumitra* difficult to dispose, these women did not have a *handay volay* or stove. 2 reported that scrubbing *Uger* to keep it white was a complete *talay navu* or head ache.

(d) Maintenance of Devices: Washing / Drying / Storing

Q 5 How much water and cleaning agent was required for each wash? Q 6 Where did you wash the device and how did you wash the device? Q 7 Where did you hang out to dry?

Nirma detergent/Hasta bar soap/Saval bar soap (local brands) were used in both villages for washing the menstrual cloth. A plastic clothes brush was used for removing stains. Washing was done at the village pond or *karey*, Figure 5.13. The *karey* is located between the two villages. *Uger* was hung out in the sun on a bush at the pond for as long as they were there at the pond. Then the pad/s were brought back along with the family washing in a tub, figure 5.13 (b) then hung on the clothes line – hidden under larger garments or clothes, figure 5.14.



Figure 5.13 (a) *Karey* or pond where clothes of family and menstrual products are washed
(b) All clothes are brought back home in a *bandlay* or tub



Figure 5.14 *Uger* pads hung out under larger clothing

Others reported washing in the bathing area, Figure 5.15 (a) and hanging out *Uger* in the corner on a hook, Figure 5.15 (b). When it was raining *Uger* took nearly two days to dry, if sunny it took about 7 to 8 hours for it to dry out. In the peak of summer 36 – 38 degrees centigrade and over – *Uger* dried out completely in 5 hours.



Figure 5.15 Washing area home of a participant at village SV

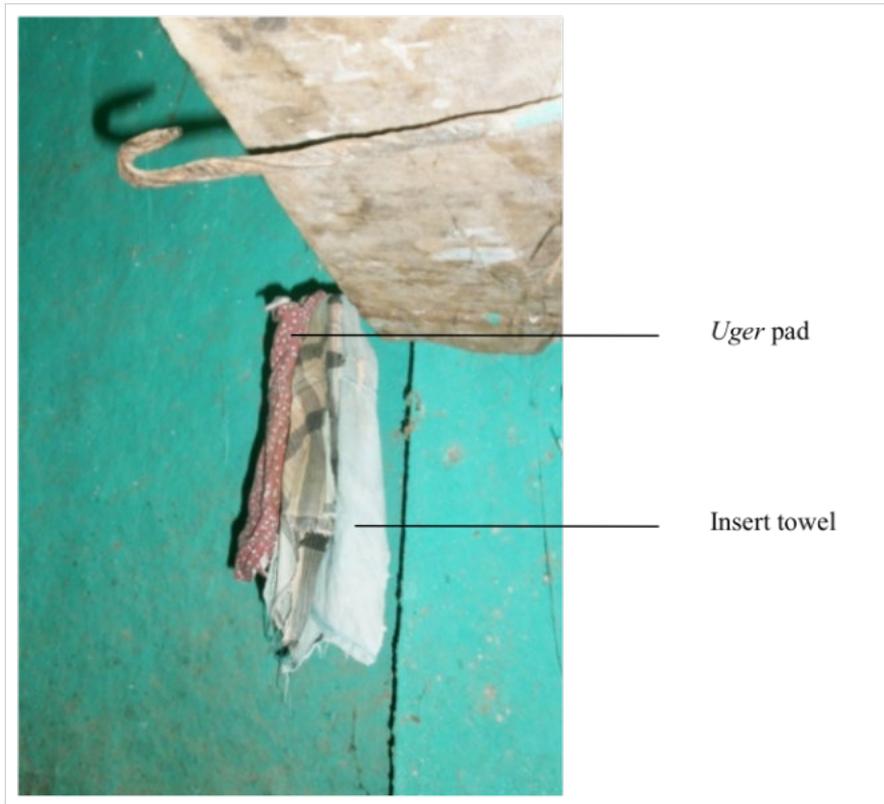


Figure 5.16 Drying Uger in the washing area

(e) **Social Acceptance**

Q 7 How easy or difficult is it over all to maintain - washing, drying, reusing, storing?

Table 5.12

Maintenance of Uger pads

Uger	Difficult to maintain	Neither difficult nor easy to maintain	Easy to maintain
	2	14	35

2 persons said it was very difficult to wash stains and to keep the towels white.

Q 8 How easy or difficult was it to dispose the product

Table 5.13

Ease of disposing soiled pad

Rutumitra	Difficult to dispose	Neither difficult nor easy to dispose	Easy to dispose
	3	15	35

(e) Device Preferences and Feedback

“Q 12 What are the overall advantages and disadvantages of these product? Which of the two products will you put one above the other if you had a choice? Please give us feedback.

The final product choice question posed to participants at the end of the 8 cycle trial was “The study is now complete; you have used two types of products for 8 cycles. Between these two products what is the product that you prefer and what will you continue to use? You can also tell us if you want to go back to your old product, or use a combination of these two new products.”

Table 5.14

Menstrual device preference

Old cloth	<i>Rutumitra</i>	<i>Uger</i>	Combination
11	16	14	10
Combination preferred			
Cloth + <i>Uger</i>	Cloth + <i>Rutumitra</i>	<i>Uger</i> + <i>Rutumitra</i>	
9	0	1	

The product preferences were spread out. There were 11 participants out of 51 who rejected both products wanting neither *Uger* nor *Rutumitra*, that is, 21.5 % of our sample, preferring instead their earlier product, old cloth. Of the remaining participants – 16 showed clear preference for *Rutumitra*, that is 31%, while 14 preferred *Uger* that is 27%. A combination of products was preferred by 19%. Over all it appears that cloth and cloth based products were preferred. We received more feedback which we list in Table 5.15, which we will come back to later in the summary of this study.

Table 5.15

Consolidated Feedback on Menstrual Devices

<i>Rutumitra</i>	
Positive comments	Negative comments
<i>“Disposable is very good - no botheration about washing and managing. Just use and burn.”</i>	<i>“I will never be able to afford to spend on disposables, so <i>Rutumitra</i> is not an option for me”</i>
<i>“It’s a modern product and everyone is using now a days. I really liked this.”</i>	<i>“I do not have a handay volay. I have to collect pads and at the end of the cycle throw pads in the garbage. This is not an option, it is headache to throw disposables”</i>
<i>“I can afford to buy disposable pads every month. I get a salary there is no problem.</i>	

Uger	
<i>"Its good. Its better than our clothes that we use during periods. It is very comfortable while working in the field.</i>	<i>"I cannot use this Uger, its not suitable and enough for me. (meaning flow) I will use my own clothes as I was using earlier. Also I don't want to use this in future. "</i>
<i>We don't feel stress during our periods after we started this Uger product, because of buttons we don't feel it will fall down."</i>	<i>"Towel is very thin. It is not enough for my flow, it is okay for use on days when we have less flow"</i>
<i>"Uger takes time to adjust after cloth. But after the adjustment it is good"</i>	<i>" Uger towels are stained too much, I will not use this anymore"</i>
	<i>"The size of Uger is to small, I would like it larger"</i>
	<i>"I do not like the button arrangement."</i>
	<i>"White colour is a problem, madam"</i>

While a social dimension can be observed from this comment:

"Both Uger and Rutumitra have to be bought. This means I have to go to the market in future to bring it. It is not available in the village shop. So I much prefer old cloth"

an economic dimension can be observed from this remark :

" Madam, I am using all these products because its free. Left to me, I would never spend any money on menstruation when old cloth can do the job."

We will come back to in Chapter 6 where we discuss economic pillar.

5.4 Findings: Health Aspects

For Q 11 Health problems from use of product 1) Did you face any problems with the products with respect to health, such as itching or rash?

Table 5.16

Health problems reported from Rutumitra and Uger

	Health Problems		
	Itching	Burning	Boils
<i>Rutumitra</i>	4	0	0
<i>Uger</i>	1	0	0

Health outcome was measured by observing the direct affect of the two pads on the body. Out of 51 participants who tried *Rutumitra* – 4 reported problems – 7.8 %. See Table 5.7. None of these 4 women had reported any problems in the pre recruitment form with their earlier product – old cloth. 3 reported mild itching by cycle no 3 – while it was uncomfortable they

did not have to take any medication, they continued to use *Rutumitra*. One person in Cycle 3 said the following, "*Don't know - some infection happened this month also. So I have applied cream & ointment this month. Since last month I had the same problem*". She was advised to stop using *Rutumitra* for cycle 4 and go back to earlier product. She crossed over to the next product in Cycle 5 reporting no problem after that. Out of 51 participants who tried *Uger* only 1 that is 1.9 % - reported minor itching – but continued wearing *Uger*. She had not reported any previous instances of itching in the pre recruitment form.

5.5 Summary Study 2

From the perspectives of health more persons reported health problems (4 respondents) with *Rutumitra* as opposed to 1 person who reported a health problem with *Uger*. In that sense *Uger* has scored better.

In spite of the fact that participants in the study had an adequate number of pads, changing was limited to two to three times a day. We concluded two reasons for this. Previous practices are brought forward, that is changing typically once in the morning and once in the evening. Some women also reported that from the stock of pads given to them, some shared pads with their daughters or other female relatives, in spite of the instruction that the pads were only for those in the study.

In addition to practice, infrastructure issues have a bearing on menstruation management. Most users have only one room homes⁶². Many women in the study changed their menstrual product in the only room they own, selecting those times when they have the most privacy, when men folk are away at work. Menstrual products are stored in this same room making access easy, there is no water in this space, so the genital areas and hands cannot be washed. So when a pad is changed there will always be discharges remaining in the vaginal area that will impact health. Frequent changing is only possible if infrastructure is available for women, a place to comfortably and privately change with running water and other facilities. Hence, for both menstrual products facilities were compromised.

⁶² Most houses have only one multipurpose room, this area is used for sleeping, for guests to sit and others. In nuclear plus or joint families we may find two to three rooms.

The design and nature of the menstrual device was measured through comfort and absorbency. We found that *Uger* was not liked by one user citing the reason “too bulky” due to its thickness. On the other hand *Uger* found favour with many due to its reusable nature and the fact that they would not have to invest money every month. In the same way, *Rutumitra* was disliked due to its being too thin. Users complained that the absorbent material bunched up in corners. A few users discovered that changing the pad often can prevent this problem. Users who had earlier tried pads with wings, felt the *Rutumitra* should have been made with wings. *Rutumitra* was liked for its easy disposal.

In terms of management, the traditional practice of hiding the menstrual product after washing was practiced by users. *Uger* pads were washed and dried in the same way as other menstrual cloths and hung out in dark corners to dry. The pads were dried hidden under other clothing, not getting direct sunlight which would have been the appropriate way.

Users gave feedback on the design of the products. 4 women during discussions shared that if *Rutumitra* had wings it may have been more comfortable. Winged pads potentially give a better fit and underwear is known to remain more stain free than with pads without wings. Perhaps the product preference figure would then have moved more significantly toward *Rutumitra* if it had wings? This was the one major limitation, the two products were different, one with wings and one without.

5.5.1 Conclusions from Studies 3 and 4

The two studies established *Uger* did not cause any “new” health problems. It was a new, untested product. We now know that it may reduce problems and at least not add to problems that currently exist, e.g. infections because of poor washing or improper drying.

5.6 Scoring on PASS

In this section we demonstrate scoring on PASS for both studies. In section 3.3.3 we had discussed parameters for scoring on PASS. Using the parameters of the pillar dimensions we demonstrate scoring for the three devices, *TP*, *Rutumitra* and *Uger*. Any one dimension can be considered and /or even a selection of dimensions can be considered.

5.6.1 Score Pillar S, *Samaj/Health*

For the health pillar we use the parameter: “Symptoms such as rash, itching, boils or abscess”.

For study no 1 , *TP* and *Uger*, out of 13 participants, 4 women reported itching and boils from the use of *TP* , no health problem was reported from *Uger*. **For study no 2 , *Rutumitra* and *Uger*** Out of 51 participants, 4 women reported itching from *Rutumitra* , 1 reported itching from *Uger*. Therefore even when if no/low problems were reported from *Uger*, from **sections 5.1, 5.2 and 5.3** we had learned that menstrual health problems can occur for a variety of reasons, hence we position the score on the health pillar for all three products at "2", neither sustainable nor unsustainable, Refer Figure 5.16

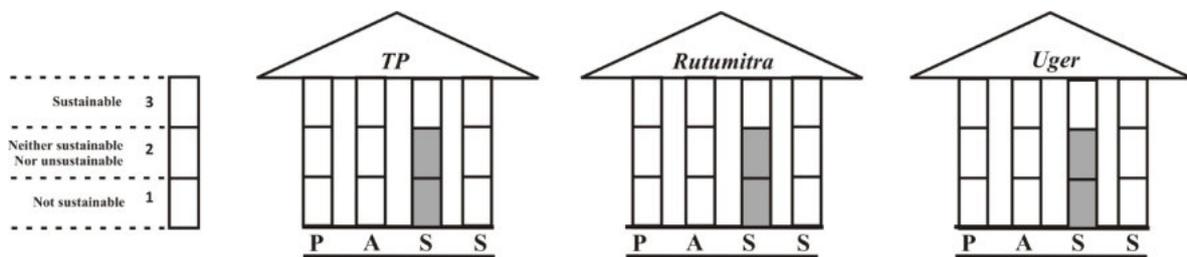


Figure 5.16 Visual representation of PASS Scores for Pillar S, *Samaj/Health*, for *TP*, *Rutumitra* and *Uger*

5.6.2 Pillar S, *Samaj/Social*

From Study 1, we take 3 factors from the social dimension as examples

Table 5.17

Different parameters assessed for social.

	<i>TP</i>	<i>Uger</i>
Design and function	Not be seen as secure, prone to shifting	Seen as secure due to button feature
Maintenance of products: Washing/Drying	Seen as very easy	Seen as a more difficult, more time taken to wash, not easy to hang out in the open due to color of device
Product preferences	1 person found good	12 persons found good
	Sustainable = 1 factor Not Sustainable = 2 factors	Sustainable = 2 factors Not Sustainable = 1 factors
PASS Score	1	3

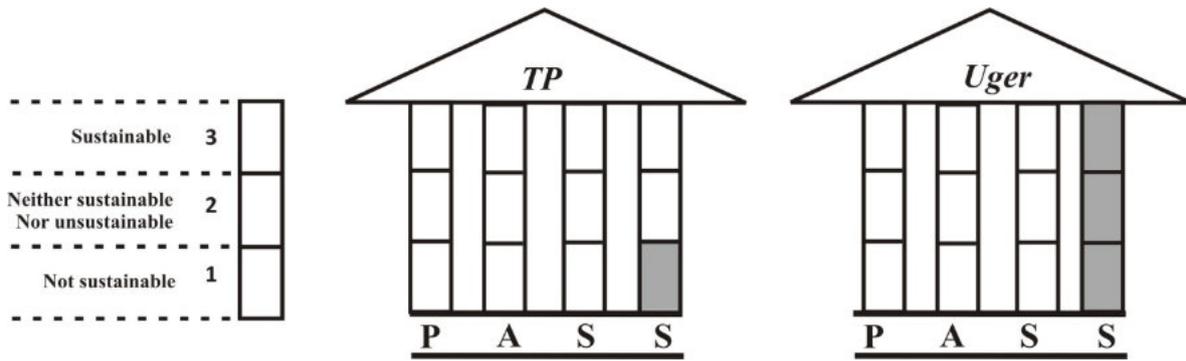


Figure 5.17 Visual representations of PASS Scores for Pillar S, *Samaj/Social* for *TP* and *Uger*

From Study 2 we take the same 3 factors for the social dimensions.

Table 5.18

The different parameters assessed for social.

	<i>Rutumitra</i>	<i>Uger</i>
Design and function	Seen as secure, prone to shifting	Seen as secure due to button feature
Maintenance of products: Washing / Drying Or Disposing	Seen as very easy to dispose	Seen not very difficult to maintain but time taking. But also not rejected
Product preferences	Seen as a good product. Users happy to use it if there was no cost involved	Seen as a good product. Users happy to use it if there was no cost involved
	Sustainable = 3 factor Not Sustainable = 2 factors	Sustainable = 2 factors Neither sustainable nor Unsustainable = 1 factor
PASS Score	3	2

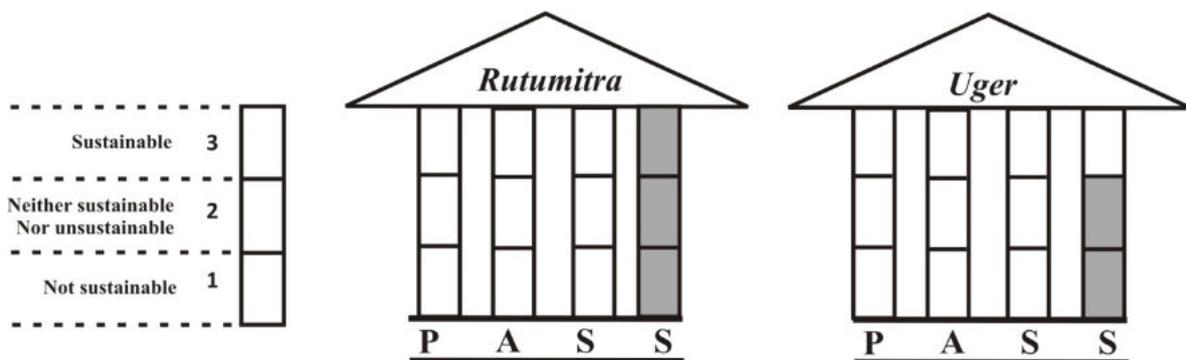


Figure 5.18 PASS Scores for Pillar S, *Samaj/Social*, for *Rutumitra* and *Uger*

5.7 Summary

Uger pads were developed as a solution to **RQ 1**, “*How can we make the management of menstruation sustainable?*”. We can see from the analysis that while *Uger* is sustainable, and has been accepted by users, the convenience of disposable pads must be acknowledged. As stated in the report *Menstrual Health in India - Landscape Analysis*, “The majority of sanitary pads sales occur in urban areas, rural areas still accounted for 32 % share in 2014.” (Murlidharan, Patil & Patnaik, 2015) The gap between those who purchase DSNs and those who do not, is closing at a rapid rate. The practical reality is the aspiration for disposable napkins, and its use can no longer be assumed to be restricted to urban contexts. What can deter the user from future purchase of disposables is affordability and the availability of infrastructure for disposing. However if *Uger* can be made affordable to rural communities with low resources it can be a tool for achieving sustainability of menstruation. These are discussed in Section No 6.

For RQ 2 and RQ 3 – “*How can Menstruation Management Sustainability be measured?*” and “*How can we holistically compare for menstruation management sustainability between different menstrual products and management systems?*” We have been able demonstrate visual PASS scores from the two studies. For health effects such as rash and boils there is no new or significant health impact from *TP*, *Rutumitra* and *Uger*. In terms of social dimensions we used only three dimensions for social pillar as examples, there can be many more dimensions for measuring and comparing. What has come through while is it is possible to score one device over the other, it is also not very simple. We also anticipate that as we add more dimensions the scores will change, which may be the limitation in the design of the PASS tool. At the same time it has the flexibility of allowing the assessor to decide the number of dimensions at the start of the assessment

In the next chapter, 6 we assess the three menstrual products, *TP*, *Uger* and *Rutumitra* through the PASS tool from two dimensions environment and economics.

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Chapter 6

Assessing Environment and Economic Aspects of Menstrual Devices through PASS

6.0 Introduction

The PASS tool has four dimensions. In chapter 5, we assessed three menstrual management products, namely *TP*, *Rutumitra* and *Uger* against two of these dimensions, social aspects and health. In this chapter we assess the three products against the other two aspects, environment and economic.

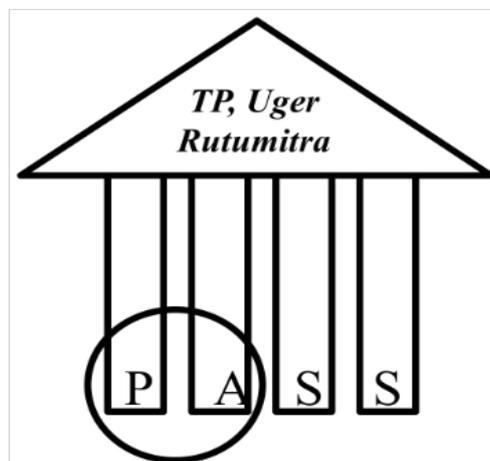


Figure 6.1 The PASS Tool, circling the two aspects, P, *Paryavarana*/Environment and A, *Arthik*/Economic

In the assessments around environment and health we considered *TP, Rutumitra* with *Uger*. The assessments conducted in this chapter answers RQ 2 and RQ 3 and were done in the following way to compare the multi-dimensions of the three menstrual devices.

For assessing environment dimensions Pillar P, *Paryvaran*, we conducted two studies

- Study of menstrual debris (section 6.1)
- Assessment of four menstrual devices (section 6.2) done through PASS

For assessing economic dimensions of Pillar A, *Arthik*, we considered

- Cost of menstrual products (section 6.3.1)
- Cost of maintaining (section 6.3.2)
- Cost to time (section 6.3.3)
- Health costs related to menstrual devices (section 6.3.4)
- Costs associated with disposal (section 6.3.5)

6.1 Study 5 Study of Menstrual Debris

All used menstrual products generate waste or debris. Once a menstrual device is of no use, that is when it is no longer able to perform the function of managing blood and other discharges, it is discarded. This waste is defined in the resource book of MHM Alliance (2017-2018) as:

“Menstrual waste refers to blood and used and discarded menstrual absorbents, including cloth, disposable sanitary napkins, tampons, and other substances or materials that girls and women use to soak up or hold blood during menstruation.”

When users simply throw away waste in an open field or on the road, this action is the first negative impact on the surroundings, it is visually unpleasant as menstrual devices strewn around become an eyesore. In urban areas menstrual waste is cleared by municipalities.

Urban areas generate larger volumes of menstrual debris as compared to rural locations. The waste is not segregated and is mixed with general waste, termed solid waste. These large volumes became very apparent when we conducted a small study at IIT⁶³, Bombay. We learned from discussions with team members of the Public Health Office (PHO), at IIT

⁶³ IIT - Indian Institute of Technology

Bombay, Ms Fatima Banu, Mr Rajesh Rokhde and Mr B.S. Patil between Oct – Nov 2011 who coordinate Solid Waste Management (SWM) . The campus generates 3 to 5 tons of garbage every day. The garbage load increases to 7 tons on days like festivals or major conferences, when the waste consists of leftover food, flowers and other materials. Dry garbage such as paper and other recyclable material that come in from departments on the campus are taken away by Shri Mukti Sanghtan for processing/product development. The PHO team helped us to track menstrual debris. The journey of used menstrual devices begins with menstruators placing used sanitary napkins a dustbin in the bathroom. The dustbins are emptied by the cleaners and taken away to a location on the campus referred to as “Behind Power House, Hillside”. Refer to Figure 6.2.

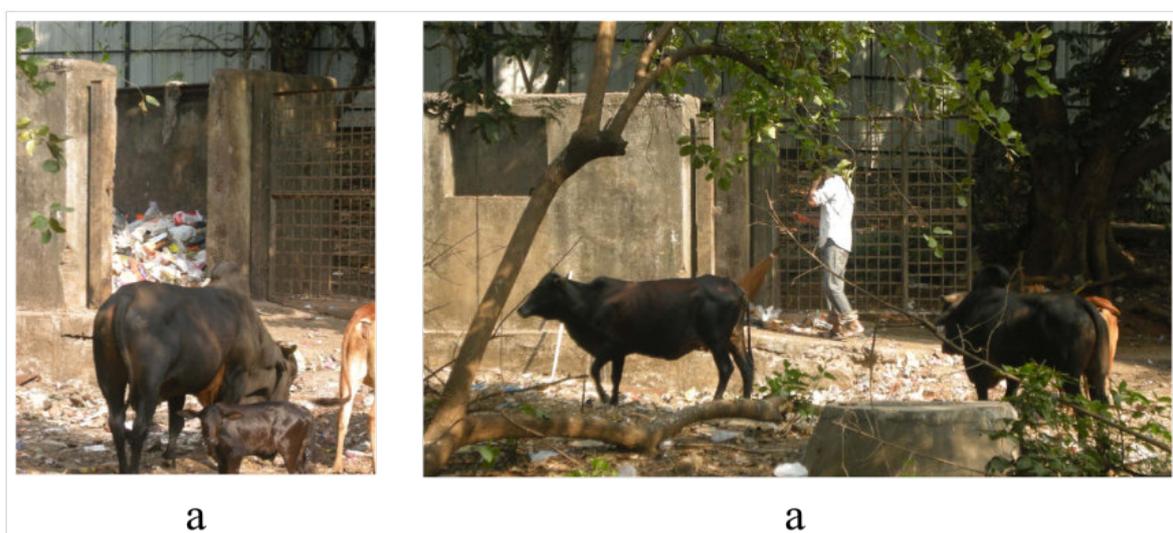


Figure 6.2 Garbage dumping location, “Behind Power House” at IIT Bombay

From here, the garbage is picked up every other day by the BMC⁶⁴ vans and taken away to landfills. Currently its final journey is the Mulund landfill. The PHO team shared that earlier the garbage made its way to the Deonar land fill which is currently choked.

We studied menstrual waste from a girls hostel, hostel no 11, on 21st October, 2011. Table 6.1 shows that of the total amount of waste generated, 53.8 Kg of mixed waste, both wet and dry, 3.76 % of the waste was of sanitary napkins.

