

PERFORMANCE CHARACTERISTICS OF LOCAL AND IMPORTED SANITARY PADS

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Abstract

A comparative study of Zimbabwean manufactured and imported sanitary pads was carried out in order to elucidate the performance characteristics that make them popular with the majority of women. Five different types of the most popular imported and locally made sanitary pads that were determined by a preliminary questionnaire survey were selected and their performance characteristics, that is, absorbency, liquid retention and strike through properties determined. The results show that imported sanitary pads are preferred by Zimbabwean women (47%) due to their performance characteristics such as comfort, odour control, size, absorption, sticking of adhesive, packaging and protection of strike through. Women using local products account for 39% of the sample population and those using both imported and local products 14% and a significant number of women in rural areas (72%) are still using alternative methods due to the prohibitive costs of modern methods of sanitary protection.

Keywords: sanitary pads, performance characteristics, imported pads, local pads, and disposal

1. INTRODUCTION

Production of menstrual pads dates back as early as the 10th century and through the ages women have used different forms of menstrual protection [1] (Figures 1-4). Until disposable sanitary pads were created, all women used some form of cloth [2] or reusable pad to collect menstrual blood. The first of the disposable pads were generally in the form of a cotton wool or similar fibrous rectangle covered with an absorbent liner [2]. Sanitary pads developed from the reusable cloth sanitary pads, followed by the reusable menstrual cups, disposable sanitary pads [1,3] and then disposable tampons. Disposable pads had their start with nurses using wood pulp bandages to catch menstrual flow thus creating a pad that was made from easily obtainable materials and inexpensive enough to throw away after use [1].

The ergonomic design of the pad also changed through the 1980s to today. Earlier materials were not as absorbent and effective as modern

methods and leaks were a major problem. Some variations introduced were the quilting of the lining, adding "wings" and reducing the thickness of the pad that was up to two centimetres by utilizing products such as sphagnum.

Protection for women during their "critical" days is not a problem in a modern world because a variety of sanitary products are available in the market. It is always up to the woman to choose what sanitary products are best for her and what is more convenient. However, to Zimbabwean women the choice of these products is very limited mainly because of the price and the fact that current production has not been able to meet the high demands of the entire female population. With the prevailing economic situation, products such as sanitary pads and tampons do not come cheap and are rarely available in the shops therefore, Zimbabwean women only have two choices, that is, "buy if you can afford and if you cannot afford use alternative methods". It is no secret that for most Zimbabwean women,

the indignity of menstruating without proper sanitary protection is 'a real pain', both literally and figuratively. It is reported in [4] that during the "critical days" young girls and wives buy black dresses or skirts made of very heavy fabric specifically for the period of menstruation. This would mean that the lady would not be involved in any form of work in and around the house during menstruation (that is, cooking, washing, gardening and cleaning, etc.) but stay indoors during her critical days until she has finished. For schoolgirls, the unemployed, rural women and low-income earning working women, life literally comes to a standstill at "that time of the month" because of inadequate protection. As a consequence, millions of Zimbabwean women are forced to replace tampons and pads with alternative methods such as newspapers, dirty rags and tissues, a practice, which might lead to vaginal infections [4].

1.1. Menstruation

Every woman /female considered normal undergoes a period called menstruation. This marks the start of a woman's fertile days whereby she starts to reproduce. Menstruation is a normal female function that occurs every 21-28 days for three to five days [5]. At this stage a woman continuously discharges fluids and therefore needs a form of absorbent material, to collect and retain her menstrual flow.

Today, women use different methods to collect their menstrual flow and these include, sanitary pads, tampons, panty liners, cloth menstrual pads and other alternatives. The choice of these products is based on the fact that women are exposed to life differently and, hence their choice of protection may differ because of the situation they find themselves. Although women are homogenous in the sense that they experience menstruation between the ages of about eleven and fifty years, menstruation affects individual women differently with variations in both the duration and the density of the flow among others [5].

Normal or regular menstruation lasts for a few days (usually 3-7 days) and the average blood loss during menstruation is 35 ml with 10-80ml considered normal [6]. The flow rate during the menstrual days is as follows:-

- **Initial stages of menstruation:-**Flow is moderately light

- **Middle stage or on the second day:-**Flow ranges from medium to heavy
- **The last days:-**Flow resorts back to medium or light

1.2. Composition of the menstrual flow

The most important point to note is that unlike normal blood menstrual blood does not coagulate [6] and thus there is a higher possibility of experiencing leaking.