Table 6.1

Waste generated from hostel no 11, October 21st, 2011

⁶⁴ BMC – Bombay Municipal Corporation

	Garbage type	Weight
1	Paper and corrugated board	8
2	Plastics	8
3	Tetrapack	8
4	Cloth	2
5	Bottle/Glass	0.3
6	Wrappers	2
7	Wet Garbage	7
8	Mix	2
9	Wood	0.5
10	Rubber Shoes	3
11	Miscellaneous (aluminium)	6
12	SANITARY NAPKINS	7
	Total	53.8

Table 6.2, shows types of waste generated on 27th October, 2011, in hostel 10 of 400 women. Out of 30 Kg of mixed waste, 7 kg was sanitary napkins, 20% of the overall waste. Refer Table 6.2

Table 6.2
Waste generated from hostel no 10, October 27th, 2011

	Garbage type	Weight
1	Paper and corrugated board	11
2	Plastics	4
3	Tetrapack	0
4	Cloth	0
5	Bottle/Glass	0
6	Wrappers	1
7	Wet Garbage	6
8	Mix	1
9	Wood	0
10	Miscellaneous	0
11	SANITARY NAPKINS	7
	Total	30

In spaces with a concentration of women such as a hostel, the amount of menstrual debris will be higher when compared to waste from other locations. We studied the figures from other locations. The unsustainable nature of disposable products became clearer to us when we

learned about menstrual waste generated from a single residential area of Udaipur, in South Rajasthan. 100 households generate 8 kgs of sanitary waste, a mix of menstrual and infant and adult diaper waste, roughly 6% of total waste, as told to us by Kaniyalal Dangi of the NGO *Suchi Abhiyan* at Udaipur city. Udaipur city is two and half hours away from the location where we conducted our first trial (also our practice area). If and when DSN (and diaper) usage increases in these locations, as they have in urban areas, we anticipate similar remnants of menstruation management devices and diapers. Both DSNs and diapers contain the same raw materials, which we will come to when we assess raw materials in section 2.2.2.1. The researcher, along with Kaniyalal made a visit to the dumping site at village Titardi on the outskirts of Udaipur, in October 2013. At the time of the visit, a dumping truck had just come in off loading garbage. The dumping site itself was smoking, refer Figure 6.3. There were animals around the dumping site foraging for food including young adolescent girls looking for materials that they could sell for their livelihood, Figure 6.4. Looking at the overall garbage scenario, it was evident that the health of the communities living around that garbage would be impacted from this dumping site, from soil pollution, water pollution and air pollution.

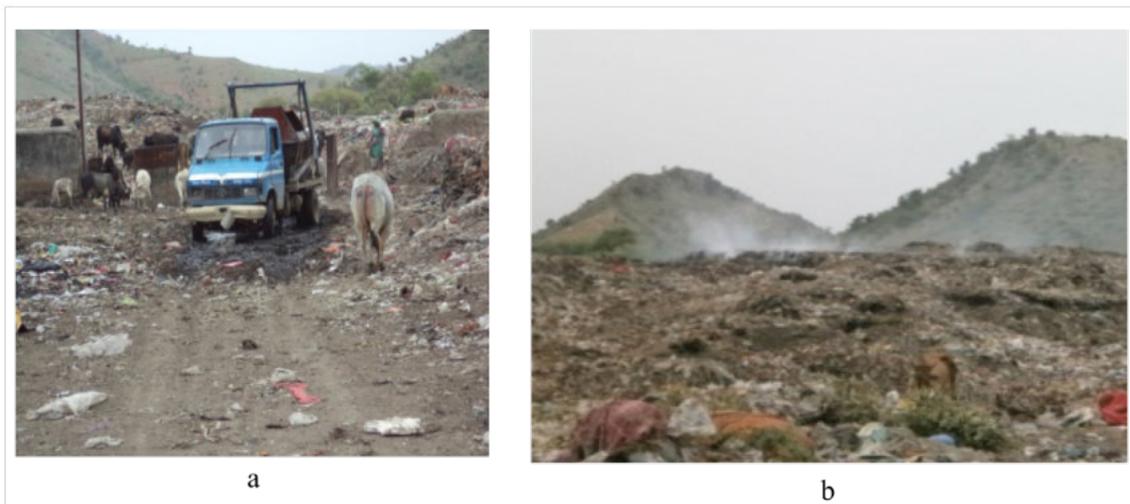


Figure 6.3 (a) Trucks off load garbage at dumping site at Village Titardi, outskirts of Udaipur
(b) Smoking dumping site at Village Titardi



Figure 6.4 Cows forage for food while young adolescents sort waste

We also looked at garbage issues in the city of Bengaluru in India, as the location of trial no 2 previously described in Chapter 5, is approximately 2.5 hours from Bengaluru. From a conversation with Rajesh Babu of NGO Swacha, Bengaluru, in September of 2015, he shared with us the following fact: a minimum of 800 tons of diaper and sanitary napkin waste reach the landfills in and around Bengaluru every few days. Used menstrual products lie buried along with other trash. According to Rajesh Babu, most often these items remain in a preserved condition under large amounts of other mixed garbage both wet and dry. The core of the sanitary napkin and of disposable baby and adult diapers⁶⁵ is trapped between layers of polymer stopping disintegration processes. According to Afsar, Kumar & Alam (2015), who have studied three saturated landfill sites in Delhi region “Leachate from open dumps finds its way into ground water.” There are high levels of soil and water pollutions from dumping sites. These are not monitored and the authors have recommendations for treating leachate.

Disposable products appear to be an unsustainable menstrual device going just by the amounts of debris alone. Roe (1992) says; “*The commercial production of menstrual products results in environmental exploitation and degradation. This is in conflict with the objective of sustainability.*” The negative impact from DSNs when it was first invented and commercialised was never fully anticipated. The focus of “sustainability” in the early years, refer section 3.2, was only on conserving nature with not much attention being paid to social, economic or health. Bobel (2010), sums up:

⁶⁵ Disposable absorbents such as sanitary napkins and diapers are made of similar raw materials, in different proportions.

In its 1971 product launch ad, Kotex depicted a fashionably dressed woman joyfully kicking a box of New Freedom pads. The copy reads: “Whee! They’re flushable! Welcome to the beltless, pinless, fuss-less generation!” The pollution attached to single-use products had not yet registered, perhaps because the environmental movement was just beginning its transition from a conservation-focused enterprise. Bobel (2010)

In contrast to urban menstruators, rural menstruators have to take responsibility for the waste they generate as they have no external agency like a municipality to clear their garbage. Therefore users burn or bury in both locations where we conducted our trials (South Rajasthan /Karnataka). Rural users bury their menstrual products in the fields or in the backyard of their house. We know from our previous work in the field that they dig a small hole deep enough approximately one foot deep, bury the menstrual device and then cover it with soil, placing a stone on it so that dogs cannot dig it out.

During a field visit to rural Jharkhand in November 2016, we learned that users bury pads in the village pond. We were shown the pond at village Chamrabad, by Lindsey Barnes, who heads the NGO Jan Chetna Manch⁶⁶, Bokaro:

“Young girls use disposable pads that they get from school which they bury in the dry parts of a pond when they bathe. During monsoon the pads swell up with water due to the gel present in them and begin to float. This causes damage to pond life, besides being visually unpleasant.” Lindsay Barnes, founder of the NGO.

Mukherjee (2017), who has done a pilot study in the same village, has also found that this is common practice. We did not come across this method of burying during both our trials but the possibility of this cannot be discounted in locations where there are water bodies. There is no doubt that these are serious environmental concerns as Adams (2006) points out that once a lake is polluted it can create ecological imbalance.

"Polluted lakes do not necessarily return to their former state when pollution stops; climate cannot be expected to vary around some mean approximating to the conditions of the last 30 years."

“Deep burial” is recommended for disposable sanitary napkins by the MHM Alliance (2017-2018) with a specification that it is best to dig a pit one metre deep in order to bury disposable

⁶⁶ The researcher was a consultant to Jan Chetana Manch - MHM training programme

sanitary napkins. Users are not aware of these recommendations, and do not dig deep enough as described earlier.

While we will come back to assessing environmental dimensions of disposal later in the thesis, we will now discuss issues around the burning of waste. On the World Health Organisation's website there are alerts around burning health care wastes it says:

“Open burning and incineration of health care wastes can, under some circumstances, result in the emission of dioxins, furans, and particulate matter.” (Health Care Waste, WHO, 2018)

“Incinerated materials containing or treated with chlorine can generate dioxins and furans, which are human carcinogens and have been associated with a range of adverse health effects.” (Health Care Waste, WHO, 2018)

Similar alerts are present in other guidelines.

“Burning of waste and especially of plastic based sanitary napkins is not recommended, as it emits toxic compounds.” MHM Alliance (2017-2018)

While the Central Pollution Control Board (CPCB) of India has specified standards for bio-medical and common incineration facilities and emissions, (Guidelines for Management of Sanitary waste, 2018) there are a variety of incinerators in the market, such as *matka* (earthen pot) incinerator a low cost option that may not be adhering to these standards. One such model has been developed by Vatsalya Foundation (Desai, 2015), and is sold under the brand name *Ashuddhinashak* – and is commonly used in rural Gujarat. The burning temperature that is reached in these type of incinerators is lower than recommended, with a burning temperature of 300 degrees. The contradiction here is that the SWM guideline lists it as an option, while safe burning is between 850-1100 °C.

“Only modern incinerators operating at 850-1100 °C and fitted with special gas-cleaning equipment are able to comply with the international emission standards for dioxins and furans.” (Health Care Waste, WHO, 2018)

For burning of large volumes of used menstrual devices, the methods recommended by MHM Alliance (2017-2018) are autoclaving, composting, chemical treatments and recycling. From literature we learned that open burning of cotton fabric releases Formaldehyde and Acrolein, both organic compounds that are toxic when inhaled (Chemicals released during burning,

2008). However the emissions from one or two single pieces cloth by individual users within a community can be considered insignificant, according to govt of India MHM guidelines: *“However, plain cotton clothes of degradable sanitary material can be burnt provided that there are no better options available.”*

We contacted Dr. Nitin Labhasetwar, Chief Scientist at CSIR-National Environmental Engineering Research Institute (NEERI), Nagpur for his opinion on burning. He confirmed that it is not easy to reach a firm understanding of this as the composition of different elements within a DSN is not the same. Refer appendix VIII for email correspondence.

Menstrual health activist Shradha Shreejaya, ecologist and coordinator at Thanal Trust, an NGO in Kerala has studied and analysed three SWM laws, the Bio-Medical Waste Rules, 1998, the Plastic Waste Rules, 2011 and Municipal Solid Waste Rules, 2016 to understand where menstrual debris fits. According to her, the Municipal Solid Waste Management Guideline in India (2014), for treatment of menstrual waste is unclear:

“The treatment of menstrual hygiene waste as biomedical waste faces opposition from municipalities due to the sheer volume (an estimated 5% of all MSW) and complex logistics associated with separate handling of this stream of waste.”

“Even though commercial sanitary napkins contain a significant amount of plastic, this law (plastic law) does not clearly state that commercial sanitary napkins and diapers come under its purview. It is left up to the court to interpret the law in this context.”

There is a section on Extended Producer’s Responsibility (EPR) in waste management guidelines of India, we find here that the municipal authority may ask manufacturers – either collectively or individually – to provide the required finance to establish waste collection centres. This appears to have not been implemented. Due to this apathy, in protest, the waste pickers from an NGO - Solid Waste Collection and Handling (SWaCH) in Pune, forced companies to wake up by parcelling used sanitary napkins to multinational agencies, Johnson & Johnson, Procter & Gamble, Hindustan Unilever Limited and Kimberley Clark, (Desai, 2013) (Wastepickers protest, 2013). Despite this effort, multinational companies so far have not taken up any responsibility for environmental clean up, we can assume that companies may have taken advantage of the fact that menstrual waste lies in a grey area within the Solid

Waste Management Laws. Thanal Trust, in Kerala has been filing public interest litigations demanding that:

- (a) Menstrual products be considered essential healthcare products so they are treated as Bio Medical Waste
- (b) Information about raw materials be clearly stated on disposable products
- (c) Producers be held accountable for the waste and contribute to management of waste

Menstrual waste is certainly a cause for concern and this warrants not one, but many solutions. Barman, A. et al. (2017) have calculated and projected the volumes of menstrual waste over the population in India.

India being a developing country, with a population of 1.34 billion, out of which 323.6 million female are between the age group of 15-49. If we consider that 10% of Indian women use disposable sanitary pad then each individual will generate at least half a kilo of waste a month. In that way, 10% of the female population in India will generate 16180 tons of waste every month. (Barman et al., 2017)

Managing menstrual waste in India (2019), a fact sheet from the environmental magazine Down To Earth, reports that:

There are 336 million menstruating women in India, of which 36 per cent use disposable sanitary napkins — that totals to 121 million women as estimated by the Menstrual Hygiene Alliance of India (MHAI).

Summarising the discussions around debris, we can clearly see that conversations must intensify on the burden and impact of menstrual products on environment. Potential solutions for sustainable living have to be urgently put into practice by all humans; Ross (2009) called for a new ethic urging each individual to become involved in protecting the earth.

“A new ethic is required which advocates the need to operate within ecological carrying capacity of the earth. Ecological sustainability imposes duty on everyone to protect and restore the integrity of the earth’s ecological systems.” (Ross, 2009)

If we were to examine the 17 Sustainable Goals (Sustainable Goals,2015) set by the United Nations, some of goals listed can be directly linked to menstruation management. Menstrual products in our view fits into Goal 11: Sustainable Cities and Communities and Goal 12: Responsible Consumption. In this scenario reusable options are a potential solution. Menstrual debris is indeed a challenge and poses a threat to surroundings. In the next section

we assess four menstrual products through the dimensions of Pillar P, environment through production, maintenance and end of life stages.

6.2 Study 6,7,8,9 Assessing Pillar P, *Pariyavaran*/Environment of Three Menstrual Devices through PASS

Menstrual devices have three environmental dimensions, the production phase, the maintenance phase and the end of life phase, refer to Figure 6.2. For assessing the environmental dimensions we considered these three aspects.

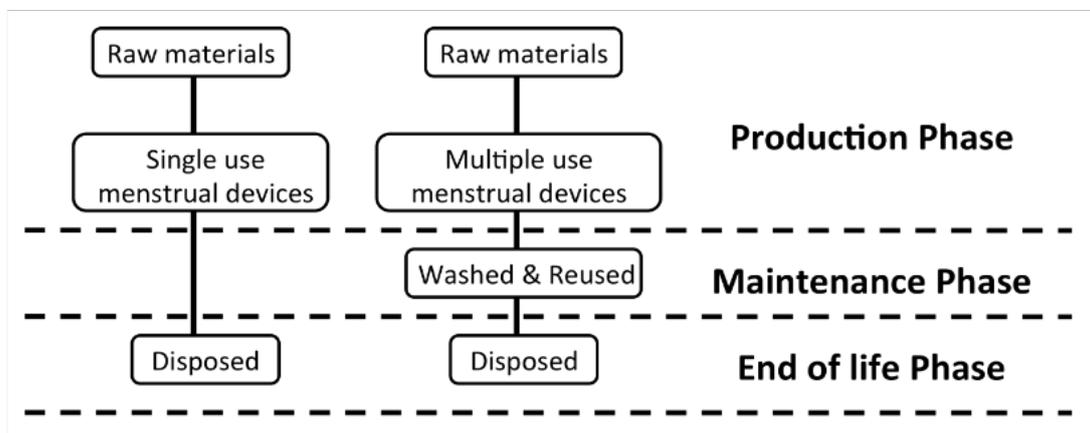


Figure 6.5 Three phases for assessment of Menstrual Devices for environment

- The production phase includes calculations for all aspects related to the making of menstrual device. These include first making an inventory of raw materials, then calculating for water and energy used during extraction processes, production, procurement, manufacturing processes, packaging (both bulk packing and individual unit packing) and transportation
- The maintenance phase includes the amount of resources used to maintain the device, such as water and soap, clothes brush for cleaning, sunlight and privacy for drying and a place for storing for use the next time.
- The end of life includes the number of menstrual products used and the impact of these devices at the time of terminal disposal.

6.2.1 Assessing *TP*

6.2.1.1 Production Phase

(a) Raw materials

TP (*TP*), a flannel/ poly acrylic standardized product in terms of both colour and size widely available in the local markets has been previously described in Chapter 2. Refer appendix IX and appendix X for lab analysis, which has been identified as polyacrylate (polymer /plastic /synthetic based) by the textile laboratory at Bansthali University, Rajasthan. To the best of our knowledge we found no studies on the production processes of *TP*.

(b) Packaging materials

Here we consider packing material at the point of purchase, at a time the user buys *TP* from the shop keeper. *TPs* come in a bulk packing of 24 pieces (section 2.3). This is sold “loose” and does not come in any individual wrapping. So we have considered no resources used for packing at the time it reaches an individual user.

6.2.1.2 Maintenance Phase

From Trial no 1 we learned that each time a *TP* is washed, water used is estimated at 4 to 7 litres. We have taken an average of 3 *TPs* per day over four days, which comes to approximately use of 12 *TPs* per menstrual cycle. Taking an average of 4 litres of water per cloth, this comes to 48 litres of water used to maintain *TP* per cycle. Users have estimated “less than half a cake” of a detergent bar per cycle, 5 to 10 minutes to wash one *TP*. Taking an average of 6 minutes X 3 *TPs* X 4 days it will take 72 minutes per menstrual cycle. In 40 to 45 degrees heat it takes 40 minutes for cloth to dry, in 38 – 40 C within 50 minutes and 1 to 2 hours in rainy season under a fan.

6.2.1.3 End of Life Phase

(a) Number of Devices

From trail 1, we learned from users that *TP* lasts 4 to 5 cycles. 3 to 6 *TPs* are discarded at the end of this period. The number of *TPs* discarded over 12 cycles is 16 and about 480 pieces of cloth will be discarded in a 40 year reproductive health life span.

(b) Terminal Disposal

While there are many studies on decomposition of different fabrics, we found no research related to decomposition of the *TP*. We simulated actions of rural menstruators. We buried and burned *TP*. We buried two *TPs* using one site as the garden of the office of Jatan Sansthan and the other site as the garden of the researcher’s home. The hole in which the *TPs* were placed was approximately 12 inches deep. We unearthed it after six months, it was almost intact, with no sign of any disintegration. Refer figure 6.6. The laboratory report had

classified this as synthetic material. In a study from the USA, Li, Frey & Browning (2010) tested cotton and polyester fabrics under laboratory conditions. They found polyester fabrics almost intact on burying:

“a slight initial degradation, but the fabric (polyester) was still intact after testing under both laboratory conditions and the compost environment.” (Li, Frey & Browning, 2010)



Figure 6.6 Photo of TP buried for 6 months, when unearthed was intact

We conducted one experiment by burning TP by lighting a match stick to the corner of the fabric. It burned very quickly with an acrid smell leaving behind a black hard mass with a plastic like feel.

6.2.2 Assessing *Rutumitra* and Branded DSNs

6.2.2.1 Production Phase

(a) Raw Materials

MITU Foundation, the producers of *Rutumitra* pads were not aware of any raw material details. They had sourced everything required for setting up a DSN unit from Arunchalam Muruganatham, an award winning inventor and well known supplier of low cost machines and raw materials used in the production of DSNs. His business model is designed for rural SHG groups, (Jaishree Industries, n.d) (Venema, 2014) (Arunchalam Muruganatham, Wikipedia). NGO SHG⁶⁷ groups have been sourcing both machines and raw materials from him. According to Kala Charlu, founder of MITU foundation, Arunchalam’s team conducts training for women producer groups at the location where the unit is set up, even at that time no raw material information was shared even upon probing. The trainees are simply told to mix ingredients in different proportions of fluff and powder, grind it in a mixer and subsequently manually press mould the pads. The two ingredients the researcher found later

⁶⁷ SHG – Self help groups

was, one the absorbent core that is cellulose or fluff (Fluff pulp for hygiene products,n.d) and two, SAP (Superabsorbent polymer) powder, also called slush powder, (SAP- LG, n.d) (SAP, n.d). We will come to this later in this section. MITU on their own initiative got an absorbency test done, refer appendix XI for laboratory report.

The researcher visited the *Rutumitra* pad production centre, refer Figure 6.7 (a) and (b) and Figure 6.8 (a) and (b).



Figure 6.7 (a) MITU Foundation Sanitary Napkin Centre Name Board
(b) Centre unit at village Turuvekere



Figure 6.8 (a) Women working at the unit (b) Ready to pack *Rutumitra* pads

Rutumitra pads made by MITU are pads without wings. It has a top-sheet – which is a fluid permeable surface, followed by an absorbent core, with an impermeable backing with adhesive, which can be pasted on to the crotch of the underwear.

Since MITU was not aware of the composition of raw materials in DSN, they printed no raw material information on the plastic packet of their DSNs. Refer appendix XII for *Ritumitra* packet information. Next we examined the packing of pads developed by other SHG groups, such as Sakhi pads refer appendix XIII. We also examined four brands of branded sanitary napkins available in South Rajasthan and in Dodabellapura, Bengaluru (the nearest town for the trial site no 2). The brands *Sofy*, *Stayfree* and *Whisper* were common to both areas, whereas we saw the brand *Don't Worry* only in Rajasthan, refer appendix XIV for information on outer packing. We saw that there was a variety of textual information, such as number of pads in packet, licence, registration and trademark information, directions for disposal, information about wings, freshness, scent and wetness locking features, location details of the manufacturing unit, and instructions for wearing. We found no information about raw materials in the products, the only factors to suggest that the products may not bio degrade if thrown in the latrine were “*Do not flush pads. It may cause clogging of drains.*” We had previously mentioned in Section 5.3 that Sofy pads have a skin allergy alert to suggest that there are chemicals which may not agree with some users.

Woeller & Hochwalt (2005) in their study, describe materials in DSNs as:

“ In brief, the topsheet is a polyethylene/polypropylene non-woven fabric bearing an emollient finish; the core comprises a two-layer, low density, open-celled, polyacrylate polymer foam; and the back sheet consists of an impermeable pigmented polyethylene film with a panty-fastening adhesive. Scented versions of the pad contain a small amount of perfume applied between the back sheet and the under surface of the core.”

They have they listed raw material compositions, refer Table Table 6.3

Table 6.3

Source: Study: *Safety assessment of sanitary pads with a polymeric foam absorbent core* Woeller & Hochwalt (2005)

Component	Function	Raw material composition
Topsheet	Fluid permeable surface cover that is soft to the skin and allows fluid to penetrate	Perforated non-woven fabric of polypropylene/polyethylene fibers
Emollient	Potential comfort and skin moisturizing benefits	Petrolatum based formulation
Absorbent core	Absorb and capture fluids	Polymeric open-celled foam

Perfume	Scent	Fragrance raw materials
Backsheet (printed)	Moisture impermeable barrier	Low density polyethylene film with pigments
Adhesive	Fasten pad to the undergarment	Polyaromatic/polyolefinic block copolymers, hydrocarbon resins, mineral oil

The EDANA Sustainability Report has details of the layers within a DSN, raw material within a *Rutumita* pad can be estimated from this. Refer figure 6.9

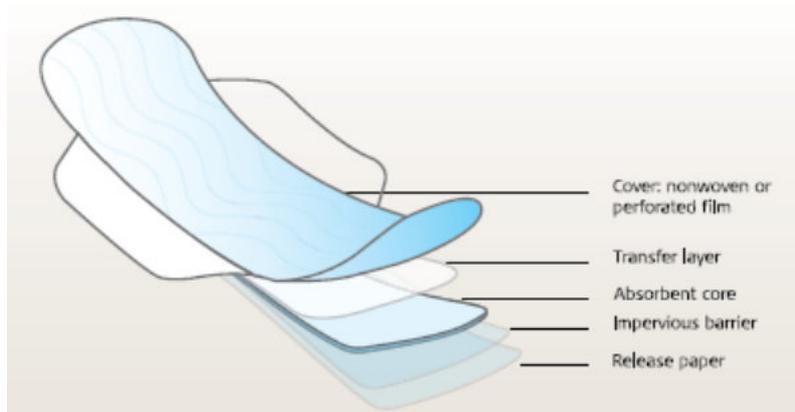


Figure 6.9 Source: Schematic drawing of an ultra thin DSN, EDANA Sustainability Report 2007-2008

From the same report we were able to estimate the different proportions within a *Rutumitra* pad.