The menstrual fluid contains approximately 50-60% blood with mixtures of secretion of uterine, cervical and vaginal glands and mucoid substances. It also contains 2-3% diffusible constituents such as urea, glucose, amino acids, electrolytes and hormones. Albumin proteins and hemoglobin account for 85% of all proteins found in plasma[5].

When menstrual fluids are exposed to air, they start forming bacterial cells and hence produce bad odours therefore, to avoid unpleasant smelling of women during menstruation it is important that the sanitary protection media have an odour controlling agent that is not harmful to the user.

Sanitary pads obviously don't cause any significant environmental impact during use, but they do during production as well as final waste utilisation stages [2]. Today disposable menstrual pad are dominating the market as they are worn during a woman's period to absorb her menstrual flow and then disposed away when full. The pad is worn externally, between the vulva and a woman's undergarment. These sanitary pads have different variations depending on the manufacturer and these include [7]

- a) **Panty Liner** - Designed to absorb daily vaginal discharge, light menstrual flow, "spotting", slight urinary incontinence, or as a backup for tampon use.
- b) **Ultra-thin** - A very compact (thin) pad, which may be as absorbent as a Regular or Maxi/Super pad but with less bulk.
- c) **Regular** - A middle range absorbency pad.
- d) **Maxi / Super** - A larger absorbency pad, useful for the start of the menstrual cycle when menstruation is often heaviest.
- e) **Night** - A longer pad to allow for more protection while the wearer is lying

down, with absorbency suitable for overnight use.

- f) **Maternity** - Usually slightly longer than a Maxi/Super pad and are designed to be worn to absorb lochia (bleeding that occurs after childbirth).

The shape, absorbency and lengths may vary depending on manufacturer, but usually range from the short slender panty liner to the larger and longer overnight and they can either be reusable or disposable.

1.3. Tampons

A **tampon** [Figure 4] is a plug of cotton or other absorbent material inserted into a body cavity or wound to absorb fluid. The most common type in daily use is a usually disposable plug that is designed to be inserted into the vagina during menstruation to absorb the flow of blood. The use of these devices has occasionally caused infection and (rarely) death [8].

There are various devices that can be used for menstrual collection. These include among others cloth menstrual pads (Figure 1), menstrual cup (Figure 2), wingless type (left) and winged type (right) of disposable Sanitary (Figure 3).



Figure 1: Cloth menstrual pad [2]

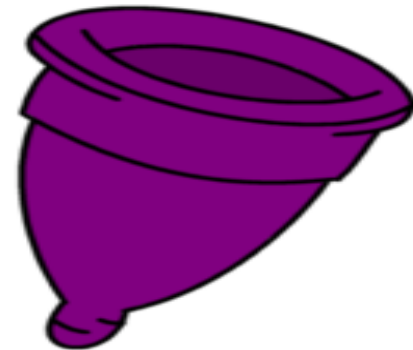


Figure 2: Menstrual cup [3]

Figure 3: Wingless wingless type (left) and winged type (right) of disposable Sanitary

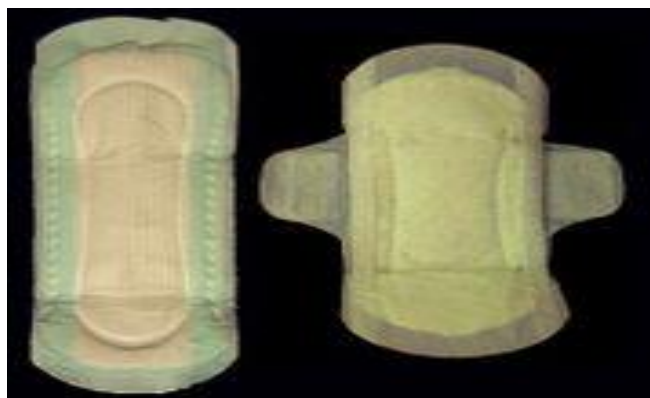




Figure 4: Tampon [8]

1.4. The main components of sanitary pads

The main components of a modern sanitary pad [Figure 5] include the following [9];

- i) Top layer- external layer of a sanitary towel and has direct contact with the skin. It is commonly made from a very thin non-woven fabric and transfers blood quickly to the layers underneath.
- ii) Pad filling- absorbent core and acts as the blood storage layer. It has to absorb the blood as fast as it is received and has to allow distribution of the liquid through the structure so that the whole core is utilised.
- iii) Bottom layer- used to protect clothing and surrounding areas from being stained or wetted by fluids retained in a pad or absorbent core. It is typically made of breathable polyethylene film or a non-woven film composite that prevent wetness transfer out of the sanitary napkin.

2. METHODOLOGY

Pads are produced mostly from fluffed pulp and cotton. Synthetic materials are used to enhance quality and functionality, as well as in special high-protection packaging. The main raw material used for manufacture of sanitary pads in Zimbabwe is bleached cotton. Cotton is a natural cellulose fibre which normally acts as the absorbent core of the entire pad structure and, the materials used for the top layer and the bottom layer usually vary with the manufacturer. It is generally recognized that most consumers prefer cotton personal care items to those containing synthetic fibers because of the comfort, softness, absorbency, strength, handle and availability of the cotton.

Five different types of the imported and most popular locally made sanitary pads that were determined by a preliminary questionnaire

survey were selected and the following determined.

- i. Liquid retention - ASTM D 461 "Standard Test
- ii. Absorbency- ASTM D 4772-97 "Standard Test Method for Surface Water Absorption of Terry Fabrics (Water Flow)" and ASTM D 461 "Standard Test Method for Methods for Felt" that describe absorptive capacity. These methods are based on measuring changes in weight with a balance [11].
- iii. Strike through- this test method was designed to measure penetration of liquid through the sanitary pad samples using small volumes (2.0 ml) of blood substitute test liquid [12,13]. The test duration to allow for wetting and diffusion of the liquid drop from the surface of the sample to the collector layer was ten minutes and the area stained was calculated using the area of a circle method.

2.1. The test liquid

Actual menstrual blood could not be used due to potential risks of infection by blood borne pathogens and the complexity of attaining it therefore; a blood substitute mixture made out of the following ingredients [14] was used.

- | | | |
|--------------------------|-----|-------|
| 1. Plain flour | 10g | |
| 2. Distilled water | | 200ml |
| 3. Yellow food colouring | 2ml | |

same absorbency rating and cotton absorbent core.

1: -represents local sample

2: - represents imported sample

Table 1: Details of Tested Sanitary pads

Labelled Absorbency Rating	Thickness (mm)
ULTRA THIN 1 2	6
LIGHT 1 2	12
MEDIUM 1 2	14
REGULAR 1 2	15
SUPER 1 2	20

2.2. Sample groups

A sample population of 50 women per age group was chosen within the city of Bulawayo and in a nearby rural setting as shown in Table 2

Table 2: Sampling Frame

GROUP	AGE	SAMPLE AREA
Teenagers	12-19	Urban
Young Adults	19-26	Urban
Adults	26 & above	Urban
Rural	Random-All ages	Rural

Where

Ultra-thin, light, medium, regular and super: - represents samples with

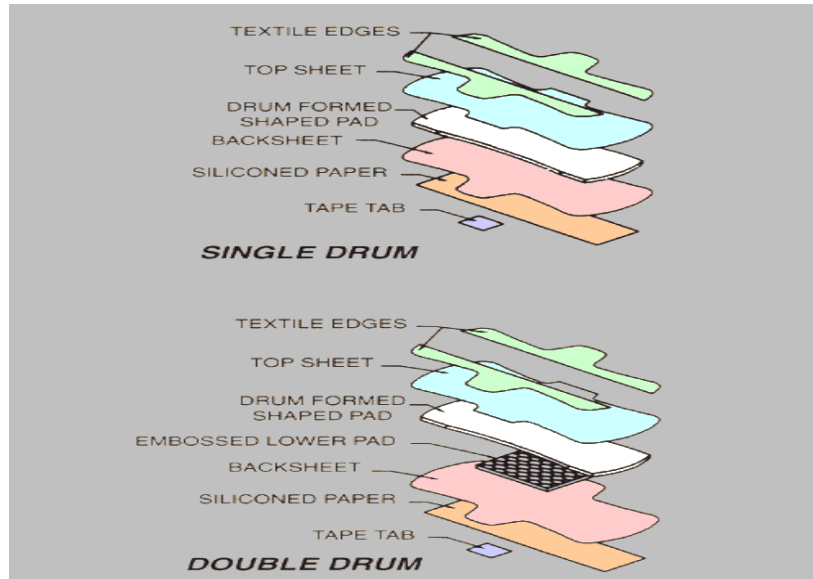


Figure 5: Two different designs of most common sanitary pads sold in Zimbabwe. Single drum and Double Drum (with embossed lower pad) [9]