Figure 6.10 Average ultra thin sanitary pad composition EDANA Sustainability Report

We conducted our own experiments by cutting open a branded sanitary napkin. Refer figures 6.11, 6.12 and 6.13

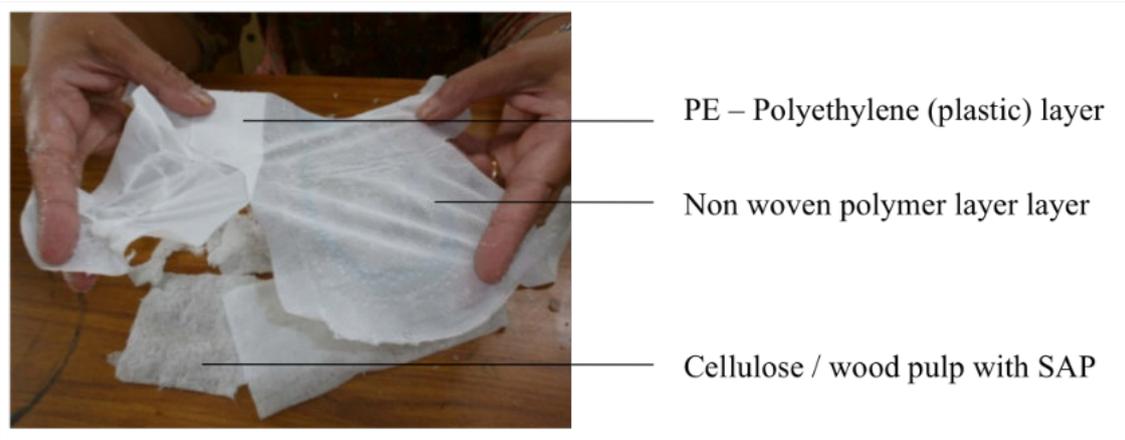


Figure 6.11 Separating a generic DSN

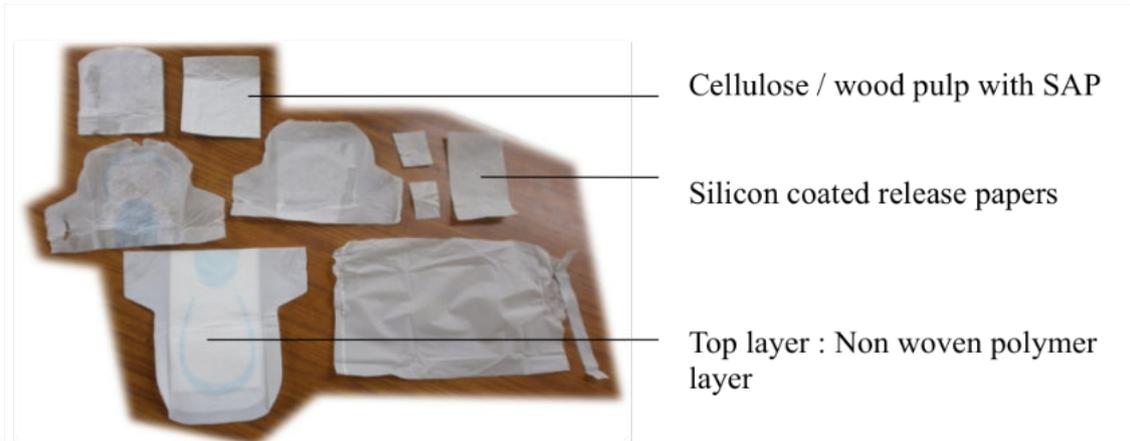


Figure 6.12 Parts of a DSN

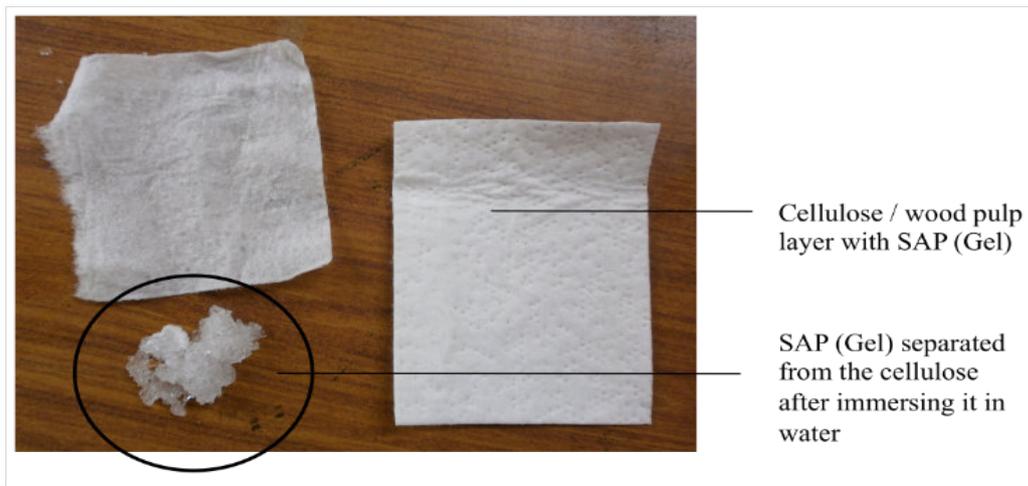


Figure 6.13 Separating gel from the cellulose layer

Barman, Katkar & Asagekar (2017) from a textile and engineering institute in Maharashtra, India, have studied raw materials in DSNs. We quote from their study:

“Material which are used in feminine hygiene product are derived from natural resource mostly petroleum based which cannot be reused or compost and at the same time over-exploitation of these resources have to be stopped otherwise nothing will be left for our future generation.”

Further they have studied the bio degradability of DSNs:

“Few components of sanitary pad will disintegrate and be attacked by the bacteria in a public or private sewage disposal system but polyethylene or polymeric films used as a barrier sheet remain intact as this polymer are inert and are not broken down by bacteria and thus pollutes the environment.”

Upon conducting an internet search for “Supply of raw materials for disposable sanitary napkins” we found many sites selling raw materials, corresponding to all the raw materials we have found in our review. From two websites, Alibaba and Made-in-China (Supply raw materials, n.d), we saw that the materials were similar to those from the earlier quoted studies: absorbent core, gels, adhesives, silicone coated release papers, plastic sheets and others.

(b) Packing Materials

At the point of distribution of the pads in the trial, each *Rutumitra* packet made of plastic, came with 4 pads in it. Users used on an average 3 packets at the end of each cycle. This is 3 plastics packets per cycle, over 12 menstrual cycles this will mean 36 plastic packets.

6.2.2.2 Maintenance Phase

Rutumitra, requires no maintenance as it is used one time, wrapped in a newspaper or in a piece of plastic and discarded. Users took between 30 to 40 seconds and repeated this 3 times day. This is roughly 2 minutes per day X 4 days = 8 minutes per menstrual cycle. We will come back to this when we assess cost to time in the economic section 6.3.3.

6.2.2.3 End of Life Phase

(a) Number of Devices

10 to 12 napkins are discarded at the end of each cycle, this amounts to 180 pads at the end of 12 cycles and 4800 pads in a 40 year reproductive life span.

(b) Terminal Disposal

Open burning or burial are ways used by rural users to dispose used menstrual products. In trial no 2, users burned *Rutumitra* in the *hande vole* or stove for heating bath water. Pads are placed in the chamber described previously in section 5.3, Figure 5.12.

We conducted our own experiments. *Rutumitra* pads were set alight by a match stick, but with no coconut fronds. It burned quickly with an acrid smell leaving behind a plastic black mass.

Due to over-sight the researcher had not buried *Rutumitra* while in Karnataka. Instead she buried *Whisper* pads in her garden and in the garden of Jatan Sansthan Office at Udaipur. The hole in which the pads were placed was approximately 12 inches deep. One pad was buried cut in half so has to expose a cross section of the pad. Another pad was torn up and buried. The tearing action was done to see if smaller pieces break down faster. We, however, found not much difference. The pad had disintegrated after 6 months, but only to a small extent, the materials still remained recognisable as sanitary napkin, refer Figure 6.14. According MHM Alliance (2017-2018) book, “*The SAP (in the Napkin) does not allow the otherwise compostable absorbent core, to degrade either, thus limiting waste reduction.*”

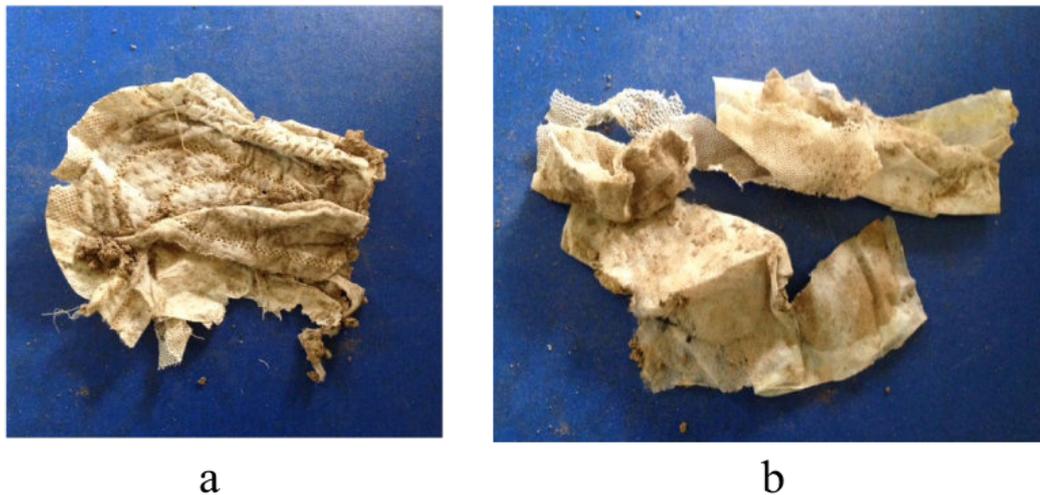


Figure 6.14 (a) Pad cut in half and buried (b) Pad torn up and buried

6.2.3 Assessing *Uger*

6.2.3.1 Production Phase

(a) Raw Materials

Uger, made from cotton fabric, was developed as a sustainable menstruation management tool in answer to RQ 1, which has been previously detailed in Chapter 4. The raw materials of *Uger* are cotton fabrics of 4 varieties, printed Poplin (top), White cloth (bottom), Casement (inner layer) and brushed cotton flannel (towel). The buttons for fastening *Uger* are made of metal. We have not calculated for water use and energy to produce these raw materials, these are beyond the researchers' skill sets. However, we have made estimates from secondary sources. For assessing water use for cotton fabric, we have used Water Foot Print (WFP)⁶⁸ calculation of a cotton shirt, which has been calculated as 2700 litres, by Hoekstra (2009). We can assume that two meters have been used to make the shirt, from the same two meters of fabrics we can make ten *Uger* pads. Going by this rough estimate, a ball park figure of water required to create an *Uger* pad is 270 litres. Chapman, A, (2010) says production of synthetic textiles requires far more energy than the production of natural fibres. At the same time his study says that cotton production produces less green house gases.⁶⁹ If we were to look at what is more sustainable, it will require detailed calculations which have not been attempted as it is beyond the scope of this research.

(b) Packing materials

Uger is packed in a cotton bag or potli made from cotton fabric containing two pads. 3 cotton *potlis* are required every one and half years or 18 menstrual cycles.

6.2.3.2 Maintenance Phase

From Trail no 1 and 2, we learned that for *Uger* water use is estimated at 8 to 10 litres. We have taken an average of 2 *Uger* pad holders with three insert towels per day over four days, which comes to approximately use of 20 items per menstrual cycle. Taking an average of 7 litres of water per item, this comes to 140 litres of water use to maintain *Uger* per cycle. Users have estimated “more than half a cake” of a detergent bar per cycle, 10 to 12 minutes to wash one *Uger*. Taking an average of 11 minutes X 4 *Uger* (2 holders + 2 towels) X 4 days it

⁶⁸ “The water foot print of a product is an empirical indicator of how much water is consumed, when and where, measured over the whole supply chain of the product” (Water Foot Print Network,n.d).

⁶⁹ Reference - <http://envormation.org/environmental-footprint-of-clothes-and-comparison-of-cotton-and-linen-flax-fabric/> Environmental footprint of different textiles and comparison of cotton and linen (flax) fabric

will take 176 minutes per menstrual cycle. For drying *Uger*, in 40 to 45 degrees heat it takes 220 minutes for cloth to dry, in 38 – 40 C within in 50 minutes and 1 to 2 days in rainy season under a fan.

6.2.3.3 End of Life Phase

(a) Number of Devices

Collaborators during the design phase and users from trail no 1 and customers of *Uger* pads (we will refer to customers in Chapter 7 when we discuss dissemination) shared with us that *Uger* holders last more than 18 cycles, while the insert towel gets frayed by 12 to 14 cycle. The towels will get discarded before the holders. Users will use over an 18 cycles time frame, 6 pad holders and 12 insert towels. Over a 40 reproductive life span user will use 480 pieces of *Uger*.

(b) Terminal Disposal

We buried new *Uger* pads (that is not used by anyone). One *Uger* pad was opened up and buried flat, and the bother pad buried buttoned up. We assumed that users would bury an *Uger* pad buttoned up to conceal stains. An insert towel was buried next to it a little away. Both samples were unearthed after 3 months.



Figure 6.15 *Uger* pad kept flat and buried

The buttoned up pad had biodegraded figure 6.16 (a) and its appearance can be seen in figure 6.16 (b). The insert towel had bio degraded, figure 6.16 (b) When we unearthed the same spot after 6 months we found no trace of the *Uger* pad or the insert towel.

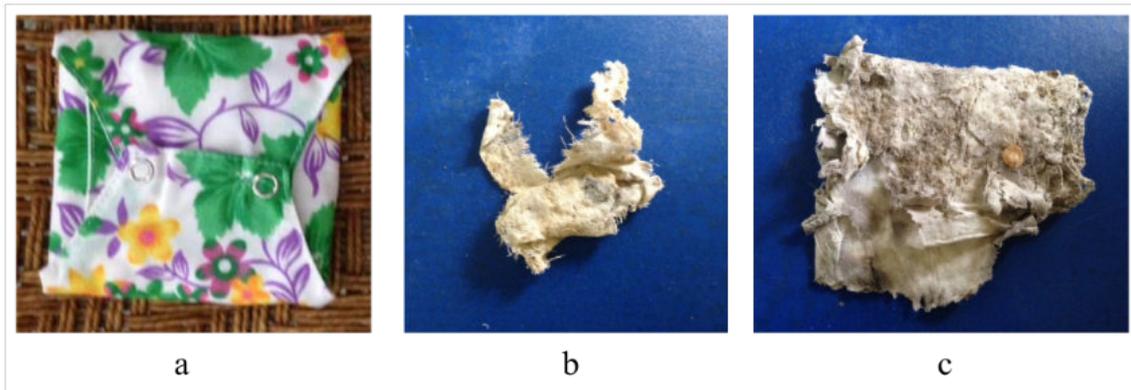


Figure 6.16 (a) *Uger* pad buttoned before burying (b) Insert Towel after burying for 3 months (c) *Uger* pad after burying for 3 months

A new *Uger* pad was buried lying it flat and unbuttoned. The pad had biodegraded in three months Figure 6.8. and there were no remnants after 6 months. In the case of *Uger*, the metal press buttons turned into a black rusted mass. We can assume that being metal it will eventually biodegrade.

We burned *Uger* pads by lighting it with a match stick. It burned slowly leaving behind ash like residue.

6.2.4 Summary of Assessments and PASS Scores for Pillar P

For any PASS analysis and subsequent scoring, two options are possible, a single dimension can be compared across products or we can compare multiple dimensions for a holistic picture, by adding scores from the individual dimension. Table number 6.4 summarizes all the assessments we have done for pillar P.

Table 6.4

Consolidated assessment for Pillar P, Paryavaran, Environment

Pillar P Assessment	<i>TP</i>	<i>Rutumitra</i>	<i>Uger</i>
Raw materials – water use	Not calculated	Not calculated	Not calculated
Raw materials – water use	Not calculated	Not calculated	Estimated from secondary source as 270 litres per pad
Packing materials* one cycle	None	3 plastic packets	3 cotton <i>potlis</i>
Packing materials* life time	None	36 packets per year X 40 years = 1440	3 <i>potlis</i> per year X 40 years = 120
Maintenance water one cycle	48 litres	None	140 litres

Maintenance water lifetime	48X12 X 40 = 23,040 litres	None = 0	140 X 12 X 40 = 67,200 litres
Maintenance soap One cycle	Less than half cake detergent bar	None	More than half a cake detergent bar estimated 75% of 1 bar
Maintenance soap lifetime	5 bars per year X 40 = 200 bars of detergent	None	9 bars per year X 40 = 360 bars
Number of devices one cycle	3 to 6	10 to 12	6 holders + 12 insert towels (over 18 cycles)
Number of devices life time	480	4800	4 holders + 8 insert towels per year X 40 years = 480
Terminal disposal if burying life time	No bio- degradation for 480 <i>TPs</i>	No bio- degradation 4800 if DSNs** are used	Bio degrading of 480 Ugers
Terminal disposal if burning life time	Burning 480 <i>TPs</i>	Burning 4800 <i>Rutumitras</i>	Burning 480 Ugers

*Packing material at point of purchase / at the point when device was given to user

** As previously explained *Rutumitra* was not buried

We did not consider water and energy use during production of the 3 menstrual devices as these calculations were beyond the skills of the researcher. Table 6.5 shows a life time analysis for the six parameters for the environment pillar, packing material, water use during maintenance, amount of soap used, number of devices used, numbers that will be burned or buried. (We have not calculated for water use during raw materials, no PASS score was calculated.

Table 6.5

Consolidated PASS scores for Pillar P, Paryavaran, Environment

	Life time	<i>TP</i>	<i>Rutumitra</i>	<i>Uger</i>
1	Packing materials	None	1440	120
	PASS scores	3	1	2
2	Maintenance water	23,040	0	40,320
	PASS scores	2	3	1
3	Detergent soap bars	200	None	360
	PASS scores	2	3	1
4	Number of Devices	480	4800	480
	PASS scores	2	1	2
5	Burying	480	4800 (if generic DSN)	480
	PASS scores	1	1	3
6	Burning	480	4800	480
	PASS scores	1	1	3
	Total PASS scores	11	10	12

We demonstrate the visual representation of PASS scores of the three menstrual products over a life time so that we can compare this over single dimensions. We will first show the scores for individual dimensions followed by consolidated PASS scores for all dimensions for Pillar P.

From Table 6.5 we can see that in terms of packing material *TP* scores over *Rutumitra* and *Uger*, however *Uger* score over *Rutumitra*. These individual assessments will help to take a decision on one single dimension of sustainability, demonstrating that a comparison is possible. *Rutumitra* appears to be the most unsustainable in terms of packing materials refer Figure 6.17.

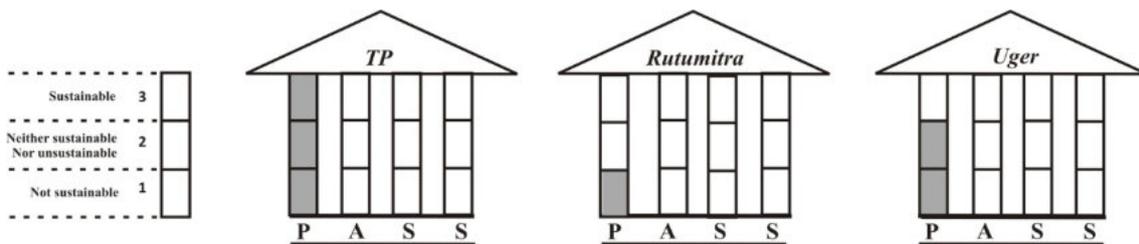


Figure 6.17 Visual representation PASS for packing material for menstrual products

Similarly we find that water use is the highest with *Uger*, refer Figure 6.18. Such an assessment, for example, will assist in taking an intervention decision if we are to introduce a product like *Uger* into a geography with limited water sources.

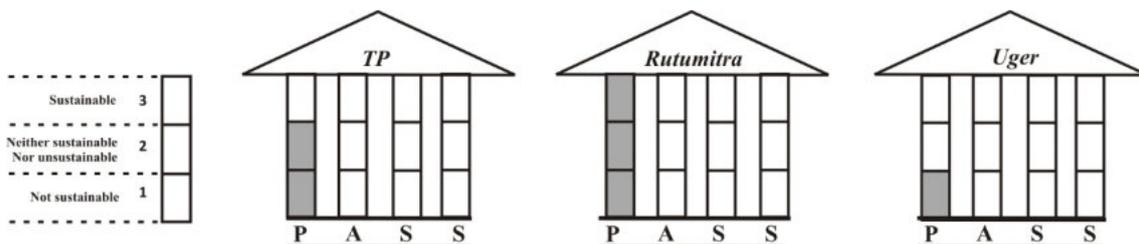


Figure 6.18 Visual representation PASS for water used to maintain menstrual products

For assessing the number of detergent soap bars used over a life time for the three devices, we will find the *Uger* needs the maximum number of bars followed by *TP* and none are required for *Rutumitra*. Refer Figure 6.19

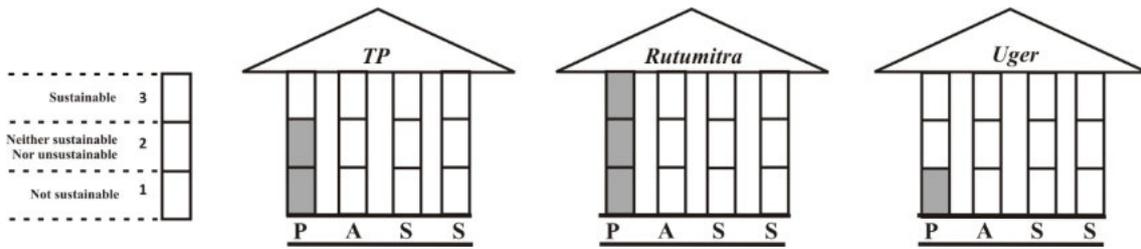


Figure 6.19 Visual representation PASS for number of soap bars required to maintain menstrual products

Looking at menstrual devices used over a life time, we can see the *Rutumitra* pads is the least sustainable with 4800 pads that will be discarded by a single user. On the other hand both the same numbers of *Uger* and *TP* will be disposed which is sustainable. Refer figure 6.20.

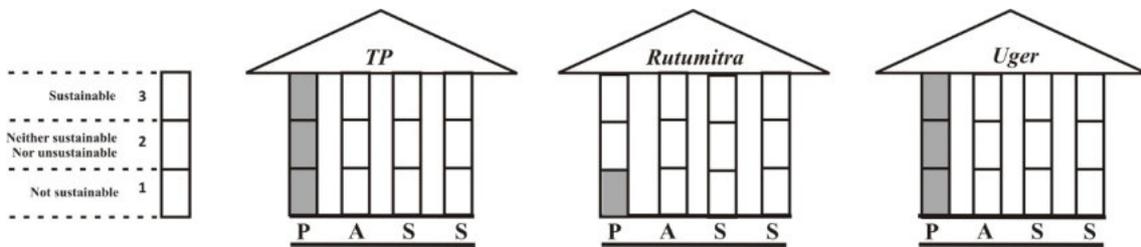


Figure 6.20 Visual representation of PASS for number of devices that will be used in a life time

We have seen from the burying experiments that *Uger* biodegraded within 6 months, as opposed to *TP* and the generic DSN. If we are to look at generic DSNs they all contain raw materials in different proportions. We can assume *Rutumitra* also will not bio degrade just as other DSNs which we have already seen.

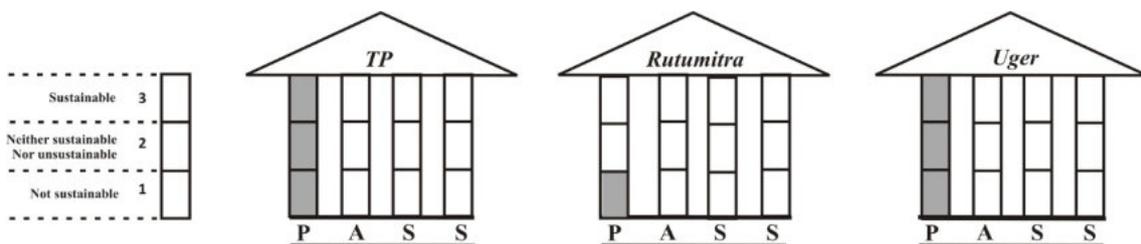


Figure 6.21 Visual representation of PASS for number of devices that will be buried in a life time.

We have seen from section 6.1 that open burning of menstrual products is not recommended, but in the absence of an appropriate way to bury, rural users will have to resort to burning their menstrual debris. In this scenario *Rutumitra* will be the least sustainable as 4,800 pads

will have to be burned. The same numbers of *Uger* and *TP* will be burned, making both these products more sustainable than *Rutumitra*. Refer Figure 6.22.

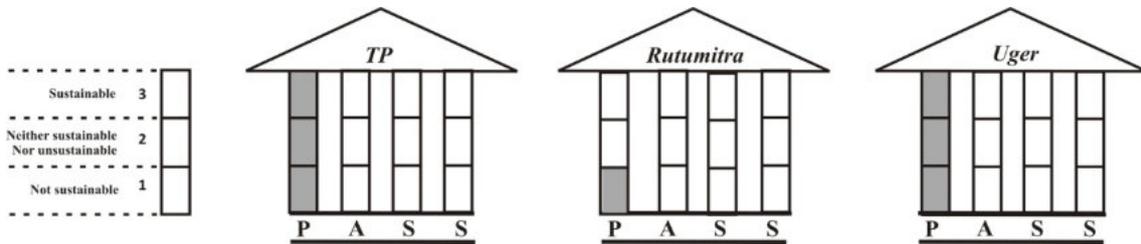


Figure 6.22 Visual representation of PASS for number of devices that will be burned in a life time

From table 6.5 if we bring here the consolidated scores for environment, *Uger* scores the highest at 12, with *TP* coming next, with *Rutumitra* coming in last.

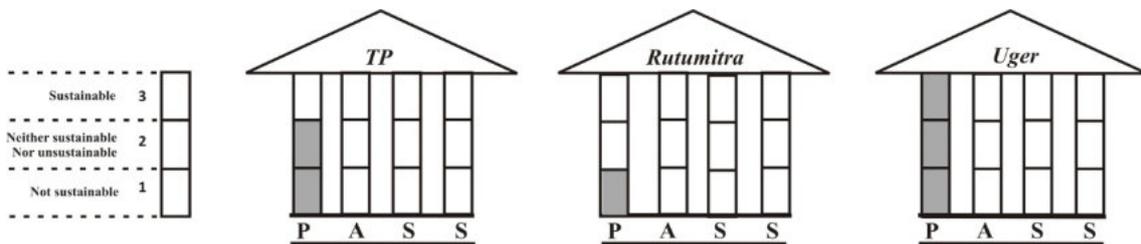


Figure 6.23 Visual representation of consolidated PASS for 6 dimensions of environment for four menstrual products

Rutumitra as we have seen scores very poorly when it comes to environment, based on the 6 dimensions we have assessed.

6.3 Study 6, 7, 8, 9 Assessing Pillar A, *Arthik*/Economic of Three Menstrual Devices through PASS

Menstrual devices have three environmental dimensions, the production phase, the maintenance phase and the end of life phase, refer Figure 6.2. For assessing the economic dimensions we considered aspects from production to end of its life to include, costs of

menstrual products, cost of maintaining, cost to time, health costs around menstrual devices and costs associated with disposal.

6.3.1 Cost of Menstrual Devices

Managing menstruation has a recurring cost, devices are needed for managing each cycle. While users make choices based on a number of factors such as social sanction, comfort or accessibility previously discussed in chapter 5, cost is a factor that will govern purchase. Selection of products depend on the family budget, we inferred this from study 3 and 4. Another factor is the economic independence of a user, if she is earning herself she has the means to take decisions, such as in the case of the Anganwadi and the ASHA worker in study 4.

20 *TPs* are required over a 12 month period. At the current price, *TPs* cost Rs 10 per piece. This amounts to Rs 200 for 12 cycles. Over a 40 year period, the amount spent will be Rs 8,000.

Rutumitra on the other hand costs Rs 5 per pad. Users require between 10 to 15 pads per cycle, therefore if we take an average of 12 pads, this amounts to Rs 60 per cycle, Rs 720 over 12 cycles and Rs 28,800 over a life span.

Uger pads at current price are Rs 120 per pad, with a user requiring 6 pads per cycle. This set of 6 *Uger* pads and 12 insert towel will last 18 cycles. The user will spend Rs 480 per year, and calculated over a 40 year period, this comes to Rs 19,200.

From these calculations we can see that *TP* over a life time is the least expensive followed by *Uger*. *DSN* is the most expensive as compared to *TP* and *Uger*.

6.3.2 Cost of Maintaining Devices

Costs for maintaining have been calculated by the number of bars of soap required to wash menstrual products. For *TP* users calculate 5 bars of soap for 12 cycles and 200 bars over a life time, which come Rs 1000. There are no soap expenses for maintaining *Rutumitra*. For

Uger, users have estimated 9 bars of soap over a 12 cycle period, 360 bars over a life time which comes to Rs 1800.

6.3.3 Cost to Time for Maintaining Devices

TP takes 5 to 10 minutes to wash. Taking an average of 6 minutes X 3 *TPs* X 4 days it will take 72 minutes per menstrual cycle. Time calculated over a life time is $72 \times 12 \times 40 = 34560$ minutes. *Uger* takes the most time to maintain, 10 to 12 minutes to wash one pad. Taking an average of 11 minutes X 4 *Uger* (2 holders + 2 towels) X 4 days it will take 176 minutes per menstrual cycle. Time calculated over a year is $176 \times 12 = 2112$. Over a life time this will be $2112 \times 40 = 84480$. In section 6.2.2.2 we had calculated that *Rutumitra* takes 8 minutes per menstrual cycle for the action of wrapping and throwing away. Over 12 cycles it comes to $8 \times 12 = 96$ minutes and in a life time this will come to $96 \times 40 = 3840$.

6.3.4 Health Costs Associated with Menstrual Devices

We have seen that the three devices *TP*, *Rutumitra* and *Uger* have caused health problems. We also have seen from studies reported in section 5.1 that there can be many causes for infections. In all cases if there is to be a health problem, requiring follow up, there are costs associated with it. These include travelling to the health facility and returning home, doctors fees in case it is a private doctor, registration fee in case it is a government facility and finally the costs of medicines. Health cost will vary case to case, user to user. If we are to assess this on the PASS pillar, for Pillar A, the health costs will be the same across menstrual products.

6.3.5 Costs Associated with Disposal: Drains and Sewers and Municipalities

Users often throw away used menstrual devices (cloth, *TP* and DSNs) into drains or latrines. Figure 6.19 (a) shows a DSN thrown in the drain. In the context of where we have conducted the trials, plumbing issues still have not reached large scale concerns as very few people have latrines. But it will not be long before some of these issues are also a part of the rural scenario, as toilets are being built at a rapid rate as a part of Swach Bharat Abhiyan and WASH⁷⁰

⁷⁰ WASH - acronym for "water, sanitation and hygiene". Universal, affordable and sustainable access to WASH is a public health issue in development.

programmes across the country. While today there is no sewerage systems in the areas where we conducted the trials, we foresee sewer systems coming in as villages grow into towns.

Menstrual products clog latrines, drains and sewer systems, refer figure 6.24. Unclogging and breaking open pipes to extract menstrual products and other processes costs money. These expenses are incurred at an individual level in a users home or at an institutional level such as a college or an office. Disposable pads have been known to cause greater problems than cloth due the nature of the raw materials, the SAP or gel in pads swell with water and choke pipes, for example in the ‘S’ bend in latrines.



Figure 6.24 Sanitary Napkin stuck in a drain

MHM Alliance (2017-2018) states that disposable pads are very difficult to manage.

SAP in sanitary napkins makes it more difficult to manage waste generated! ...because of the super absorbent polymers (SAP) contained in them, they absorb and retain thirty or more times their weight in fluid, causing blockages in sanitation systems.

Sanitation workers face dangers of toxic gases, as they climb down into sewer lines to unblock a variety of debris which also includes sanitary napkins. See Figure 6.25.



Figure 6.25 Worker cleaning choked sewers – Photo Courtesy – <https://ecofemme.org/sanitary-waste-in-india/>

The dangers of toxic gases that cleaners have to face have not received as much focus as it should; in fact, deaths are routinely reported by the media.

“Mumbai's municipal corporation does not have data specifically for sewer workers, but last year it said 1,386 conservancy workers had died over six years since 2009.” (Limaye, 2016)

There is a law prohibiting employment of manual scavenging, Prohibition and Rehabilitation Act (2013) which is not implemented. In our view, life is precious and there is nothing that can justify these kind of tragedies.

Managing solid waste from cities has become a very complex exercise. If we take one city as an example, according to the newspaper Hindustan Times, “Mumbai is expected to spend around 280 crores in the current financial year 2018-2019, almost 1% of its municipal budget – on disposing of its garbage.” (Nair,2018). The costs for clean up is significant. While we have not covered any of these cost in detail, it is important to consider it in a cost analysis and this has scope for future research work.

6.3.6 Summary of Assessments and PASS Scores for Pillar A

For this pillar, as with environmental pillar, two options are again possible, measuring single dimension vs comparing individual dimensions and getting consolidated scores.

Table 6.6 summarises all the assessments we have done for Pillar A.

Table 6.6

Consolidated assessment for Pillar A, Arthik, Economic

	<i>TP</i>	<i>Rutumitra</i>	<i>Uger</i>
Menstrual device – one cycle	Rs 10 x 2 = 20	Rs 5 x 12 = 60	Rs 120 X 6 = Rs 720 over 18 cycles
Menstrual device – 12 cycles	Rs 240	Rs 720	Rs 480
Menstrual device – life time	Rs 9600	Rs 28,800	Rs 19,200
Maintenance soap one cycle	Rs 5	None	Rs 5
Maintenance soap 12 cycles	Rs 5 X 6 bars = Rs 30	None	(Rs 5 X 10 bars) = Rs 50
Maintenance soap lifetime	1200	None	2000
Time taken for washing calculated for one cycle	6 min X 3 <i>TPs</i> X 4 days = 72	None	11 min X 4 <i>uger</i> x 4 days = 176
Time taken for washing calculated for 12 cycles	864	None	2112
Time taken for washing calculated life time	34560	None	84480

With reference to life time cost *Rutumitra* will emerge as the most expensive and the least sustainable. *Uger* will work out as more expensive than *TP* in terms of life time costs. For maintaining reusable menstrual products, *Uger* will be the most expensive as soap costs are high in comparison to *TP* and *Rutumitra*. In terms of time taken to maintain menstrual products *Uger* is the least sustainable, *TP* appears to be the least time consuming. *Rutumitra* pads management time is significantly very low. Table 6.6 shows summary of assessments and PASS scores.

Table 6.7

Consolidated PASS scores for Pillar A, Arthik, Economic

	<i>TP</i>	<i>Rutumitra</i>	<i>Uger</i>
Menstrual device – life time	Rs 9600	Rs 28,800	Rs 19,200
PASS scores	2	1	1
Maintenance soap lifetime	1200	None	2000
PASS scores	2	3	1
Time taken for washing calculated life time	34560	None	84480
PASS scores	2	3	1
Total PASS score	6	7	3

We demonstrate the visual representation of PASS scores for Pillar P of all four menstrual products so that we can compare over a single dimension. For example, the costs of menstrual devices that will be used in a life time are demonstrated in figure 6.26.

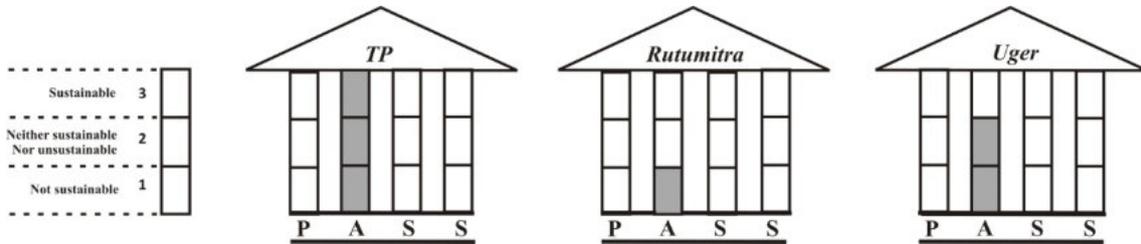


Figure 6.26 Visual representation of PASS for the costs of devices in a life time

From Table 6.6 we can see that in terms of expenses on soap *Uger* is highly unsustainable, there is no soap use for maintaining *Rutumitra*, making it sustainable, with *TP* positioned in the middle.

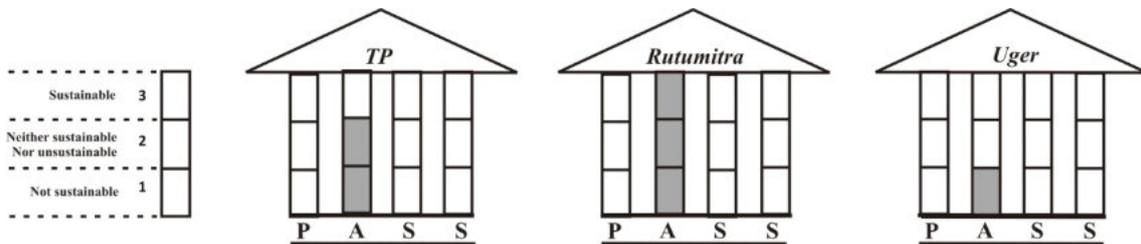


Figure 6.22 Visual representation of PASS for the costs of soap in a life time

From table 6.6 we can see that in terms of time spent to manage devices, *Uger* is highly unsustainable, with *Rutumitra* sustainable and *TP* positioned between the two.

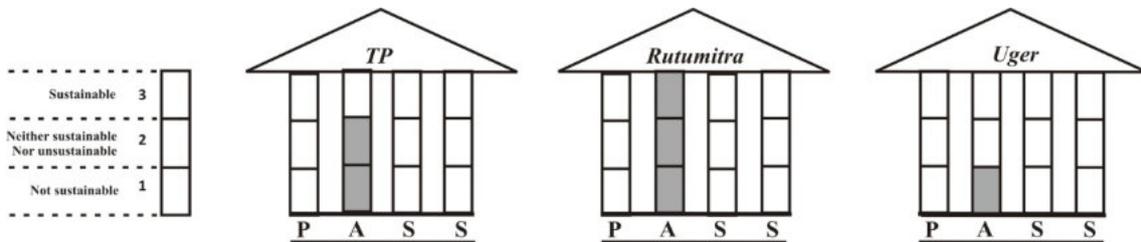


Figure 6.27 Visual representation of PASS for the costs to time spent

These individual assessments will help to take economic decisions for one single dimension of sustainability, across devices.

We also demonstrate consolidated PASS scores for all dimensions for Pillar A as in Figure 6.28.

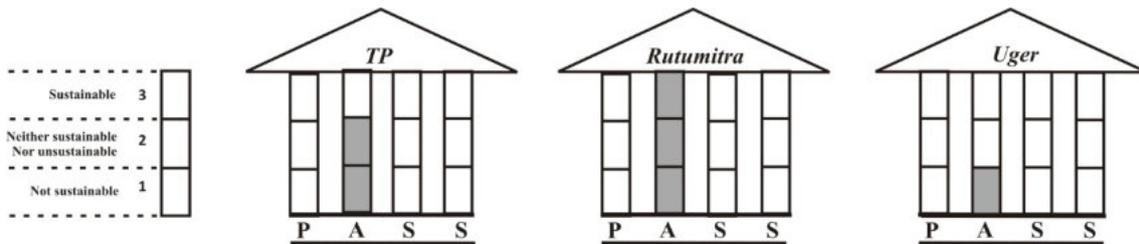


Figure 6.28 Visual representation of consolidated PASS scores for costs across life time

6.4 Summary

The terminal disposal of cloth and *Uger* pads over all appears to be less harmful going by the debris generated. The disposal of *Uger* pads for example, would typically have been done by the users after 18 cycles. Women would have either burned or buried *Uger*. Burying would potentially cause no environmental harm as it biodegrades but if burned the numbers of *Uger* pads would still be lower than burying *TPs* and far lower than burning *DSNs*. Burying cloth and *Uger* are clearly the better solutions. In a similar way the impact of burning of cloth and *Uger* pads will be way lower when we compare it to burning *TPs* and more significant when compared to *DSNs*.

In terms of economics, *Uger* will emerge as the most expensive for maintaining in term of both water and soap used. At the point of initial purchase, *Uger* is the most expensive, however its life span is the longest when compared with cloth, *TP* and *DSN*: is an expensive product in comparison to cloth, solutions for economic sustainability have been worked out which are discussed in chapter 7 where we discuss *DIY*, *Do it Yourself* components.

Devices such as cloth and *Uger* respond to the environment pillar of menstruation sustainability. While we claim we have found some answers for menstruation sustainability,

we have also seen that there can be no simple solutions as this is a wicked problem. While sustainability may remain within a complex web of inter-connections, we feel that it needs to be continually unravelled, finding solutions, at the same time be in readiness for changing or modifying the same solutions. As stated by Pryshlakivsky & Searcy (2013);

*‘Every solution to a wicked problem is a “one-shot operation”;
because there is no opportunity to learn by trial and error, every
attempt counts significantly’.*

Therefore, this lens of “every attempt counts significantly” has been demonstrated through *Uger* and the PASS tool proposed in this thesis, these we claim are solutions that count. Both these tools can be used for building new or building upon existing devices and systems to make the management of menstruation sustainable.

The multi-dimensional nature of menstrual products has been seen clearly in the environment and economic pillar. This is where the PASS tool can have a clear role, while designing products will help to anticipate future scenarios for sustainability. However there have been limitations to the analysis. Environmental assessments will include measuring three types of pollution, air, water and soil. Toxins released during burning, the pollution from leachates into soil and water was not measured in this study, which could have been calculated.

These aspects to multi dimensions of menstruation and sustainability need to be disseminated to inform practice so that agencies involved in menstrual intervention programmes can benefit from our findings from both *Uger* and PASS. In the next chapter we discuss:

- who can use the PASS tool
- how solutions were found to make *Uger* pads affordable to communities
- the ways in which we informed both communities and intervention programmes on menstruation sustainability

Chapter 7

Dissemination

Informing practice

7.0 Introduction

We have been able to make two contributions through this enquiry, *Uger* pads and the PASS Tool. The effort of the enquiry does not end with literature review, trials, experiments, tools development and assessing. Rather we see it is the start of informed dissemination and informed interventions on the ground and a systematic method to scale up menstruation management sustainability. The studies have added significant value to our earlier years of work. As mentioned in chapter 1, the researcher and her colleagues have worked in the area of menstrual health for many years. However, it was only through the research conducted as part of this Ph.D thesis that it became clear that the aspects of sustainable menstruation management is both multi-dimensional and interconnected and no one aspect can stand completely alone. The formulation of dissemination strategies was only possible due to the understanding we developed around the many interconnected issues. It has become very clear that if one aspect to menstruation management is sustainable, there may be another aspect that

is not. We have seen this in the example of disposal sanitary napkins (DSN), where convenience is sustainable for menstruators but environmentally it leads to the menstrual debris. *Uger*, which may have very low menstrual waste, uses resources such as water and cleansing agents for maintenance. In this scenario, menstruation management decisions should be taken to be able to move towards sustainability, as fully sustainable menstrual management seems unrealistic due to the multiple dimensions. In this chapter, we discuss how we put our learning into practice by modifying our earlier strategies and the significant efforts towards disseminating information on sustainable menstruation management.

7.1 Making PASS and *Uger* Copy Left

As a first step, the two contributions, PASS and *Uger* pad, were made copy left (copy left, n.d) for the ‘greater common good’⁷¹. This aligned with the researcher’s philosophies previously referred to in section 1.3. If the tools had been retained as “copy right” it would have restricted its use, benefitting fewer numbers of stakeholders, and this itself would have been an action leading to unsustainable menstruation management. The copy left philosophy was also disseminated so that stakeholders pass on the contributions and modify it as they see fit.

7.2 Disseminating the Contributions

At the ground level, the strategy for disseminating for sustainable menstruation practices was in keeping with one central aim – informed choices for decision making. As a first step, we contextualized *Uger* by placing it among a range of options in order to inform stakeholders about the variety of devices available. We designed the *Uger* Training Kit. The kit includes training aids or IEC⁷² materials and a range of menstrual management options; to include samples of commonly available menstrual devices. Refer Figure 7.1 showing the kit and its different components. Refer appendix XV for details of each component in kit. We modified our training modules and training aids to include the two contributions from the enquiry, PASS and *Uger* Pads. Our training module was originally with 5 sessions,(i) Breaking silence

⁷¹ the common good is that which is shared by and beneficial to all or most members of a given community - [htTPs://en.wikipedia.org/wiki/Common_good#Definition](https://en.wikipedia.org/wiki/Common_good#Definition)

⁷² IEC – Information Education Communication – in the development context the term IEC is commonly used to mean, posters, flip charts, pamphlets, take away media material and other

about our bodies (ii) Anatomy (iii) Emotional and physical changes in the body as we grow (iv) Understanding myths and taboos around menstruation (v) Menstruation and night emission (vi) Learning to make our own menstrual pads. To this, 4 new sessions have been introduced and the complete training module is now entitled “Sustainable Menstrual Health Management”. New sessions included are:

- Getting Familiar with the *Uger Kit*” (which introduces the facilitator on how to use)
- Informed Choices Using *Uger Kit* (options available)
- Using PASS to Assess Menstruation Management
- Role of Men in Menstruation



Figure 7. 1 The Mahwari Kit, a white canvas kit is shown in the centre. 15 components are part of the kit that are used by the facilitator to communicate for informed choices for managing menstruation.

7.2.1 Dissemination: Tool 1 – PASS

Earlier menstruation sessions focused on reusable cloth as the best option. This strategy has undergone a huge shift. We now include information about raw materials in products and the pros and cons of each menstrual device. We share information about the variety of devices available, raw materials in different products, the different ways of managing, compare the different ways of disposal and other practices associated with management.

The next step involves a practical demonstration of how to assess any dimension of menstruation through the four PASS pillars. We demonstrate this two different ways. For example, a certain practice “*drying the menstrual devices (TP/Uger) under larger garments*” is analysed through PASS. From pillar S, *Swasth*, Health, this practice is examined and understood as detrimental to health (reusable devices get no sterilization from sun). If detrimental to health, potentially it may lead to seeking health care which costs money. From the dimension Pillar A, *Arthik*, economics, the practice is then analysed as not sustainable. Going ahead to Pillar P, *Parvyavaran*, Environment, this practice has no foreseeable negative implication on environment. For the Pillar S, *Samaj*, Social Pillar, the practice of hiding cloth is an action that perpetuates shame, and analysed accordingly. Similarly we work with participants comparing costs, comparing number of devices and other dimensions. While transacting this session, the training explains the holistic concept of how we can “fail” or “pass” any device, practice or facility after critically analysing the four pillars.

Scoring on PASS is an aspect we have not yet introduced as the researcher and implementing team feel it is a little complex for women and adolescents to compute. We have attempted the PASS assessments with participants in two different ways. In the first instance we developed the PASS tool as simple 3 dimensional paper model. See Figure 7.2, where 4 paper cylinders have been made corresponding to the 4 PASS dimensions. An A4 sized card sheet is placed on these paper pillars simulating the roof to represent the PASS tool. A menstrual product is placed on the pillar, Figure 7.3. Taking away any one pillar demonstrates “not sustainable”, Figure 7.4.



Figure 7.2 Cylinder made of paper to represent pillars of PASS



Figure 7.3 A card sheet placed on the cylinders to represent a roof. A Sanitary Napkin is placed on the roof to assess the dimensions of sustainability.



Figure 7.4 One pillar has been removed to demonstrate “not sustainable”

In the second method, we use the table format, x and y axis. All the 4 aspects environment, economic, health and social are on x axis, menstrual devices are on the Y axis. Refer Figures 7.5 and 7.6 . The assessment on the PASS tool visual is computed on the board by analysing each aspect; refer Figure 7.7 (a), (b)

	P	A	S	S
Cloth				
TP				
DSN				
Cup				
Tampon				
Uger				
Sponge				
Labial pad				
Goonj pad				
Any other				

Figure 7.5



Figure 7.6 Facilitator V. P. Singh PASS session at a MHM training workshop at the Vishwas Training Centre, Udaipur, date December 17/18, 2018

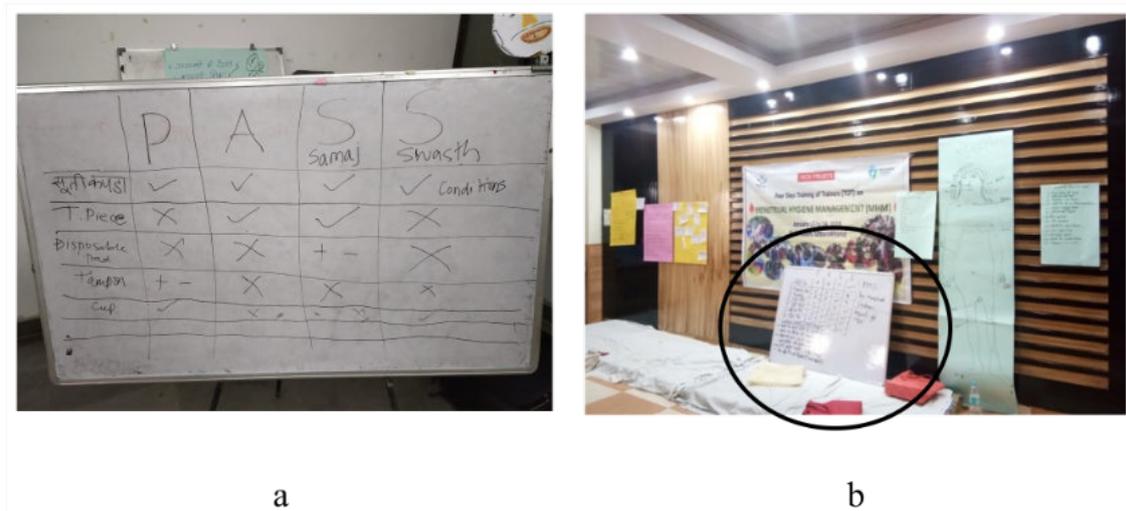


Figure 7.7 PASS analysis by facilitators at MHM trainings (a) V. Sodha at Hunar Garh Training Centre, Khadbamniya Village, Rajsamand, for NGO Breakthrough, December 23 to 25, 2018 (b) O. P. Gayri for Tata Trust, Dehradun, December 15 to 17, 2018

7.2.2 Dissemination: Tool 2 Uger

For menstruators from low resource communities, there is a sustainable aspect to stitching one's own pad. It empowers menstruators as they take charge of the making of their own device, a self reliant and self dependent action. This is crucial in the context of adolescents and women who may not be economically independent or mobile. Making a menstrual product brings a user closer to her own body, instilling self respect, bringing back the "do it yourself - for yourself" culture that was prevalent until the consumer markets changed our habits. Figures 7.8 and 7.9 show women stitching their own *Uger* pads at a workshop conducted at an Anganwadi⁷³ in Hissar, Harayana. The workshop was supported by Spark Minda Foundation.

⁷³ Anganwadi is a rural child care centre in India. This is an Indian government initiative which was started in 1975 as part of the programme, Integrated Child Development Services.



Figure 7.8 Women working on pad templates



Figure 7.9 Women stitching *Uger* pads

An instruction sheet on how to make a pad is distributed to participants as a take away at the end of the stitching session so that they in turn can share the making method within their social group, refer appendix XVI. For resource poor communities, there is the option of stitching *Uger* after recovering cloth from old garments. We have made samples of pads from old shirts and *kurtas*. On an average, 4 to 5 *Uger* pads can be made from a long sleeved men's *kurta*. This aspect of “repurposing” aligns with an aspect to strong sustainability, “reuse of waste” (refer figure 3.3 where eight specific actions to promote strong sustainability have been detailed). A garment which may have any way been put away is has been put to good use. Another option is to buy two meters of new cloth to make *Uger* pads. The cost of cloth will come to approximately Rs 160 (Rs 80 per meter). According to our calculations, we can make ten *Uger* pads in 2 meters, making this a viable option.

7.3 Other Significant Aspects

7.3.1 Including Men

A major shift we have made at Jatan Sansthan is that we have inducted male facilitators from December of 2015 to conduct awareness and education components of menstruation management. This in itself is a component of sustainability, male involvement, breaking gender stereotypes. Breaking barriers of awkwardness and taking the lead in menstrual health communication are actions from men moving closer to aiming for sustainable menstruation. Figure 7.9 (a) and (b) shows male facilitators at training sessions.



Figure 7.9 Facilitators conducting sessions (a) O.P Gayri, K. Baldev (b) R. Chundawat

Irrespective of gender, participants learn to stitch their own cloth pads. Especially for non menstruators, this action of stitching a cloth pad is a symbol of losing fear and getting comfortable around menstruation. Additionally, it instills empathy toward menstruators. All these conscious actions of including men, brings the management of menstruation closer to aiming for sustainable menstruation.



Figure 7.10 (a) (b) Facilitators V.P Singh and R,Singh demonstrate how to make Uger pads

7.3.2 Establishing *Uger* Production Centre

While the *Uger* pads were made copy left, we put the design into production to increase its outreach over a cross sections of menstruators across the country. We purchased basic furniture such as tables and stools, three foot operated motor sewing machines, one interlock machine, and a cutting machine. We trained 10 women from a low income settlement in Udaipur city and a pad production unit was established. Once the training was completed, the production process model we used was “work at home”. Women come to the centre, take away the pre cut pads and stitch at home on their own sewing machines. Sale of pads is from Jatan Santhan office and online. We have a customer base of over 500 users, with repeat purchases.

7.3.3 Design of Infant Nappies

The understanding from the enquiry led the researcher to develop baby nappies as another reusable management product, infant nappies. These have been put into batch production and are currently being tested by young mothers who are our collaborators. This is yet to be systematically researched and has potential for future work.



Figure 7.11 Uger Baby Nappy with insert

7.3.3 Outreach

Since the past few years, 2016-2019 (financial periods March to April) we have reached out to more than 30,000 women, girls, boys and men from rural communities. We were commissioned by the governments of Jharkhand, Bihar, Haryana, Maharashtra and North

East, UN agencies such as UNICEF, UNFPA, WASH⁷⁴ United and WSSCC⁷⁵ to conduct awareness and pad stitching workshops with adolescent and women's groups. Similar workshops also were conducted with student communities, schools and colleges. We covered ground through CSR initiatives such as Spark Minda, Google, Techno Serve, Enviro vigil and others. We have been able to bring focus to sustainable menstruation through our advocacy work with Rajasthan government at the MHM awareness launch at Jaipur and district Bhilwara in September 2018. Our sustainability work has been covered by newspapers, such as Dainik Bhaskar, Sakal Times – Pune, Hindustan Times.

7.3.4 Recognition and Demand for *Uger*

The results of keeping products Copy Left have benefitted women groups. SHG womens groups in Panduran, Nagpur, Sathi Delhi and an SHG group initiated by Govt of Bihar - Bhalpur Jeevika SHG , have started their own cloth production units using the *Uger* pad design. In April of 2018, IIT, Madras commissioned the *Uger* team to establish 4 Cloth Production Centres in the North Eastern States of India, Assam, Meghalaya, Manipur and Arunachal Pradesh. The members of the SHG group travelled to Udaipur to our centre for a three day production training. Refer Figure 7.12 a and 7.12 b.



Figure 7.12a Women from SHG groups from Assam, Meghalaya, Manipur and Arunachal Pradesh

⁷⁴ WASH – Water Sanitation and Hygiene

⁷⁵ WSSCC - Water Supply and Sanitation Collaborative Council



Figure 7.12b Women from the four states at the production training at the *Uger* centre, learning stitching

Jatan established a production unit for an SHG group with support from the local administration at district Semdega in Jharkhand, March 2019. *Uger* pads also have received recognition from other sectors. In 2015, we were shortlisted for the award, Design to Improve Life⁷⁶. Our work was recognised by the Pune International Centre⁷⁷. As a part of the recognition, we have been given a mentor who has been guiding the unit since January 2019. The recognition also gave us an opportunity to show case our work at the Honey Bee Innovators meet at IIM, Ahmedabad in 2019.

7.3.5 Closing Down of MITU Production Unit

During the course of this enquiry we were witness to the closing down of MITU's pad production unit around the years 2017 -2018. The unit was found to be "not sustainable". The reasons were many fold. Electricity was intermittent in Turvekere, generator sets had to be used which was not cost effective. SHG groups were not able to market *Rutumitra* as they were not willing to travel outside of their villages. There was surplus of pads each month. After an initial period of 6 to 8 months, there was no demand for pads even from women within the village. Customers told the MITU team that too many used pads (bloodied) were lying around the village and it now had become an eyesore. If tools to anticipate sustainability had been used, perhaps a more carefully thought out process for pad production and distribution could have been done.

⁷⁶ <https://designtoimprovelife.dk/award/>

⁷⁷ <http://puneinternationalcentre.org/social-innovation/programmes/ncsi/innovators/>

7.4 Summary

We do not in any way claim that our own enhanced practice and demand for trainings and establishing of production units in the Menstruation Management space validates *Uger* or *PASS*. We see this enquiry and the subsequent implementation components from it as crucial to informing practice. The dissemination journey has not been beneficial just for our own work, it has benefitted others working in the same space, as we have been able to give many stakeholders a holistic perspective around menstruation management sustainability. However, social change is gradual and the move toward sustainable menstruation management too will be a gradual process and achieving 100% sustainability is not realistic as we have seen. In the next chapter, the concluding chapter, we summarize the overall findings of this enquiry and lay out the many perspectives from this thesis.

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Chapter 8

Conclusion

8.0 Introduction

The motivation for this thesis was to inform practice by adding knowledge that will be of value to practitioners who work in the area of menstruation management. We explored this through three research questions.

RQ 1. How can we make the management of menstruation sustainable?

RQ 2. How can Menstruation Management Sustainability be measured?

RQ 3. How can we holistically compare for menstruation management sustainability between different menstrual products and management systems?

In response to the first research question, we designed and developed a menstrual management tool called *Uger* Reusable Cloth Pad, described in chapter 4. We tried to address the second and third research questions by developing a multi-dimensional measuring tool called PASS to measure and compare sustainable products and systems, as detailed in chapter 5. The PASS tool assesses menstrual products on the dimensions of health, social, environmental and economic impacts. We used the PASS tool to assess the sustainability of three specific menstruation management products, namely *Uger*, *Rutumitra*, a disposable

sanitary napkin and *TP*, through cross over trials and other studies, as discussed in chapters 6 and 7. This concluding chapter lays out the findings, contributions, limitations and possibilities of achieving Sustainable Menstruation Management and identifies areas for future research work.

8.1 Findings and Contributions

We had proposed a definition for Sustainable Menstruation Management in section 2.7 as:

“a method of managing menstruation, by the practice and use of devices and systems that maintain balance between environmental, economic, social and health aspects, causing no harm to the user or to the larger community.”

The contributions to this thesis, the 2 tools, *Uger* pads and PASS, take their roots from this definition. Sustainability of any product, including a menstrual product, is not a one-dimensional construct. We propose PASS (fig 8.1), a tool that allows users to compare sustainability of menstrual products across multiple dimensions. We identified four dimensions that we argue to be the most relevant in the context of menstruation management sustainability – environmental sustainability, financial sustainability, sustainability with respect to the health and sustainability with respect to design and comfort of menstrual products within the social contexts in which the user lives.

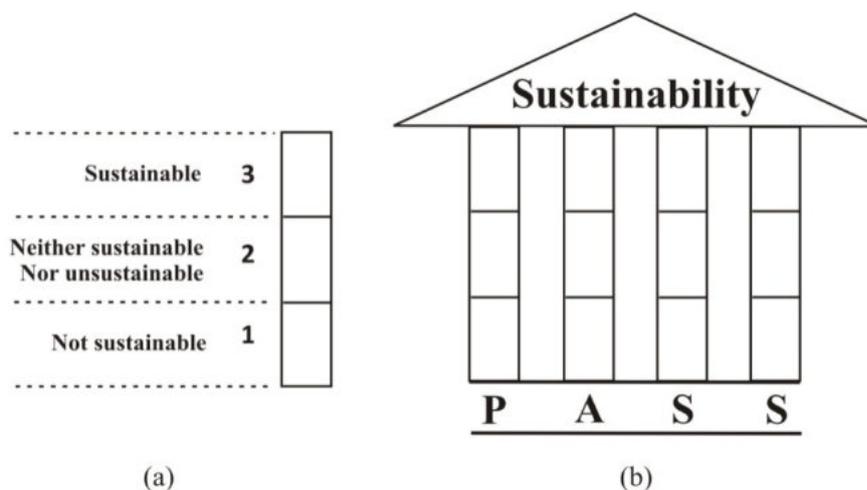


Figure 8.1 (a) Divisions in the pillars to assess sustainability (b) PASS tool for assessing sustainability of any aspect to menstruation management, device, practice or facility

We designed and developed *Uger* pads (fig 8.2), a reusable menstruation management product that we argue is sustainable across these four dimensions.



Figure 8.2 (a) *Uger* Cloth pads, showing upper and lower side (b) Upper surface of pads, with insert towels placed on the sides

Through several studies, we compared the sustainability of *Uger* and two existing menstruation management products, a disposable sanitary napkin (DSN) *Rutumitra* produced by MITU Foundation Bengaluru and reusable flannel cloth, *TP* available in the markets of our area of professional practice, on the four dimensions of PASS. Below, we discuss the performance of these three menstruation management products on these dimensions of sustainability.

8.1.2 Assessing through P – *Pariyavaran* – the Environment Pillar

Uger and *TP* have an obvious environmental waste advantage over *Rutumitra* and other DSNs. Nevertheless, we carried out three studies to understand the environmental impact of these products.

The first concern is raw materials used to manufacture a product, which itself has environmental implications. In chapter 6, we described raw materials used in the three products. Through a lab study, we identified that *TP* was made up of a material called polyacrylate, a flannel. It was not easy to do an analysis of the materials used in *Rutumitra*, the outer plastic packing has no raw material information. Raw materials for *Rutumitra* were sourced from Jaishree Industries, suppliers of both pad manufacturing machines and raw materials, of which the contents were never disclosed to MITU. Nevertheless, we analysed raw materials from secondary sources from studies, reports and our own experiments and

websites of industries supplying raw materials for pad manufacturing. We have seen that contents vary based on the brand of DSN, according to absorbency and physical appearance (design). We found that it was made up of materials such as non-woven polymers, skin moisturizing emollient, wood pulp, SAP (superabsorbent polymers), paper, silicon, adhesives and plastic sheets. Several NGOs and university groups have experimented with raw materials for compostable and disposable menstrual absorbents such as banana fibre, water hyacinth, corn, tapioca and others described in section 2.3.2. We argue that these are not main stream products. These seem to be mainly experimental products as of now, and were not widely available in the market at the time of writing. These varieties of DSNs are available online and cannot be accessed by women in the context of our enquiry and hence have not been considered in our discussion around environmental sustainability. Also, these are reported to be more expensive than the current DSNs. While such attempts are indeed required, as of now we do not know whether the costs of these products can be brought down through improved production techniques, whether they can be manufactured sustainably and whether they can become available as widely as DSNs currently are.

Uger pads, on the other hand, are of layers of cloth, poplin, casement and brushed cotton, as described in Section 4.1.4. The advantage is that this is bio degradable, hence from the perspectives of the first environmental concern, *Uger* will emerge as a better option.

A second environmental concern is disposal. Menstrual products are disposed in different ways. This is discussed in Section 6.1.2. While it is obvious that cotton fabric bio-degrades and polymer materials do not, home-experiments were conducted with menstrual products such as burying, burning and tracing the used menstrual products disposed. We both buried and burned samples of *TP* and a branded DSN. We analysed the debris left by these samples, six months later. We found that while *TP* was intact, the DSN was tattered from one side with most of the product still intact. While ideally it should have been buried in controlled experimental conditions, taking into account soil, water and surrounding vegetation, the context we used was the backyard, an area that a user would typically select in rural communities. For convenience we took two locations that we could easily monitor, the garden area of the Jatan Sansthan office and the researchers own garden, which limited a scientific analysis. In the case of the burning experiment, a simple match stick was used and held against the product, both products quickly burnt out with an acrid smell leaving behind a hard

resin like residue. We also described burying and burning of *Uger* pads, in Section 6.2.2.3 *Uger* pads had disintegrated completely after 6 months. In the burning experiment *Uger* burned slowly and left behind an ash like residue. In this study, *Uger* performed the best, followed by *TP* and the DSN. Thus we can conclude that when comparing methods of disposal of products, *Uger* will fare better than *TP* and DSN. When comparing methods of disposal against the numbers of products that need to be disposed, *Uger* will emerge ahead.

The third environmental concern was menstrual debris which was measured by analysing how many products users discard in a time period of 12 menstrual cycles and over a reproductive health life span, described in Section 6.1.2. We found the case for DSNs to be very weak, 4800 pieces that will be discarded in a life time as opposed to *Uger* and *TP*. We can conclude from this that from environmental perspectives, reusable products will fare better than one time use products.

The fourth environmental concern is maintenance of menstrual devices. From this perspective, one drawback of both *Uger* and *TP* is that these products need water and detergent bars to wash at each cycle. *Uger* needs the most water and soap for maintaining as compared to *TP* and significantly more when compared to DSN.

The fifth concern is facilities, while at first instance it may appear to have no relationship with environment. Unlike in urban areas, systems to take away disposed menstrual devices do not exist in rural areas. As we discussed in Section 6.1, rural users dispose their own garbage. Usually this involves burning, burying or composting biodegradable waste (such as food) or using waste as fuel, such as coconut tree fronds, corn husk and others. Bath water, for example, is heated using coconut fronds and husk in the area where we conducted our second trial. Rural users are the first to notice that DSNs do not biodegrade and note that these remain in front or back of their houses and in the fields as an eyesore, Section 6. In this sense, rural users are therefore more aware and sensitive to the non-biodegradability of DSNs than urban users. However, currently, the panchayats⁷⁸ do not have a solid waste management policy and implementation on their agenda. The reason for no policy or system is fairly obvious as mentioned above, communities have rarely produced any waste, using everything around them in multiple ways. It is only in the last five years, that non- bio-degradable consumer

⁷⁸ Panchayats are local self governing bodies in villages

items like shampoo pouches, food items in pouches and cheap plastic toys have had a wider outreach due improved markets and motorable roads. While there are sanitation committees in the villages that work on water and hand washing issues, during the *safai abhiyans*⁷⁹ that are conducted, all plastics and used pads are burned as a way of management which is not recommended. Community aspirations, purchase attitudes and abilities have changed, which will increase all waste including menstrual waste. We estimate that in the areas where the studies were conducted, solid waste management systems will have to be put in place in another 6- 8 years. Up until that time, there will be a build up of used menstrual products, if DSNs are the only options for rural users. In such a scenario, *Uger* clearly emerges as an option to inform communities and to inform professional practice.

The sixth concern is no clear government policy for menstrual waste. It is not considered bio-medical waste nor is it considered a plastic waste, this has been detailed in Section 6.1.5. Due to this lack of clarity municipalities club all waste together and take it away into dumping sites inspite of being aware of the well known harmful effects of mixed solid wastes. This grey area where DSNs lie, has been used to the advantage of multinational companies. They have not been known yet to take up EPR (Extended Producer Responsibility) and continue to produce products that are not sustainable.

From all the studies conducted we measured the score on the PASS tool by measuring the environmental pillar using menstrual debris as a basis for calculation. The highest sustainable score on the environment pillar was *Uger*, followed by *TP*. *Rutumitra* came last as the least sustainable.

The Environment pillar for PASS could have many aspects of measurements such as Life Cycle Analysis / Water Foot Print, Cradle to Cradle. While calculating these measurements are beyond the scope of this enquiry, we are aware that other measurements could have included LCA during the manufacturing of products, amount of water use and soil and air pollution.

⁷⁹ Safai Abhiyan – Cleaning up Campaigns

8.1.3 Assessing through A – *Arthik* – the Economic Pillar

It is not easy to compare one-off costs of disposable and reusable products. Among the three products that we considered, *Uger* has the longest lifespan (18 cycle), compared to *TP* (4 cycles) and DSNs (6-8 hours). As we discussed in section 6.3.1 cloth comes at no cost, with *TP* costing Rs 10 per piece with a life time cost of Rs 8,000 over a 40 year period. *Rutumitra* on the other hand costs Rs 5 per pad with Rs 28,800 over a life span. *Uger* pads produced at Jatan Sansthan at current price are Rs 120 per pad with a user requiring 6 pads per cycle. Calculated over a 40-year period the user will spend Rs 19,200 in a life time

Both DSNs and *Uger* pads may not be within the budget of low-income users, hence may not be entirely suited for these communities. The advantage of *Uger* though is in its copy-left design so it can be locally made by anyone who knows how to use a needle and thread, as discussed in the dissemination in chapter 7, where we have also pointed out alternative low cost solutions, hand stitching pads from fabric recovered from old clothes, which is at no cost to the user or machine stitching own pads from new fabrics at the users own home.

In terms of life time costs for maintaining, detergent bar expenses are highest for *Uger* (Rs 1800) ,followed by cloth (Rs 1200) and then *TP* (Rs 1000). There is no maintenance cost for *Rutumitra*. In the rural context, washing and reusing is still an accepted way of managing a menstrual device, the role of reusable cannot be discounted and time and maintenance costs will be acceptable and sustainable.

Health costs around menstrual devices and costs associated with disposal while not calculated are significant amounts and further studies are required to be done in these areas.

8.1.4 Assessing through S – *Samaj* – the Health Pillar

We learned that there is continuing silence around menstruation with many taboos and restrictions. Through the literature review in section 2, we learned about shame and isolation and how it manifests in low self esteem, affecting mental health. In chapter 5 we described existing knowledge , attitudes and practices within communities. We also learned how young women get information about menstruation, typically from their own elders and peer group

which is the reason for continuing incorrect information around sustainable practices. For example hiding cloth in dark spaces, an unhealthy practice, preferring this method due to superstition, to avoid misfortune on males. We learned that there is no discussion with men about the subject of menstruation, women do not make their needs known and men see menstruation as women's business. The silence reflects in poor infrastructure for managing menstruation, no running water facility no private space to change menstrual product, no private space to wash or hang menstrual cloth. All these factors lead to unhealthy and unsustainable menstruation management.

To evaluate the potential impact on health of the three menstruation management products, we conducted two experiments, these were cross over trials. The first trial was between *TP* and *Uger* pads. The raw material of *TP* is synthetic, non-breathable and very warm to the skin. It caused discomfort, rash and boils in some users. *Uger* on the other hand caused no skin irritation. The reasons for this were two fold, one, the material itself which was cool to the skin, and two, the way the *Uger* insert towels were managed by the user, described later in this section.

There were limitations in this first trial, the sample size was only 15 participants, the design of the trial was limited due to funding. However, the negative evidence we found irritation and over all discomfort from *TP* cannot be discounted. We accept that a larger sample of participants may have led us to more findings around *TP* giving us statistical evidence.

In the second trial we found not much significant difference in comfort and health. In terms of rash and other discomfort, *Rutumitra* appeared to give users some problems. *Uger* insert towels we found, has one distinct hygiene advantage over *Rutumitra*. When the surface of the *Uger* insert towel gets soiled users refold it in a way to bring forward a fresher part of the towel, this action is typically done after 3 hours. Hence during a six hour time span the skin is in contact with at least two to three fresh surfaces. In the case of *Rutumitra* or any other DSN, the same surface of the pad is in contact for 6 hours, which can be assumed to be the reason for irritation and abrasion from a polymer based top surface.

During scoring on the Health Pillar for PASS, we calculated scores based on irritation, itching, rash, boil, or abscess reported by the participant in the trial. There could have been numerous other ways of measuring the health aspect of the menstrual products.

- Finding co-relations between menstrual products, urinary tract and reproductive tract infections
- Finding correlations between menstrual products and climate; for example how do each of the products perform during monsoon, dry season and winter.
- Finding out the detailed type of health problem from each of the products; for example, did the menstrual product cause contact dermatitis or was is inflammation due to abrasion?

Given that this was a trial run by the solo efforts of a single PhD student and volunteer time and effort of supporting sponsors and partners, there are several limitations, which we duly acknowledge. The trials were conducted in 2 locations for a period of 8 months each, using only two products at a time. Most of these constraints were determined by the limitations of the availability of resources. In spite of these limitations, we argue that we can learn a lot from these trials about the potential health impact of the menstrual management products.

For scoring health on PASS we placed all menstrual devices in the category of neither sustainable nor not unsustainable for the health pillar. As we found, all devices have a potential to cause health problems.

8.1.5 Assessing through S – *Samaj* – the Social Pillar

The social aspects of menstrual products were measured through three parameters: design and function, maintenance of products: washing / drying/disposing and product preferences.

From the first trial, section 5.4, in terms of the design itself, in comparison to *TP*, *Uger* was found to be more comfortable on three scores, it was seen as more secure as it could be fixed on to the underwear, it was cool against skin as the material of *Uger* was breathable and caused no itching, boils or allergy. In contrast *TP* was seen as not secure as it shifted within the underwear due to lack of fixing mechanism. Users changed both products two to three times a day, so in terms of absorbing menstrual discharge they performed in the same way. Users felt that *TP* was easier to maintain, taking less time to wash and easier to dry in the open as compared to *Uger*.

We argue that *Uger* is still a suitable product for users in the rural context for many reasons. It is a healthier option when compared to *TP*. The upgrade in the cloth design responds to aspirations in society, to desire for a product that is perceived to be modern or better, and in this case the design builds on existing underwear usage as opposed to the system of wearing cloth using a drawstring discussed previously in Section 2. The other advantage *Uger* offers is the insert towel, the advantages which have been previously discussed in Section 8.1.4. The other sustainable aspect we found was the use of home cloth⁸⁰ folded and placed into the insert loops of *Uger* pad. This was pointed out by three users in our practice area who were a part of our first trial whom we met after one and half years of *Uger* cloth pad use who were still using the "pad holder" part of *Uger*.

In terms of the design of *Rutumitra*, the pads were plain pads without wings. As per the feedback received from users, *Uger* was preferred due to the wings feature. However, in the area of maintenance, disposing of *Rutumitra* pads was not seen as difficult as users would burn the pad in the *handay vole* or hot water stove, as discussed in section 5.3.

There are two ways in which *Uger* is managed. A used pad is washed out at the time a user changes the device. The other method is three to four used pads are collected over the day and then washed together. In either case, time is required to wash cloth pads, hang it out to dry, monitor it and when completely dry, reuse it, with the process repeating. Eventually at the end of the menstrual cycle, users have to store it for later use. When this effort is compared to how a disposable pad such as *Rutumitra* is managed, both time and effort are greatly reduced. The simple action of wrapping up a disposable pad such as *Rutumitra* in a newspaper or another piece of plastic and just throwing this away takes all of three minutes as compared to *Uger* which is at minimum is a 11 minute exercise.

While *Uger* was acceptable to users, from the feedback we learned that if users have the means and the resources to buy disposables, they may select disposables for their future use. Alternatively they may use *Uger* in combination with disposable pads. Community aspirations are a reality, and as economic conditions of users improve, there will be a move toward disposable sanitary products. In the interim between moving from home cloth to any other perceived to be better product, *Uger* provides a sustainable solution, an upgrade.

⁸⁰ Home cloth – fabric repurposed from what is available at home

In section 7 we detailed how the concept of stitching one's own pad was developed as an empowering tool. This resonates with the DIY (Do it yourself) factor which is inherent among self-reliant rural communities. *Jugaad* for menstruation was previously discussed in section no 2.3.1. The act of stitching is that firm step away from *jugaad* – away from making do with any old cloth to manage menstruation; a stitched option with raw materials, cotton cloth, thread and press buttons, all locally sourced.

Hanging out *Uger* to dry openly under in the sun as recommended will continue to be a challenge. This will need behaviour change strategies, and well-planned social communication products. In Section 7, we described strategies around sustainable menstruation management that have been designed and disseminated. These efforts have worked and many women, men, adolescent girls and boys have broken silence around menstruation. The establishing of the Pad Production Centres in North East regions of India was discussed in Chapter 7 as an example of scale-up of a sustainable idea. *Uger* supports part-time livelihood for selected women. Other women have become self-reliant for their menstrual needs and no longer have to depend on a centralised system of access from markets or the supply from the local state government which are often erratic.

8.1.5 Composite PASS scores

Composite PASS scores are possible if we require a single score for decision-making for sustainability, but this can only be in cases where the dimensions are common across what we are measuring. In Pillar P, environment, the multi-dimensions were packing materials, raw materials of products and other common factors. In Pillar A, the multi-dimensions were the various aspects related to costs. For Pillar S, the health dimensions were similar across products so a common score was possible. However, a common PASS score was not possible for Pillar S, *Samaj*, Social. This was because we were looking at user preferences when comparing products, there were two user groups, the first comparing *TP* with *Uger* where the score was 3 and the second comparing *Uger* with *Ritumitra* where the score was 2.

We therefore have been able to demonstrate composite scores for three dimensions of the PASS, refer in Table 6.8. We have derived consolidated PASS scores for:

- Pillar P, *Paryavaran*, Environment, from Table 6.5
- Pillar A, *Arthik*, Economic from Table 6.7

- Pillar S, Swasth , Health, from Figure 5.16

Table 6.8 Composite PASS scores

	<i>TP</i>	<i>Rutumitra</i>	<i>Uger</i>
Consolidated PASS scores for Pillar P, <i>Paryavaran</i> , Environment	11	10	12
Consolidated PASS scores for Pillar A, <i>Arthik</i> , Economic	6	7	3
Consolidated PASS scores for Pillar S, <i>Swasth</i> , Health	2	2	2
Composite PASS scores	19	19	17

We have continuously seen through the enquiry the social nature of menstruation management as being complex, multi – dimensional with over lapping aspects. So even scoring for sustainability is not as easy as it may appear.

8.2 Summary

We had three research questions at the start of the enquiry.

- 1. How can we make the management of menstruation sustainable?**
- 2. How can Menstruation Management Sustainability be measured?**
- 3. How can we holistically compare for menstruation management sustainability between different menstrual products and management systems?**

Through the two tools, *Uger* pads and PASS, we have shown that the management of menstruation can be made sustainable but both have limitations. We have demonstrated that scoring for aspects of menstruation is possible through PASS. We also have been able to establish that a menstrual product on its own cannot make the management of menstruation sustainable as there are multiple dimensional aspects at play. For example, any damage to the environment affects the health of the community. Any social aspect, such as social sanction or social rejection, will determine the menstrual product that will be selected and used. Beliefs will govern how menstruation is managed. Non-involvement of men in women’s issues leads to poor infrastructure leading to unhealthy menstrual practices. While economic condition will determine selection of any menstrual product, peer group sanction will play a huge role in what is used. Due to these reasons, environment, economic, health and social aspects of

menstruation, while separate entities, are interconnected and cannot be separated easily- therefore, multi dimension solutions are required.

Can there be a drastic solution for sustainable menstrual absorbents? Ideally yes it is possible; we can introduce a law banning the use of plastics in disposable pads or banning disposable menstrual absorbents altogether. But such solutions are not practical. However a moderate ideal can be achieved if we can build robust strategies to widely disseminate our findings. Working with state governments is a realistic possibility. We have seen that government programmes view pad distribution as an answer to menstruation hygiene management, without completely addressing the equally critical components related to social, environmental and health. If this mind set can be turned around in policy formulation and action on the ground, we can come closer to achieving sustainability goals. With this in mind, Jatan Sansthan plans a dissemination seminar on Sustainable Menstruation Management scheduled for May 2020 where we envisage sharing our findings.

8.6 Areas for Future Research

We conducted studies on *Uger* Pads over menstrual cycles. Instead, if we were to put *Uger* to a test for the whole year it would have given us a more holistic perspective on how the pads function across seasons. For instance, what would have the performance of the two pads that were compared (*Uger* and *TP*, *Uger* and *Rutumitra* disposable) during winter months, during monsoon season or during summer? We were not able to capture these details over 8 months. Users are in different situations, at home, working in the fields, working on a construction site, going out of town to attend a marriage. When users compared pads we did not capture one aspect - which pad is appropriate at which time? We were not able to find out how many users in the two trials continue to use *Uger* well after the studies were concluded. If users continued using *Uger*, what were the reasons? If they discontinued, what were the reasons? These queries still remain.

Convenience, availability of funds and time governed selection of sites and length of this current enquiry. *Uger* was tested only in two regions, an area in rural South Rajasthan and another area in rural Karnataka. Given the geographical and cultural differences in India, ideally *Uger* should have been tested across the country. Not just *Uger* pads, all menstrual

devices should be tested in extreme climates, in regions of snow (Ladakh), heavy rains (Meghalaya) and extreme heat (Jaisalmer) to test for both its function and maintenance.

There is scope for more research on products. There is always scope for better design, in terms of raw materials and the form of the pad itself. A reusable product can be developed that can be maintained easily, that can be washed and dried in a very short amount of time. There is great scope for hybrid pads, part reusable and a part disposable, which can also be explored. There is scope for improving the *Uger* pad by making it leak proof. The currently available leak proof layers are not earth friendly - can these be replaced with natural rubber? These are some avenues for further exploration. One improvement we have already made since the start of this enquiry, is replacing *Uger* labels which have a polyester mix to our new labels, made entirely of cotton thread. An improvement we would like to see is replacing our cotton fabrics (which are currently BT cotton) to organic cotton. This will substantially increase the price of the products but lessen the pollution to the environment.

There is great scope to work with communities in metro cities where the use of disposables is far greater due to affordability and convenience. In the reusable menstruation management space for cramped metro- city living there is scope for portable washing machines and portable electric driers, which can be installed not just in a users home, but can be extended also into the public domains in work places, airports or at railways stations.

The challenge for menstruation sustainability is therefore enormous – how to create mass movements that embrace menstruation. What can be foreseen as the future of menstruation management sustainability? What can be foreseen as the future of practice? To quote Adams (2016) ‘The challenges ahead demand vision and boldness.’ What PASS and *Uger* have done is that one small step. Going forward the next question is "Will the study guide future practice"? The answer is in the affirmative. This enquiry will guide the many programmes that governments, non- government organisations, corporate houses and activists initiate. There is now a body of knowledge that can be used as a reference to design and develop products, programmes and policies in a sustainable way. There is scope to build on both the two tools.

Appendix I

Laboratory Report for Materials used in *Uger* pads

वनस्थली विद्यापीठ
पो. वनस्थली विद्यापीठ ३०४०२२
(राजस्थान)



BANASTHALI UNIVERSITY
P.O. BANASTHALI VIDYAPITH 304022
(RAJASTHAN)

Test Specimen report for Sanitary Napkin

Sample no 1.

Swatches of Cloth

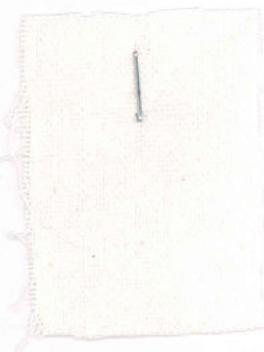
Material : Woven Cloth
Fiber : Cotton (100%)
Colour Use : Pigment Print
Water Absorbency : Poor
Soaking Area : 3.0 cm / Minute (± .5)



Sample no 2.

Layers (Cloth) (Scoured Material)

Material : Woven Cloth
Fiber : Cotton (100%)
Water Absorbency : Good
Soaking Area : 3.0 cm / Minute (± .5)



Sample no 3.

Towel (Cloth) (Scoured Material)

Material : Woven finished Cloth
Fiber : Cotton (100%)
Water Absorbency : Good
Soaking Area : 2.5cm / Minute (± .5)



विश्वविद्यालय अनुदान आयोग अधिनियम की धारा (3) के अन्तर्गत अधिघोषित Notified under section (3) of University Grants Commission Act.
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Appendix II

**Table showing 38 women who collaborated in feedback study on
Uger pads.**

Group A (Previous product reusable)

User Details – only 2 users in this group can afford disposable napkins through out the year. User 7 and user 16.		Previous product used, problems if any with previous product	Artifact <i>Uger</i> Pads given out between January 2013 to November 2013 Current Status July 2014
1	SHG member	TP and Cloth	Used <i>Uger</i> for two cycles, loved it but discontinued as she is very uncomfortable to hang this out went back to TP and petticoat cloth
2	SHG member	Cloth/Baniyan (vest)	Used <i>Uger</i> two cycles and went into peri menopause and is now very irregular so when it occurs uses old product
3	SHG member	Cloth	Used <i>Uger</i> for 4 cycles and went back to cloth, found it very difficult to hang it in the open as the <i>Uger</i> pad got more and more stained with each cycle.
4	Carer for elderly client	Cloth	Peri menopause. Very irregular, manage with my underwear so no need to wear anything. Used <i>Uger</i> but just kept it away.
5	Domestic Worker – Udaipur City	Cloth	<i>Uger</i> + cloth - uses both, is allowed washing and hanging facility where she works. Very happy with <i>Uger</i> , but will not be able to afford this when the current Pads wear out. She stitches and is sure she will stitch her own <i>Uger</i> pads.
6	Coordinator of NGO	Cloth + TP – would alternate if there was itching with TP	Loved <i>Uger</i> and has never looked back after using <i>Uger</i> . Will stitch one herself after the current <i>Uger</i> wears out
7	Environmentalist	Menstrual cup	Uses <i>Uger</i> in combination with Cup, very happy as it protects her from leaks, mother –in- law very orthodox and is unhappy with reusable being hung in the bathroom.
8	Working with NGO	TP - Burning, itching	<i>Uger</i> was taken back from her for feedback. She liked <i>Uger</i> , but went back to time piece, did not want to buy.
9	Working with NGO	TP , reported burning	Liked <i>Uger</i> and continues to use it as she got another set of pads at a training. Say she is ready to buy new ones when the current ones wear out.
10	Working with NGO	TP, itching burning	Very happy with <i>Uger</i> , itching, boil problem stopped with this. Continues to use it as she got another set

			of pads at a training. Say she is ready to buy new ones when the current ones wear out.
11	Working with NGO	Cloth	<i>Uger</i> pad is convenient, likes it a lot. After she returned her pad to the researcher, she never bothered to buy a new one and went back to her previous method
12	Working with NGO	TP	Did not like <i>Uger</i> - takes too long to wash - not worth it
13	Volunteer with NGO	TP , very hot, burning	Very happy <i>Uger</i> , used it after an abortion and found it most convenient during the excessive bleeding phase.
14	Working with NGO	TP - always leaks, never found this totally safe	Loved <i>Uger</i> . Continues to use it as she got another set of pads at a training. Say she is ready to buy new ones when the current ones wear out.
15	Cook and domestic worker at NGO	TP , redness in the genital area, itching, burning, general discomfort	While she liked <i>Uger</i> , she went back to previous product. When asked why she never asked for or bought a new <i>Uger</i> pad, she said she was not aware that Jatan Sansthan had started mass producing it, she thought they were only samples.
16	Teacher Private School	Has always used cloth from – a gel pad gave her severe itching the first time she used it as a young girl. That was the first and last last time she used a pad	Uses <i>Uger</i> now - in combination with cloth. Uses cloth for heavy days and <i>Uger</i> for light days
17	Post Graduate student	TP	Loved <i>Uger</i> and has never looked back after that. Stitches her own pad
18	Working from home in rural setting	Cloth	Loved <i>Uger</i> and has never looked back after that. Stitches her own pad.
19	Cook and domestic worker at NGO	Cloth	Never tried <i>Uger</i> even once. She does not wear an underwear and is not interested in either underwear nor <i>Uger</i> . She returned the <i>potli</i> within days.
20	Post graduate student, unemployed at home	Cloth	Has been using <i>Uger</i> for 9 months and feels she will never go back to plain cloth. Is willing to invest in <i>Uger</i> pads for the coming years

*Cloth harvested from old garments and textiles

**TP = *Time Piece*

Table no 3 – Group B (Previous product disposable product)

User Detail – all users can afford to buy DSNs for the whole year without any financial difficulty. All in the group were aware about the impact that disposables have on the environment		Previous Product and problems if any	Artifact <i>Uger</i> Pads given out between January 2013 to November 2013 Current Status July 2014
1	Working woman Designer	DSN	Did thorough research and was convinced that reusable is sustainable. So bought the Cup and uses this in combination with <i>Uger</i>
2	Student Under grad	DSN	This user also did her own through research and was convinced about sustainability. So bought the Cup and uses this in combination with <i>Uger</i>
3	Working Woman in development sector	DSN	Combination - reusable pads from <i>Uger</i> and other reusable pad companies and disposable napkins
4	Student Post Grad	DSN	Tries to use <i>Uger</i> as much as she is able to. Considers herself “green”, but makes a compromise when she is travelling and resorts to disposables
5	Student – High School	DSN - major problems - She had an extreme case of a combination of allergy, abscess and boils. Missed school for one whole week as she was not able to walk. Her mother had heard of the <i>Uger</i> pad work, contacted researcher and gave her daughter the <i>Uger</i> pads to try.	<i>Uger</i> gave her no problems in the next cycle. She has had no repeat of any infection for almost 8 months. This young girl is now a crusader for <i>Uger</i> pads and volunteers at <i>Uger</i> seminars and meets. She testifies for <i>Uger</i> breaking silence along with <i>Uger</i> team at Jatan Sansthan
6	Working Woman (does not want to reveal)	Major problems with DSN, itching,	Purchased <i>Ecofemme</i> pads and had started using that. Learned about <i>Uger</i> on the internet, bought these continues to use

		rash, intense discomfort	
7	Working Woman - consultant	DSN + Cloth - major problems with DSN -	Would use DSNs only when out of town, always cloth when in town, heard about <i>Uger</i> , bought some, tried it and has completely made the switch
8	Student - Under grad	DSN	Gave up - back to disposable after 1 cycle.
9	Student - Under grad	DSN	Gave up - back to disposable after 1 cycle
10	Student - Under grad	DSN	Gave up - back to disposable after 1 cycle
11	Stay at Home Mother	DSN - problems	Gave up – back to disposable after 1 cycle. Did not want to wash, found <i>Uger</i> very uncomfortable.*
12	Working Woman – Own Business	DSN - problems	Never Tried
13	Ph.D student	DSN - problems	Never tried
14	Student – Post Graduate	DSN	Uses in combination
15	Student – High School	DSN	Gave up - - back to disposable
16	Working Woman	DSN - Problems	Never tried
17	Was a working woman currently a stay at home mother	DSN – Problems	Never tried
18	Working woman	DSN	Used in combination with DSN for a couple of cycles and then completely gave up. Wet feeling, washing drying is not practical.

* The user is big built, *Uger* pads were too small for her.

**DSN= Disposable Sanitary Napkins

*** Problems + rashes, minor itching, control it using anti fungal

Appendix III

Correspondence Dr Taru Jindal

From: taru jindal <tarujindal@yahoo.co.uk> 23 Sep 2015, 12:47

To: buyuger@gmail.com

Namaste maam,

I don't know if you remember me. I am Dr Taru Jindal, gynecologist from Mumbai. I had visited Jatan last year.

I wanted to say that I am in love with Uger pads. I have not used plastic napkins for last one year and women of my family also have stopped using plastic pads since 1 year. They give me an amazing feeling of being one with nature. They are eco-friendly, healthy, comfortable and aesthetic. I love the way it hangs in the balcony and looks like a bird!!

You can take any statement from this mail and use it as a quote from a qualified gynecologist who supports cotton menstrual pads with a full heart.

I speak about these pads where ever i go. Recently I was working in Nepal and Bihar and i had taken these pads there to show nepali nurses also. They were so excited that they wanted to buy them right away.

I have also given talk on adolescent sex education where i have a section on cotton menstrual pads and I showed ecofemme and uger pads to school girls. They were also super excited about them.

I wish you all the best and hope uger reaches greater horizons!

Thanks maam :)

Dr Taru Jindal
M.S (Obs and Gyn)
ph: 9930567627

602, Sai Krishna Kunj,
D.N.Nagar,
Andheri(west),
Mumbai-400053

Appendix IV

Participant Information Sheet and Informed Consent Form

1. Title of the study

A proof of concept user study on disposable and reusable menstrual products

2. Names of the Principal Investigators

Dr Anirudha Joshi, Professor, IDC, IIT Bombay. Powai, Mumbai 400076

3. Information to be provided

a. Why is this study being done?

- To understand positive and negative health outcomes, design related aspects and socio – cultural aspects that govern the use of four menstrual product options .
- To understand preferences of rural users as they use and compare the four menstrual product options

b. How many people will take part in this study

You will be one among 150 menstruating women who will participate in the study spread over 8 menstrual cycles.

c. What will I receive after inclusion in this study

You will be receiving two types of menstrual products to use over a 8 cycle time period to compare.

d. How long will I be in this study? Include reasons for discontinuation

- You will be participating for 8 months, that is 8 menstrual cycles.
- You will have to withdraw only if you get pregnant
- You will have to withdraw if for some medical reason you stop getting your periods
- You may withdraw from the study if you want to discontinue out of your own choice
- You may withdraw if you are unhappy with the products we give you. Unhappy means, it is not comfortable or not suiting you

e. What are the benefits of my participation in this study?

- By participating in the study you will help us understand your experiences, problems and issues related to two menstrual products we will be giving you to use
- This information will help us to understand your menstrual needs, attitudes and will be useful for us for future health interventions and solutions for your village.

f. Are there any risks involved in my participation in this study?

There are no risks involved during your participation in this study. The only problems we anticipate are chafing of inner thighs by the use of the product. This can happen with any menstrual product. In case you face discomfort with any of the two products such as itching or any other problem that you may have not faced before and you think it is from the products we have given to you, you are at liberty to leave the study.

g. What about confidentiality?

All information that you provide, through interviews, telephonic conversations, audio recordings, photographs of used products, will be used internally by us to help us to understand your menstrual preferences. All information kept with us will be coded such that nobody will be able to trace back any information to your identity will not be revealed in any way. The study related documents will be accessible only to the regulatory bodies and the ethics committee.

Photographs of women participants will not be included. All efforts to protect the privacy of the participants will be taken.

h. What costs will I have to bear by participating in this study?

You will not have to bear any costs to participate in this study. We will be contacting you directly at your home or ask you to come to the school compound or the health centre compound which is at walk able distance. If your home location is far away from your home, we will arrange / pay for your bus fare.

i. What are my rights as a participant?

Your taking part in this study is voluntary. You can agree to be in the study now and change your mind later, which you are free to do. If you wish to withdraw from the study for any reason, you are free to do so.

j. What are my duties as a participant?

During the study we will ask you many questions related to management of the two menstrual products we are giving to you. We request you to answer the questions accurately with no embarrassment. We request you to not be shy about showing your menstrual product to us. By seeing your used products we are only rechecking the function of the menstrual products (that is it managing your blood discharges properly?) You must recall your experiences in as much detail as possible. Do feel free to share any experiences that you think are relevant to our study even if we don't ask about them explicitly.

k. Whom do I contact in case I have questions, problems or ideas after the interview?

If you think of new ideas or suggestions about design of the menstruation products or systems do contact the field coordinators at the address or phone numbers below.

Informed Consent Form

I, the undersigned, _____, being of sound mind, adult, do hereby declare:

1. That I have read pages 1 and 2 of the Participant Information Sheet (of which a copy has been provided to me). The participant Information Sheet has been explained to me in a language and in terms that I understand.
2. That all questions I have about my participation in this study have been satisfactorily answered, and all doubts that I had satisfactorily clarified by the principal investigator or his / her authorized representative.

3. That I understand that my participation in this study may not benefit me. Should I not benefit, I will not take any legal action against those who conduct or sponsor the research.
4. That I have been assured that I will not have to bear any costs of investigations or procedures relevant to the research.
5. That I can withdraw from the study at any time without having to give reasons for doing so.

I therefore fully and freely consent to my inclusion in this study.

I agree / I do not agree* to allow audio recording of my interview session.

I agree / I do not agree* to allow shooting of digital photographs of relevant artefacts such as used and washed sanitary napkins.

Signature / left thumb impression of the participant **

Signature of the principal investigator

Name:

Name:

Date:

Date:

Attested by

Signature

Signature of the witness

Name:

Date:

Appendix V

User Recruitment Interview Questions

Study no:
Date:

Participant no :
Location:

Section 1 : General

1. Name:
2. Age:
3. Address:
4. Phone number:

Do you have access to this phone at all time? Yes ----- No
If no – whose phone is this – and at what time can we speak to you on this number?

5. Marital status:
 - a) Single
 - b) Married
 - c) Separated
 - d) Widowed
6. Number of children
No of female children Ages
No of male children Ages
7. How many persons are there on your “chullah”?

No of adults:
No of children:

8. Source of income of members on your chullah is from:
 - a) family fields
 - b) livestock
 - c) salaried job
 - d) own business
 - e) daily wage labour
9. Combined Monthly income of all members on your “chullah”
 - a) Between Rs 3,000 to 4,000
 - b) Between Rs 4,000 to 6,000
 - c) Between Rs 6,000 to 8,000
 - d) Between Rs 8,000 to 10,000
 - e) Between Rs 10,000 to 12,000
 - f) Between Rs 12,000 to 15,000
 - g) Between Rs 15,000 to 20,000

h) Over Rs 20,000

10. Describe your activities in the day

11. Are you able to take independent decisions on what to buy for personal needs each month such as your clothes, flowers, bangles, bindis, etc?

- a) Yes
- b) No
- c) Sometimes

Section 2 Menstruation

12. The first time you got your period - were you aware that this would happen to you?
Yes / No

13. If you knew from before - where did you get this information from? Who told you?
Where did you hear about this?

14. Can you speak openly about menstruation issues? Give examples of whom you can speak to.

15. When you get your period do you ---

- a) Restrict your movements, for example not attend class
- b) Stop physical activities such as sports, yoga
- c) Carry on normally with all usual and daily activities

16. Are there many menstrual related taboos / beliefs within your family- such as

- a) I am not allowed to go into the kitchen or to cook
- b) I am not allowed to go to the temple
- c) I am not allowed to do pooja
- d) I have to stay in a separate room
- e) I have to sleep on a separate bed that is usually reserved for when you have your period
- f) I am not allowed to touch the water pot
- g) I am not allowed to touch the pickle jar
- h) I am not allowed to touch the tulsi plant or any sacred plant
- i) I can only enter the kitchen three days after my period, after a head bath
- j) I can only eat certain types of food at this time.
- k) Any other restriction, please specify

17. Menstrual blood is(high light one)

- a) Dirty blood
- b) Clean blood
- c) I am not sure

Give reasons why you have ticked the option.

18. In the past to three months have you had any of the following problems related to menstruation?

- a) Bleeding has stopped

- b) Excess bleeding
- c) Irregular bleeding
- d) Itching, burning, boils in genital area
- e) Spontaneous abortion
- f) Induced abortion
- g) Any other problems? Specify.

19. When I have health problems related to menstruation I usually:

- a) Ignore it
- b) Tell my friends and ask them what to do and listen to what they say
- c) Ask elders
- d) Go to the local doctor at the clinic
- e) Other

20. Under clothing information – underwear/sundee/chaddi/ (tick)

- a) You do not wear underwear
- b) I wear underwear every day
- c) I wear underwear only during my menstrual cycles
- d) The underwear I usually use is of cotton
- e) The underwear I usually use is polyester
- f) I use both cotton and polyester underwear
- g) I buy these from the market
- h) I buy this from the lady who comes door to door

21 What is the menstrual product you have been using in the past 3 months?

- a) Cloth from home
- b) Cloth from market
- c) Disposable Sanitary Napkins – please name the napkin brand
- d) If you are using combinations of products the products you use are
- e) Other notes

.....

22. Your menstrual cycle is days.

23. Facilities that you have

- a) Latrine within home
- b) Latrine within compound
- c) Bathing area within home –but separate from latrine
- d) Latrine and bathing area together in home
- e) No latrine at home
- f) No bathing area at home
- g) Running water at all times
- h) Running water sometimes
- i) No running water, only stored water - stored in

24. Soaps and detergents

- a) For washing after latrine we use
- b) For bathing we use
- c) For washing clothes we use

- d) We have these cleansing items through out the month
 - e) We do not have these some days in the month (probe to find out when these finish and how many days in the month they go with out these items)
25. Where are the family's clothes washed?
- a) Backyard
 - b) In the badi/nyora
 - c) In the bathing area at home
 - d) Other
26. Where are the family's clothes hung to dry after washing?
- a) Backyard
 - b) On the terrace upstairs
 - c) Other
27. Where do you wash your menstrual products?
- a) Backyard
 - b) In the bathing area at home
 - c) Other
28. Where and how do you hang out your menstrual product to dry?
- a) Backyard under the sun
 - b) On the terrace under the sun
 - c) Backyard – hidden under other clothing
 - d) On the terrace hidden under other clothing
 - e) In the bathing area at home openly
 - f) In the bathing area at home hidden under other clothing
 - g) Any other
29. Where do you change your menstrual product?
- a) In the latrine
 - b) In the bathing area
 - c) In the room at home
 - d) Other
30. If you are using disposable product where do you throw this?
- a) I wrap in a newspaper/paper/ and throw in the waste paper basket
 - b) I do NOT wrap and throw in the waste paper basket
 - c) I throw this away in the open field
 - d) It is taken away by the domestic worker/helper
 - e) It is collected and burned
 - f) It is flushed down
 - g) If any other system please describe
31. When did you get your last periods?
32. What contraception have you been using in the past three months?
- a) None
 - b) Withdrawal
 - c) Condom
 - d) Pills
 - e) IUD

- f) SDM
- g) Implant
- h) Operation (you, husband)

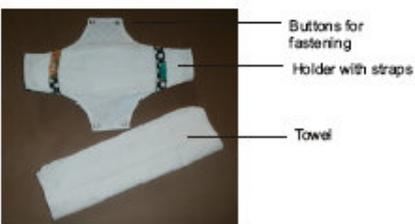
33. We have two menstrual products that we can give you to try? Will you be willing to participate?

- a) Yes
- b) No

Appendix VI

Record Diary – Study 4 - Cross Over Trial

<p style="text-align: center;">User's Record Diary Proof of Concept Study <i>Rutumitra</i> and <i>Uger</i> Sanitary Napkins</p>  	<p style="text-align: center;">Proof of Concept Study <i>Rutumitra</i> and <i>Uger</i> Sanitary Napkin</p> <hr/> <p style="text-align: center;">Thank you You have agreed to participate in the user study. This is your own information booklet and diary For recording your own notes.</p> <hr/>  <p style="text-align: right;">1</p>
<p style="text-align: center;">Details of the study</p> <p>MITU Foundation, Bangalore, along with Lakshmi Murthy, Ph.D Student, IIT, Bombay are jointly conducting a proof of concept user study on two types of sanitary napkins, <i>Rutumitra</i> napkin and <i>Uger</i> napkin. Duration of the study is over your 8 menstrual cycles, where you will be trying out these two types of sanitary napkins. You will be using type 1 for the first 4 cycles and then use type 2 for the next 4 cycles.</p> <p>The objective of the study is to understand your preferences as you use and compare the two types of sanitary napkins. Confidentiality will be maintained, your name or photograph will not be used anywhere. Representatives from MITU Foundation will be in contact with you. They will ask you about the performance of the two sanitary napkins, your opinions on the design of the napkins, your preferences and your choices and your suggestions for improvement.</p> <p style="text-align: right;">2</p>	<p>Contact details - Manjula and Gayatri of MITU Foundation are in charge of the study</p> <p>Gayatri Bai : 9538670622 Manjula Alwar : 990032454 Address : MITU Foundation, 199, 2nd Floor Terrace, Yathiraja Mutt Building, Sampige Road, Malleshwaram, Bangalore, Karnataka 560003</p> <p>Other contact details Kala Charlu – Founder Member of MITU Foundation and advisor to this study Phone 919740031720</p> <p>Lakshmi Murthy- Researcher 004, Ravi Kiran Aps, 4th Main Road, 15th Cross, Malleshwaram, Bangalore 560003. Phones: 91-9414159589, 080-23340882</p> <p style="text-align: right;">3</p>

<p style="text-align: center;">Sanitary Napkin Type no 1</p> <p>The <i>Rutumitra</i> Sanitary Napkin packet has 4 pads. Each pad can be used only once, it is to be thrown away after one use. Take out an individual pad from the packet. There is a rectangular paper at the bottom of the pad. When you peel of the paper, you will find a sticky layer.</p>  <p style="text-align: right;">4</p>	<p>Stick the pad to the underwear as shown. Wear the underwear with the pad during your cycle. You will be given 4 <i>Rutumitra</i> packets for each cycle - this means 16 individual pads.</p>  <p style="text-align: right;">5</p>
<p style="text-align: center;">Sanitary Napkin Type no 2</p> <p>This is the <i>Uger</i> Sanitary Napkin. This is made of cotton cloth. The pad has two parts, the holder and a square towel.</p>  <p style="text-align: right;">6</p>	 <p>Fold towel and place within the straps. This is the top of the pad which will be in contact with your body.</p> <p>This is the reverse view of the pad.</p> <p style="text-align: right;">7</p>



Button the pad in the underwear as shown. You will be given 3 holders and 6 towels for use throughout the 4 menstrual cycles.

8

The pad should be washed and hung out to dry after using. Once it is completely dry, you can use again.



9

Your name
 Address
 Your phone number

Thank you once more for participating in this study.

10

Your group no is

You were given Type no 1 that is *Rutumtra* Sanitary Napkins.

For cycle no 1 you received 16 individual pads on date ____
 For cycle no 2 you received 16 individual pads on date ____
 For cycle no 3 you received 16 individual pads on date ____
 For cycle no 4 you received 16 individual pads on date ____

You were given Type no 2 that is *Uger* Sanitary Napkin

For all 4 cycles you received 3 holders and 6 towels.
 The date you received this

(Remember these are washable pads, so you will be washing and reusing this for 4 cycles)

11

You will be given Type 1 Napkin or Type 2 Napkin, depending on the group you are in.

- If you are in Group no 1, you will get Type 1. You will be using type 1 for 4 cycles. Once you have completed the 4 cycles, you must contact the MITU representative. She will then give you Type 2 for the next 4 cycles.
- If you are in Group no 2, you will get Type 2. You will be using type 2 for 4 cycles. Once you have completed the 4 cycles, you must contact the MITU representative. She will then give you Type 1 for the next 4 cycles.

We request you not use any other product during your periods while you are participating in the study. However in case you are facing any problems such as itching, burning with any of the sanitary napkins, immediately stop using the napkin. Please inform the MITU representative at the earliest.

12

Please fill in the dates of your menstrual cycles

Cycle no	Napkin used	Starting date	Ending date
1			
2			
3			
4			

13

You can record your own observations here for Cycle no 1

14

You can record your own observations here for Cycle no 2

15

You can record your own observations here for Cycle no 3

18

You can record your own observations here for Cycle no 4

17

Please fill in the dates of your menstrual cycles

Cycle no	Napkin used	Starting date	Ending date
5			
6			
7			
8			

18

You can record your own observations here for Cycle no 5

19

You can record your own observations here for Cycle no 6

20

You can record your own observations here for Cycle no 7

21

You can record your own observations here for Cycle no 8

22

Please return this booklet to the MITU Foundation representatives at the end of the study.

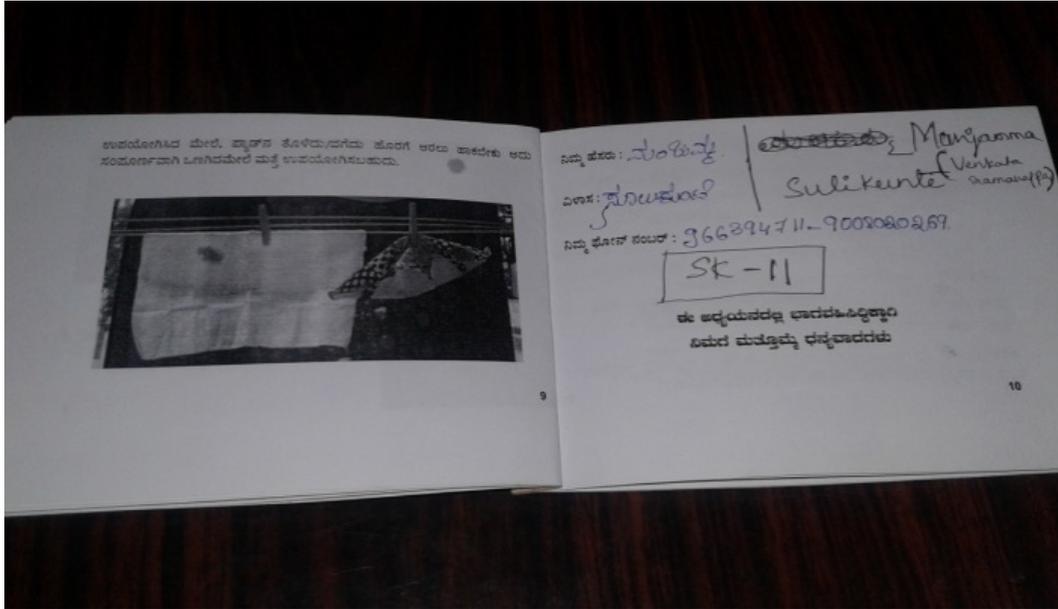
Thank You



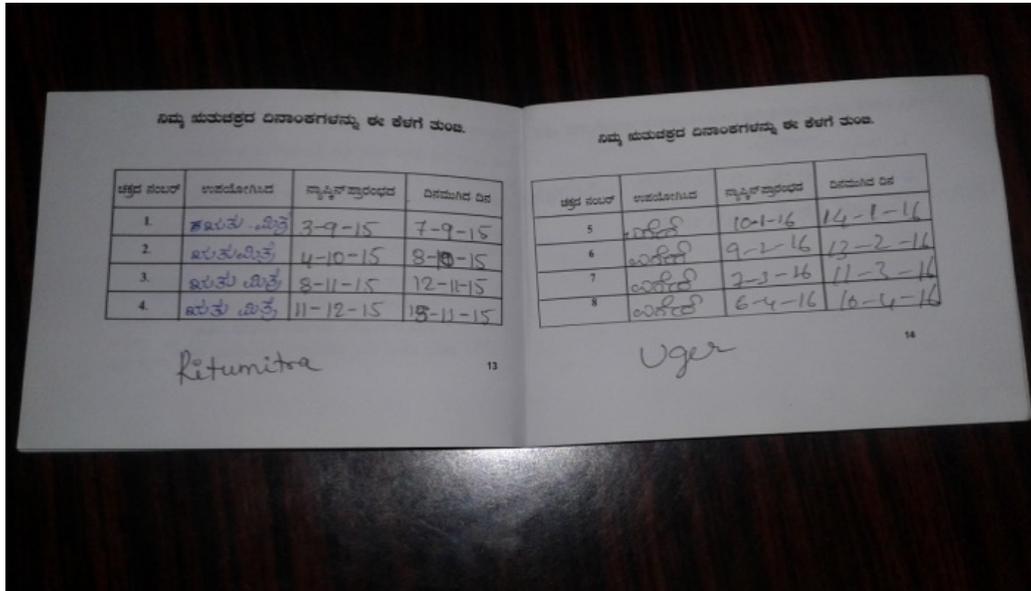
Appendix VII

Record Diary – In Kannada – Study 4 – Cross Over Trial

Dairy of Respondent - SK11- Manjamma Venkatarenappa

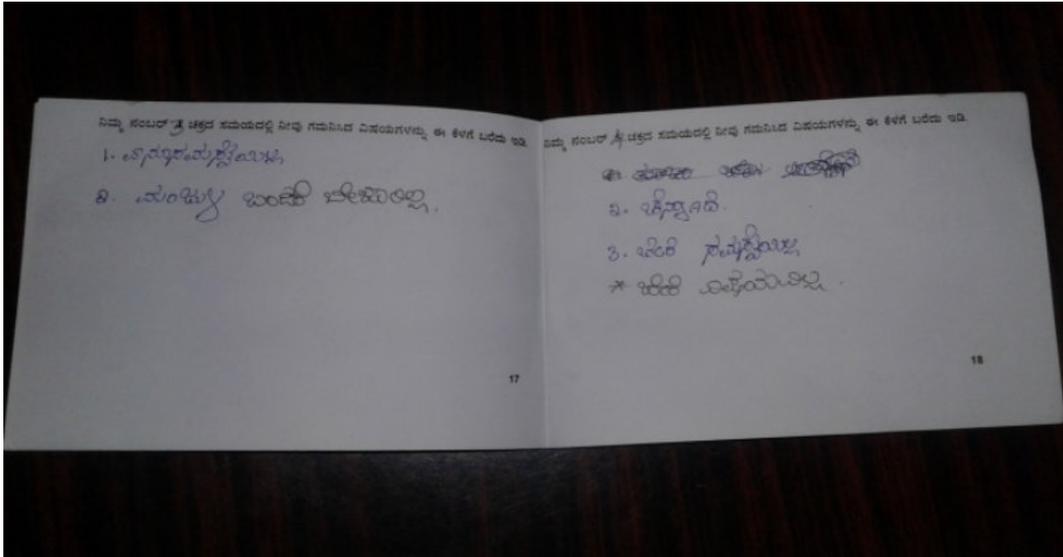
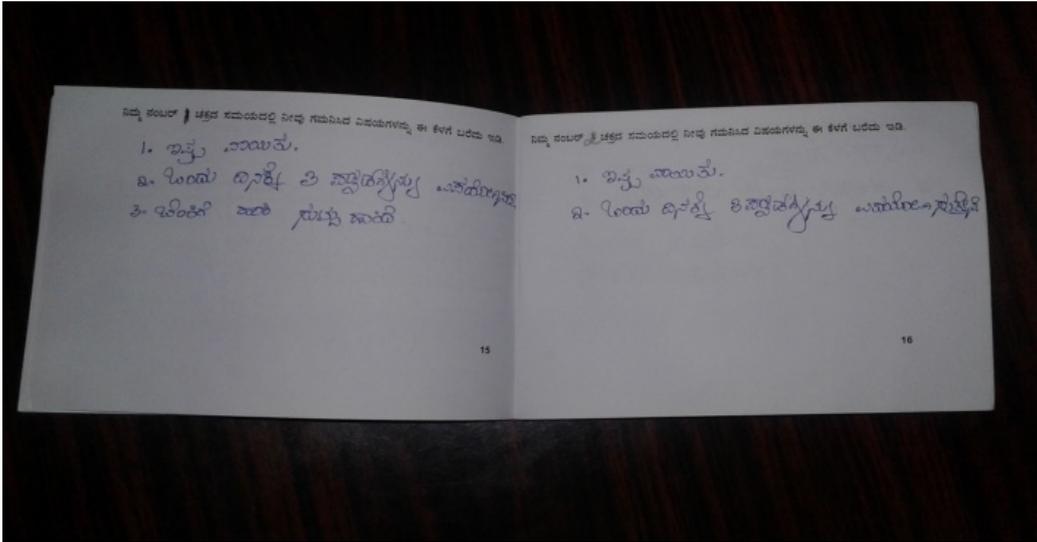


Dates of menstrual cycle



Ritumitra	3.9.15	4.10.15	8.11.15	11.12.15
Uger	10.1.16	9.2.16	7.3.16	6.4.16

Comments in record diary



- 1st Cycle: I like it. I have changed 3 pads a day during my periods
- 2nd Cycle: Its good. I have used 3 pads per day. Burnt at bath room stove
- 3rd Cycle: no changes. We don't feel bad if Manjula ask about feed back
- 4th Cycle: good no problem & nothing to share
- 5th Cycle: good. Towel is very thin. It is good because of button
- 6th Cycle: good. Wash it with Nirma powder & saval soap. Dry it on wire & will change at room
- 7th Cycle: no problem. Nothing to share
- 8th Cycle: I like the Uger. Very good. Nothing to share

Appendix VIII

Correspondence: Burning Cotton Cloth vs Disposable Napkins

From: Lakshmi Murthy <lakshmi@jatansansthan.org>
Sent: 08 May 2019 08:06
To: Nitin Labhassetwar <nk_labhsetwar@neeri.res.in>
Subject: From Lakshmi - Ph.D student IIT (B)

Dear Nitinji

You will recall that we were introduced sometime back I am a Ph.D student of Dr Virendra Sethi, working in the area of menstruation management sustainability. I am looking for very simple data and I was hoping that you could help me with this.

I am comparing (a) 100 pieces of cotton cloth, shape square, size 10 inches X10 inches VS (b) 100 disposable sanitary napkins.

What is the environmental impact upon of burning (a) versus (b) ?
Which one is better or worse?
Is there some study that has been done, can you please help with this?
Many thanks for this help.

Lakshmi

From: <nk_labhsetwar@neeri.res.in>
Date: Wed, 8 May 2019 at 10:19
Subject: RE: From Lakshmi - Ph.D student IIT (B)
To: Lakshmi Murthy <lakshmi@jatansansthan.org>

Dear Laxmi

I have asked my student to check for literature. It will be complex for the reason that there is so much of variation in composition of commercial sanitary pads and also the fact that it is not easy to get the composition of those pads available in the market (we didn't find the composition on packing or through their websites). We are also planning to approach some prominent manufacturers for the same. Will get back to you once I get some relevant info.

Regards

Dr. Nitin Labhassetwar
Chief Scientist/ Scientist-G and Head , Energy and Resource Management Division
Professor, Academy of Scientific and Innovative Research
CSIR-National Environmental Engineering Research Institute (NEERI),
Nehru Marg, Nagpur - 440 020 [Maharashtra] India
Telephone (Office): 0712 224 9753 Mobile No. +91-9850316799

Appendix IX

Lab report *Time Piece (TP)*

वनस्थली विद्यापीठ
पो. वनस्थली विद्यापीठ ३०४०२२
(राजस्थान)

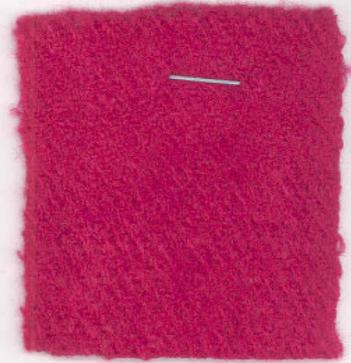


BANASTHALI UNIVERSITY
P.O. BANASTHALI VIDYAPITH 304022
(RAJASTHAN)

Sample no 4.

Woolen Woven (Cloth)

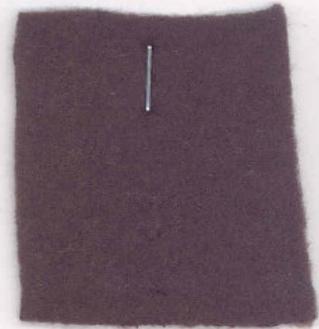
Material : Woven Cloth
Fiber : Wool (100%)
Dye stuff : Acid Dyes
Water Absorbency : Good
Soaking Area : 3.5 cm / Minute ($\pm .5$)



Sample no 5.

Fleece (Cloth)

Material : Felted Cloth
Fiber : Poly Acrylic
Dye stuff : Disperse
Water Absorbency : Very poor
Soaking Area : 0.5 cm / Minute ($\pm .2$)



Appendix X

Supporting e mail for *Time Piece* and *Uger*

Gmail - Report for Uger-Cloth Sanitary Pads.

<https://mail.google.com/mail/u/0/?ui=2&ik=c9c5a123f2&view=pt&q=k..>



Lakshmi Murthy <ellemurthy@gmail.com>

Report for Uger-Cloth Sanitary Pads.

sambaditya.bid <sambaditya.bid@banasthali.in>
To: ellemurthy@gmail.com
Cc: KD Joshi <kdjoshi@banasthali.in>

15 August 2013 at 15:36

Dear Lakshmi,

As discussed with you, Please Find Attached the test results, as tested in our laboratory.

For your information all samples have been tested for the following as per the procedure laid by International Standards.

1. Identification of Material : As per ASTM D276 Standards
2. Identification of Fiber : As per ASTM D276 Standards
3. Identification of Dyestuff : As per AATCC 161-2012 Standards
4. Absorbency : As per ASTM D4772-09e1 Standards
5. Soaking Area : As per ASTM C356-10 Standards

We hope find them useful. The original test report is being courier to you.

Thanks & regards

Sambaditya Raj
Asst.Professor
Banasthali Institute of Design
Banasthali University
Rajasthan-304022
e-mail: sambaditya.bid@banasthali.in, rajsambo2000@yahoo.co.in
Contact: +91 9887079016

2 attachments



1.jpg
195K

Appendix XI

Laboratory Report *Rutumitra*




BANGALORE TEST HOUSE
 D-36, 4th Main, KSSIDC Industrial Estate, Rajajinagar,
 Bangalore - 560 044, INDIA
 Ph.: 23356415, 23385979, 23502684, 23388895, Fax: 080-23502689
 e-mail: bthr@bthindia.com bthindia@hotmail.com
 website: www.bthindia.com



 Cert. No. RQ91/JA/1111
 Cert. No.: RO91/JA/IC/1111

TEST REPORT

Page : 1 of 1

Report No. : AU/2014/10/0130	Report Date : 28/10/2014
Issued to : Multiple Initiatives Towards Upliftment(MITU)	Customer Reference: RFA Dt: 14.10.14
#68, Margosa Road, Bet, 17th & 18th Cross, Malleshwaram, Bangalore-560055	Date of Receipt : 15/10/2014
	Date of Start of Test : 27/10/2014
Sample Nature/ Name : Rutumitra Sanitary Pads	Date of Completion : 28/10/2014
	Job Order No. : AU/2014/10/0130
Sample Condition : Satisfactory	Sample Particulars : NA

SL. No.	PARAMETERS	RESULTS	LIMITS & PROTOCOL (As per IS: 5405-1980)
	Appearance	The sanitary napkin have a very soft feel and is free from foreign matter packed in polythene cover.	
1	Absorbency and Ability to withstand pressure after absorption	Complies	Minimum 30.0 ml
2	Disposability, Minutes	1 min 40 secs	Not more than 5.0
3	pH (2% Solution)	7.20	6.0 to 8.5
	Pad dimensions Test		
4	Core Length (mm)	218.0 mm	200.0 mm ± 20.0mm
5	Total width (mm)	70 mm	60.0mm to 75.0 mm

Remarks: Sample conforms to " IS: 5405-1980 Specification" for Sanitary napkins with respect to above tested parameters only in the above respect.

Vallabhai
ANALYST

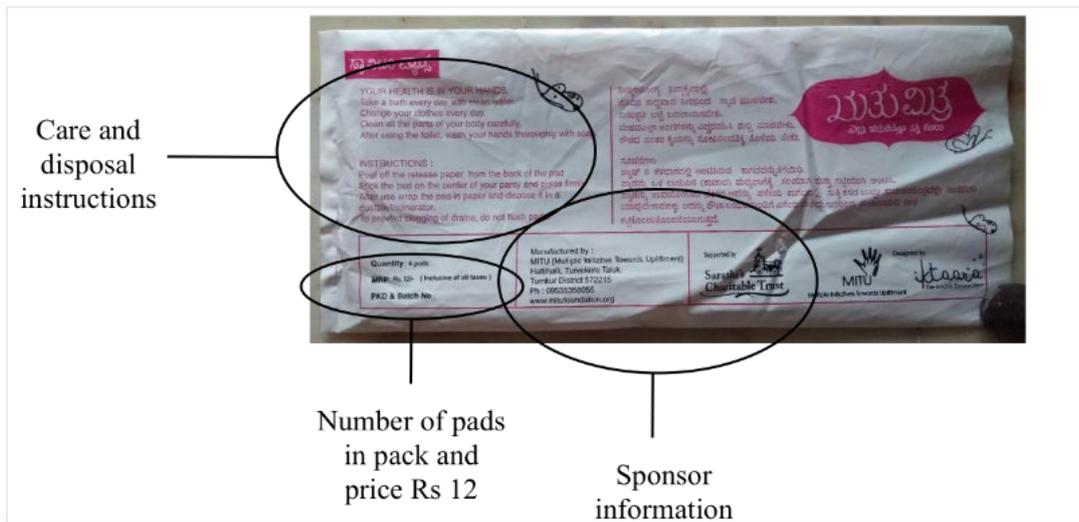
Serao Pandar
AUTHORIZED SIGNATORY

NOTE : 1. The result listed refer only to the tested samples & applicable parameters. Endorsement of products is neither inferred nor implied. 2. Samples will be destroyed after one month from the date of issue of test certificate unless otherwise specified. 3. This report is not to be reproduced wholly or in part & cannot be used as an evidence in the Court of law & should not be used in any advertising media without our special permission in writing. 4. Sample(s) not drawn by us unless otherwise stated. 5. Total liability of our laboratory is limited to the invoice amount. Any dispute arising out of this report is subject to Bangalore Jurisdiction only.

Appendix XII Rutumitra Packing



Side 1



Side 2

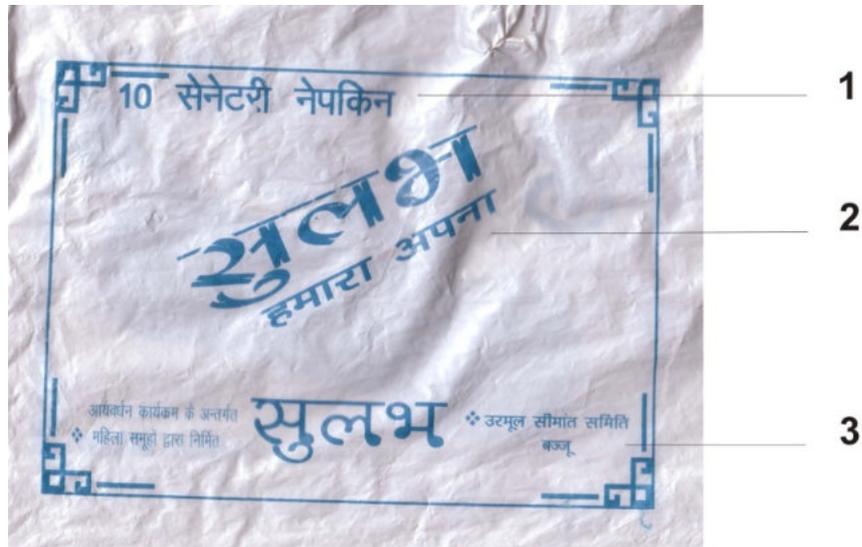
No raw material information was printed on the packet

Appendix XIII

SHG Produced napkins

	Low Cost Sanitary Napkin Brand	NGO
1	Sulabh	Plan international Supported
2	Sakhi	Water Aid Supported
3	Saathan	Hathali Sansthan Supported

Sulabh Sanitary Napkin



Packing

External plastic bag dimensions: 10”X 7”X3”

Text on Sulabh Packing

No 1

10 Sanitary Napkin

No 2

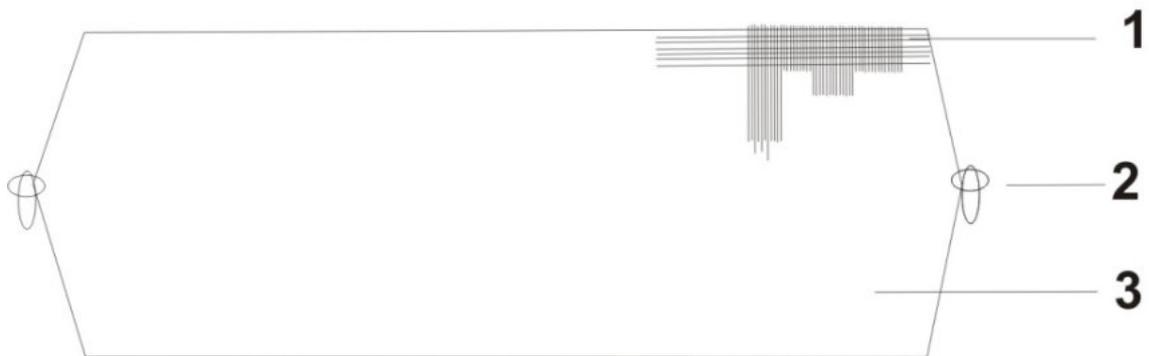
Sulabh Hama Apna

No 3

Aryadhan Karyakram kay antargath Mahila Samuhaon dwara nirmath, Sulabh, Urmul Seemanth Samiti, Bajju

Description upon opening

Ten Sanitary napkins are placed inside. The outer covering of the napkin is made of bandage material and knotted at the two ends. It is designed to be used with a draw string. The core of the napkin is cellulose.



1. Bandage material 2. Knotted ends 3. Core Of Pad

Sakhi Sanitary Pad



Packing: External plastic bag dimensions: 8" X 3" X 2.5"

Text on Sakhi Packing

No 1

Sakhi Sanitary Napkin

No 2

3 Pieces

No 3

Always Comfortable

No 4

Sakhi Sanitary Napkin Feel More Free

No 5

Mfd by Jai Mahalaxmi Swa Sahayata Samuh
Village – Mawapara, Block Pali
Dist Korba (C.G) Chattisgarh

No 6

Water Aid

No 7

Sakhi Sanitary Napkin Always Comfortable

Description upon opening

A packet contains 3 pads. There is no individual packing. Appears to be of lower quality. No plastic used in the pad



- | | |
|-----------------------|---|
| 1 Non woven Top layer | 2 Coloured paper placed to differentiate it from top of pad |
| 3 Release Paper | 4 Core of pad |

Appendix XIV

Study of outer packings of MNC, DSNs

Four branded napkins and three SHG⁸¹ produced napkin were examined

	Branded Napkins	Company
1	Stayfree (Mumbai)	Johnson and Johnson (medical items range)
2	Whisper (Baddi - North India)	Proctor and Gamble, India (Pampers and range)
3	Sofy (Japan)	Unicharm (Children – Poko pants and Feminine Products)
4	Don't Worry (Gurgaon -North India)	Mankindpharma (Deodorants, condoms and others)

- External packing – description and text analysis
- Upon opening the pack – description of contents
- Information provided on websites

Information on two branded napkins have been given as examples of what was studied.

⁸¹ SHG – Self Help Group

Whisper



Packing - External plastic bag Dimensions: 3.5 “x 4” X 1.5 “

Text on Whisper Packing

No 1

Licensed users of the trademarks net quality 6 pads.

* MRP Rs 35 only (inclusive of all taxes),

PKD & lot number, see side panel

No 2

6 PADS WINGS

No 3

Whisper is a Trade Mark of Proctor and Gamble USA

For Manufacturing address refer to letter after Pkd.

Manufactured by P and G Hygiene and Health Care Ltd

Mumbai 400099

No 4

3145A240071616

Pkd. 05/13 G

No 5

Directions for disposal

1. Wrap the pad in paper and throw in a dustbin.
2. To prevent clogging of drains, do not flush pads.

No 6

Fresh Scent – that gives you a fresh feeling throughout your period

Blue Lock Care – that Locks the wetness in

Stretchable Wings™ – That wrap snugly around your panty to keep the pad in place

(Note : Trade Mark is only for Stretchable Wings)

No 7

Contact us If you have any questions about Whisper, or if you would like to give us feedback, please email brand info@in.pgconsumers.com or call + 91-22-24942113. Visit

www.beinggirl.in for more details on Whisper

No 8

In case of G. Plot no 173 Kundaim industrial Estate, Kundaim, Goa 403115, India. Proctor and Gamble (Guangzhou) Ltd. No 1 Bin He Road, Guangzhou Economic Technological Development District, Guangzhou, P R China PC 510730. Imported by Proctor and Gamble Hygiene and Health Care Limited, P&G plaza, Cardinal Gracias Road, Andheri (E) Mumbai – 400099

No 9

Peel of the release paper from the back of the pad

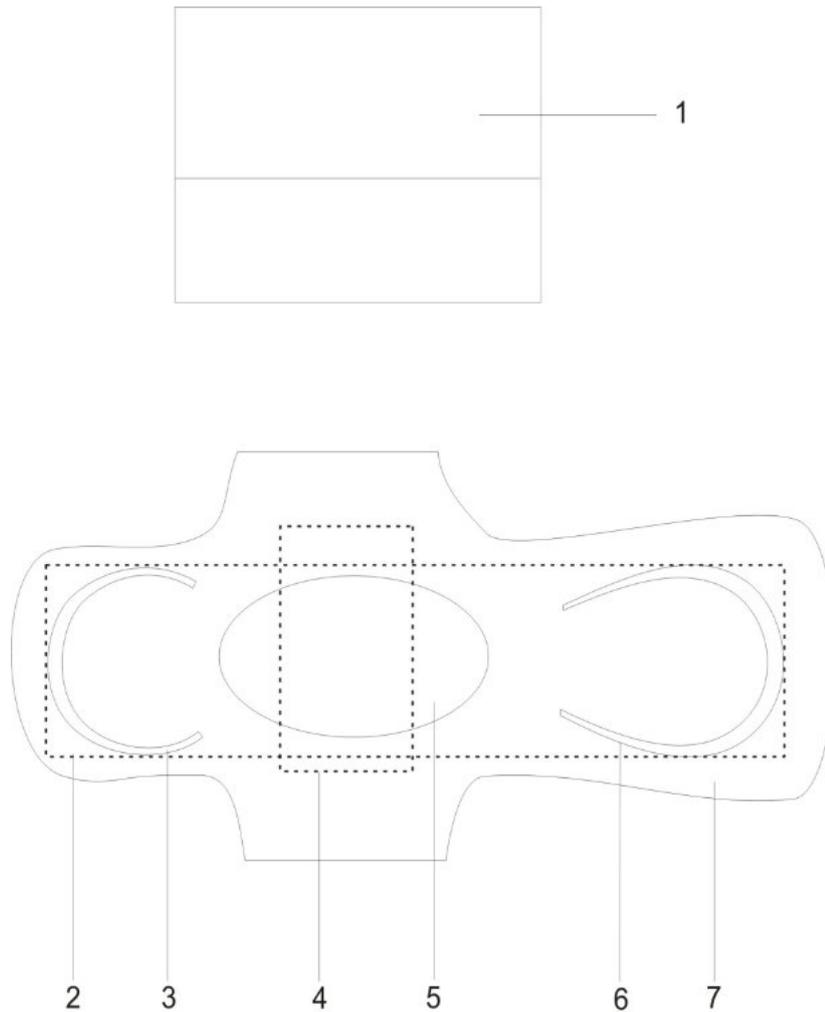
Stick the pad on your panty crotch and press firmly

Peel off the release paper from the Wings™

Fold the Wings™ around the sides of your panty crotch, and press them firmly against the back.

Description upon opening

6 Sanitary Napkins are arranged neatly inside the pack. Each pad is folded into in individual plastic cover of dimension 4 X 5.5 inches. The user takes out the pad, the release paper is peeled off from the bottom of the pad and the wings and pasted on to underwear.



1 Individual packing, 2 Release Paper

3, 5, 6 Top Non Woven Layer with Blue Printing, 7 Napkin

Sofy



Packing External plastic bag Dimensions: 4" X 5" X 2.5"

Text on Sofy Packing

No 1

Sofy^R (Note Registration Mark)

Side Walls

Sofy is Japan's no 1 sanitary napkin brand based on Intage Inc. research in Japan, April 2008
– Dec 2010

Directions for Disposal

Wrap the pad in paper and throw in a dustbin

Do not flush pads. It may cause clogging of drains

No 2

Rs 55 Sofy^R

Soft Slim

Side WallsTM (Note Trade Mark)

Prevent Side Leakage

Flexible Side Walls

No 3

8 Pads Large

Japans' No 1 Unicharm

No 4

Sofy^R (Note Registration Mark)

Side Walls

Sanitary Pads. Licensed by : Unicharm Corporation, Tokyo, Japan

Manufactured by: Unicharm India Pvt Ltd, Plot no SP 3 – 67 to 70, Japanese Zone,

Majrakath, Neemrana Rajasthan 310705, India

MRP Rs 55 (Inclusive of al taxes) Net Quantity: 8 pads

No 5

Direction for use

Peel off release paper from the back

Place the pad on panty base and press firmly

Peel of release paper from wings

Fold wings around panty base and press firmly

No 6

Sofy^R (Note Registration Mark)

Side WallsTM

Unique flexible Side Walls with Wings

Give extra protection from side leakage and keep wings clean for longer hours

No 7

Soft Cover

Gentle on Skin for extra soft, dry and comfortable feel

Super Absorbent Core with Gel

Absorbs heavy flow and locks wetness in

MRP 55

No 8

Stop using if irritation occurs.

Customer care: For any questions related to Sofy or feedback, contact us at: + 91-9971988339 or email to customer care@unicharm.com

For Pkd. & Lot No. Please refer to the right panel

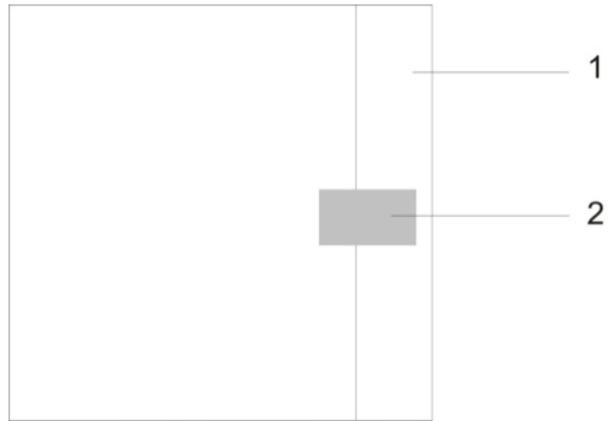
No 9

Sofy Side Walls	SOFT --- SOFT COVER design to be gentle on skin for an extra soft, dry and comfortable feeling		
	DRY --- DRY COVER Keeps you dry and clean for a comfortable feeling		
	X Large: Best for longer hours and night use	Large: Ideal for heavy flow	Regular: For Regular Day time use
SOFT	29 cm	26 cm	23 cm
DRY	29 cm	26 cm	23 cm
All variants are available in packs of 8 pads and 15 pads			

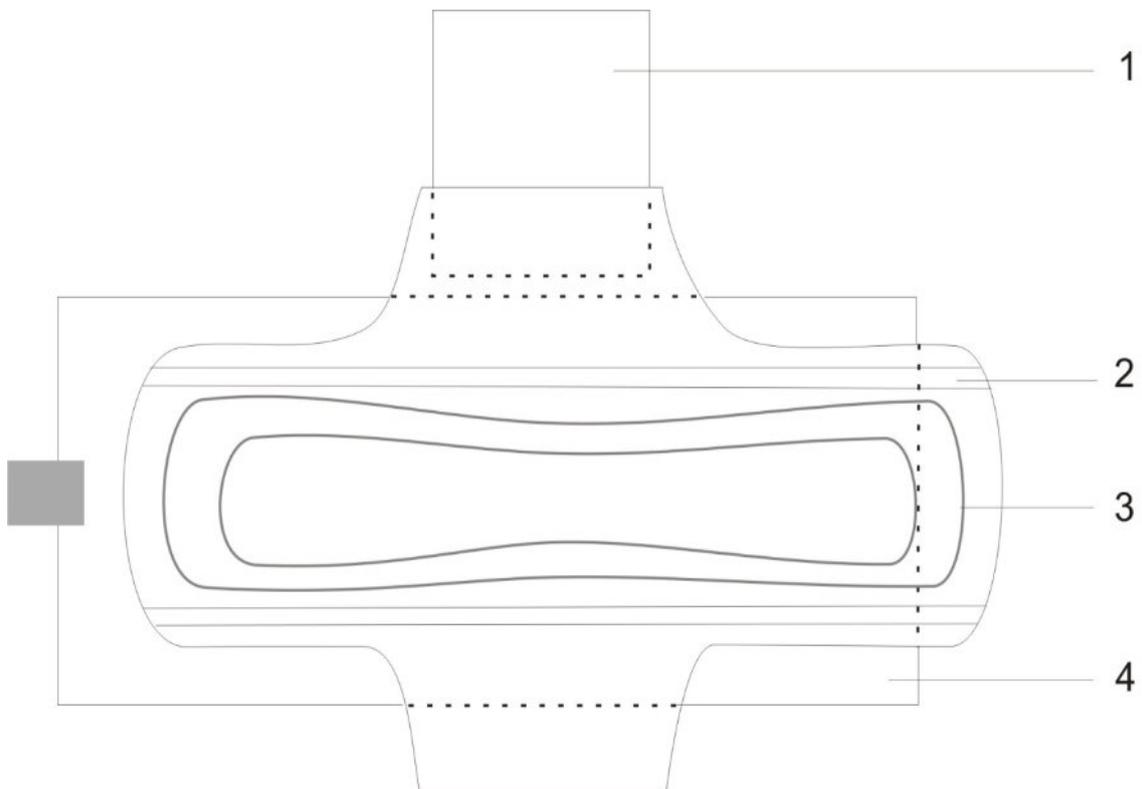
Description upon opening

8 Sanitary Napkins are arranged neatly inside the pack. Each pad has been folded into a rectangle of dimension 3.5 X 4 inches. On the back of each individual napkin, a rectangular non-woven fabric has been pasted - glued at three points to the pad. This is then folded into a square rectangular piece kept in place with a pink sticker.

When the user unwraps the pad, the wings can be separated from the release paper, the non-woven separated from the base of the pad. The non-woven comes out very clumsily may tear as it come off.



1 Polymer Packing 2 Sticker holding wrapping in place



1 Release paper 2 Walls 3 Channels 4 Non woven polymer surface

Appendix XV

Components of kit

1
Communication/Training Materials
MENSTRUAL KIT



Menstrual Wheel



Menstruation, The Simple Truth



Kaawad Book



Uger Cloth Pad Production Manual



Nutrition Flag



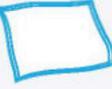
Apron



PASS Tool

2
Menstruation Management Options


Time piece


Cotton cloth


Period panty


Cloth pad


Disposable sanitary napkin


Pantiliner


Menstrual cup


Tampon


Sea sponge


Nada pad


Insert pad


Pantiliner


Light pad


Disposable pad cut in half, Uger pad cut in half

3
Uger Products

4
Disposable sanitary napkin and cloth pad

253

1 Communication/Training Materials

Mahwari Chakka/Menstrual Wheel – Shows the process of menstruation. It is an interactive product, and is comprised of two hard paper discs - riveted in the centre - with the discs moving over each other. As the discs move, information about menstruation pops up in the windows.

Menstruation, the Simple Truth – A comic book on the importance of menstruation and management.

Kaawad Book – A multilayered book showing the process of growth in both male and female bodies during adolescence. On one side is the female, Sundari, and on the other side is the male, Sunder. If working with a group of female participants, a facilitator will unfold the Sundari side of Kaawad during the session. As the participants get more comfortable, the facilitator will unfold the Sunder side. It is vice versa for a group of male participants.

Uger Pad Production Manual – A complete guide for setting up a cloth pad production unit. The contents of the manual include the process of stitching various Uger products, information related to setting up a production unit, packaging, branding and other details. The manual is given only to those groups starting a production unit.

Nutrition Flag – The foods to include in our daily diet in order to stay healthy are explained through the colours of the National Flag. Flaps are lifted to reveal food options.

Apron – The different parts of female reproductive organ and the process of menstruation is illustrated in layers. The trainer ties the apron around the waist and explains each layer while taking the session.

PASS Tool – A tool to measure for sustainability while comparing menstrual products and management systems. The tool consists of four wooden blocks and one card sheet. The participants compare menstrual management options using this tool.

Details of how to conduct the session using these tools are detailed in the training modules.



2 Menstruation Management Options

Time Piece – A warm flannel polyacrylate material, often used by women in various parts of India as an inexpensive and easily available absorbent material. This can be washed and reused. It is placed in the crotch of the underwear.

Cotton cloth – Cut from repurposed saris, bed sheets, turbans, towels and other items and is washed and reused. It is placed in the crotch of the underwear.

Menstrual cups – Made of medical grade silicon. It is worn by inserting into the vaginal canal. To remove, the suction is released and then it is slowly pulled out. It is washed out and reused several times, between seven to ten years. A menstrual cup can be worn for 6 to 8 hours.

Uger Cloth pads – Made of cotton fabric. It is placed in the crotch of the underwear and buttoned down. An Uger pad can be washed and reused at least 60 times.

Pantyliner – Made of cotton fabric. It can be used on normal days, or for managing white discharge or as safety measure before the period. It is placed in the crotch of the underwear and buttoned down. A pantyliner should be changed every 4 to 6 hours.

Tampons – Made of wood pulp, they contain some amount of bleach and other chemicals. It is worn by inserting into the vaginal canal, and removed by slowly pulling it out from the attached string. Tampons are one-time use products and then must be disposed. They should be changed every 4 to 6 hours.

Disposable sanitary napkins – Made of wood pulp, gel, bleach and polymer materials. It is a one-time use product and then must be disposed. A disposable sanitary napkin should be changed every 4 to 6 hours.

Sea sponge – These can be artificial or can be harvested from the seabed. It functions like a tampon, but can be washed and reused. It is worn by inserting into the vaginal canal and removed by slowly pulling it out after 4 to 6 hours.

Period panty – Panty with a water proof layer at the crotch, the panty can be washed and reused multiple times. It is worn like any panty.



3 Uger Products

Nadapad – A drawstring is tied around the waist and the pad is then buttoned to the straps both at the front and back. The pad can be worn without an underwear.

Insert pad – Used during days of heavy flow. A cotton towel is folded and inserted into the straps of the pad holder.

Light pad – Used during days of light flow.

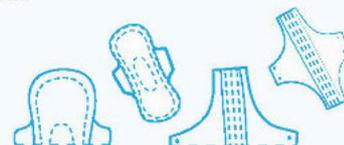
Pantliner – It is placed in the crotch of the underwear and buttoned down.

Uger products should be changed every 4 to 6 hours.



4 Disposable sanitary napkin & cloth pad

For demonstration purposes, a cloth pad and a disposable sanitary napkin are cut into two parts to be able to see the structure and raw material of each product.



Uger



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Appendix XVI

Uger instruction sheet

Side 1

12 इंच लम्बे और 09 इंच चौड़े दो कपड़े (एक सफेद सूती और दूसरा प्रिंटेड सूती) लीजिये और उन्हें चित्र में दिखाए अनुसार दो बार फोल्ड कीजिये, फोल्ड करने के बाद ये चार-चार परत के हो जायेंगे.

चारो हिस्से जिस ओर से खुते हैं, वहां डेढ़ (1.5) इंच छोड़कर चित्र में दिखाए अनुसार अर्धचंद्राकार काटेंगे. खुलने पर यह चित्र में दिखाए गए डिजाइन जैसा दिखने लगेगा. दोनों कपड़ों को इसी प्रकार काटेंगे.

10 इंच चौड़ा और 12 इंच लम्बा एक खादी का सूती सफेद कपड़ा और लीजिये और उसे लम्बवत चार परत फोल्ड कर लीजिये. अब उसके दोनों कोने वाले हिस्से चित्रानुसार गोलाई में काट लीजिये.

आइये,
उगेर पेड बनाएं.

1. कटिंग

2. सिलाई

प्रिंटेड कपड़े की बची हुई कतरन में से दो सीधी लम्बी पट्टी (लेस) सिलेंगे, जो कम से कम आधा इंच चौड़ी हो.

इन्हें उल्टा करके सफेद कपड़े के दोनों तरफ पीने दो इंच (1.75 इंच) जगह छोड़कर किनारे से सिल लेंगे. इस प्रकार यह लेस बीच में से खुती रहेगी.

अब प्रिंटेड कपड़े की कटिंग को सफेद के ऊपर रखकर तीन तरफ से सिल लेंगे.

खुले मुंह की तरफ से सीधा करके उसे भी बंद कर देंगे.

अब पहले वाले सफेद कपड़े की कटिंग के साथ दूसरे वाले खादी सूती कपड़े को बीच में रखकर तीन सीधी लम्बी सिलाई कीजिये, ताकि चार परत वाला खादी वाला कपड़ा फिक्स हो जाये.

आखिरी क्रम में चित्रानुसार दो टच बटन पेड के बिना पट्टी (लेस) वाले हिस्सों पर लगायेंगे.

लीजिये हमारा उगेर पेड अब तैयार है.

सुरक्षित माहवारी अभियान (उगेर) के अंतर्गत जलन संस्थान द्वारा प्रकाशित. अधिक जानकारी के लिए हमारी वेबसाईट विजिट करें. www.jatansansthan.org

Uger instruction sheet

Side 2

माहवारी के दिनों में रखें अपना खास ख्याल :

- माहवारी के दिनों में रोज नहाएं,
- शरीर एवं योनि की सफाई का पूरा ख्याल रखें,
- माहवारी के दौरान प्रयोग किये जाने वाले कपड़ा या उगेर पेड को किसी और को प्रयोग के लिए नहीं दें,
- दोबारा कपड़ा या उगेर पेड लगाने से पहले योनि को अच्छी तरह से साफ़ कर लें,
- कपड़ा बदलने के बाद हाथ साबुन से धोयें,
- उगेर पेड या कपड़े को साबुन तथा ठंडे/साधारण पानी से अच्छी तरह से धोने के बाद खुली धूप में सुखाएं,
- उगेर पेड या कपड़े को बाहर नहीं रखकर अन्य कपड़ों के साथ ही रखें, बाहर पथरों या अधिरी नमी वाली जगह पर न रखें,
- हर तरह की सब्बियां खाएं और भरपूर नींद लें,
- बर्दाश से बाहर दर्द होने पर डॉक्टर की सलाह अवश्य लें,
- माहवारी से सम्बंधित अन्य जानकारी लेने या हमारे इस अभियान से जुड़ने के लिए संपर्क करें: 9772333391

उगेर पेड बनाते समय ध्यान रखें:

- केवल सूती कपड़े का ही प्रयोग करें,
- नया कपड़ा सिलने से पहले पानी में भिगो लें और सुखा लें,
- कपड़े को एकदम किनारी से नहीं सिलें, इस से उसके फटने या सिलाई निकलने का अंदेश रहता है,
- अन्दर लगी पट्टी (लेस) को पीछे लेकर आप उगेर पेड को सामान्य दिनों में या ज्यादा सफ़ेद पानी आने पर भी प्रयोग कर सकती हैं,
- सिलाई करते समय टांका पास पास लें ताकि सिलाई मजबूत रहे,
- टच बटन को लगते समय इसके दोनों हिस्सों की जगह का ठीक से मिलान कर लें,
- उगेर पेड सिलाई से सम्बंधित किसी भी प्रकार की अन्य जानकारी के लिए संपर्क करें: 9672760344



सुरक्षित माहवारी अभियान जतन द्वारा युवाओं, किशोर-किशोरियों, महिलाओं तथा समाज को माहवारी जैसे संवेदनशील मुद्दे पर जागरूक करने के लिए चलाया गया एक कार्यक्रम है, इसके अंतर्गत माहवारी के मुद्दे पर समाज में व्याप्त चुप्पी को तोड़ना, माहवारी से जुड़े अंधविश्वासों और गलत धारणाओं को खत्म करना तथा इस पर लगातार शोध करना है,

उगेर पेड का निर्माण आप स्वयं कर सकते हैं, यह पूरी तरह से कॉपी लेफ्ट (बंधन मुक्त) उत्पाद है, किसी संस्था/ समिति/ कम्पनी/ अन्य द्वारा इसके व्यावसायिक निर्माण एवं विपणन से पूर्व कृपया लिखित अनुमति अवश्य लें,

संपर्क करें: जतन संस्थान, 05, तिरुपति विहार, सेतीब्रेयान मॉल के सामने, देवेन्द्र धाम के पास, भुवना, उदयपुर (राजस्थान)
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