3. RESULTS AND DISCUSSION

3.1. Sanitary pads usage

Results of the survey carried out on sanitary pad usage indicate that on average, a woman uses at least 3 pads in a day. An average period lasts 3-7 days each 4 weeks therefore,

$$\begin{aligned} \text{Average usage per year} &= \text{daily usage} \\ \text{x average period duration x months} &= 3 \times 5 \times 12 \\ &= 180 \text{ or } 15 \end{aligned}$$

packets since there are 3 pads in a packet.

It is estimated that there are approximately 3,641,519 females of the 15-65 years age group [15] from which the reproductive population is then estimated as 3,000,000. Taking the dry weights of regular pads tested and calculating the average weight, it is seen that the average size of a pad is approximately 5 grams. Therefore in a single year a woman would use at least 900 grams (0.9Kgs) of cotton wool and if all the women in Zimbabwe could afford this type of menstrual protection they will use approximately 2700 tonnes of the cotton lint produced in Zimbabwe. The response regarding the consumer preference of the type of sanitary pad i.e. imported versus local is shown in Figure 6.

The shortage of sanitary products in Zimbabwe has led to a large number [47%] of women resorting to permanently using imported products. This trend has continued for quite a number of years such that some women have developed brand loyalty to the extent that they feel local products will not do the job properly. Although imported sanitary pads are expensive the majority of the women still prefer them as they feel that the price difference is negligible and is compensated by their better performance compared to the locally made products. The negative consumer attitude towards locally made sanitary pads has impacted negatively on emerging local producers trying to penetrate the local market.

3.2. Sanitary protection in rural areas

Collecting data from rural women was a challenge since most of the rural women were not keen to openly talk about the issue of menstruation. Results of the surveys conducted in the rural areas (Figure 7) indicate that most women are not familiar with the modern sanitary protection methods and

therefore use other methods [72%] instead of the commonly used pads [9%], tampons and cotton wool [19%]. The most popular of the "other" methods used include:

1. Old clothes/ rags
2. News papers
3. Tissues
4. Sisal sponges

The main reason behind use of these traditional methods is that, rural women haven't been educated much on modern methods of sanitary protection and find them complicated and expensive.

3.3. Sanitary protection-Urban areas

Figure 8 indicates that the most commonly used methods of protection by the urban women are the sanitary pads [63%], cotton wool [27%], tampons [9%] and just 1% using alternative methods. The use of modern methods of sanitary protection in urban areas can be attributed to the fact that most urban women have many ways of generating income and therefore can afford choosing the sanitary protection method.

The urban women cited the following qualities as determining factors in their choices of sanitary products: -

1. Comfort
2. Odour control
3. Size
4. Price
5. Absorption
6. Sticking of adhesive
7. Packaging

In the total population of 200 studied sanitary pads, [48.50%] still dominate the sanitary protection methods used by Zimbabwean women. The accumulative usage of sanitary protection shown in Figure 9 is influenced by the different usage patterns observed in the rural and urban area. Results indicate that the alternative methods account for [25.5%] due to the high rural usage [72%] and that of pads is 48.5% due to the urban usage of 63%. The women's choice of sanitary products is drastically influenced by where a woman lives and her financial disposition. The overall usage results are significantly affected by the consumer patterns especially that of rural women who use less expensive methods of protection that are readily available to them.

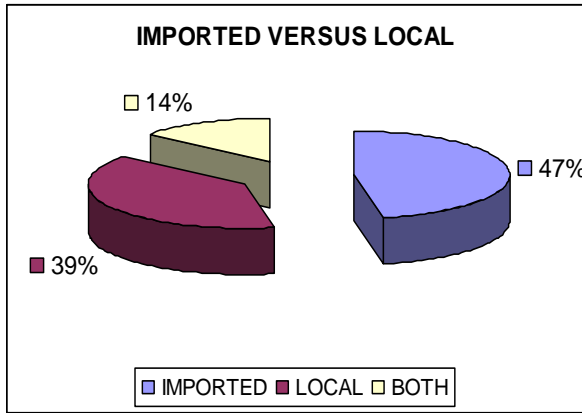


Figure 6: Sanitary pad usage-Imported versus local pads

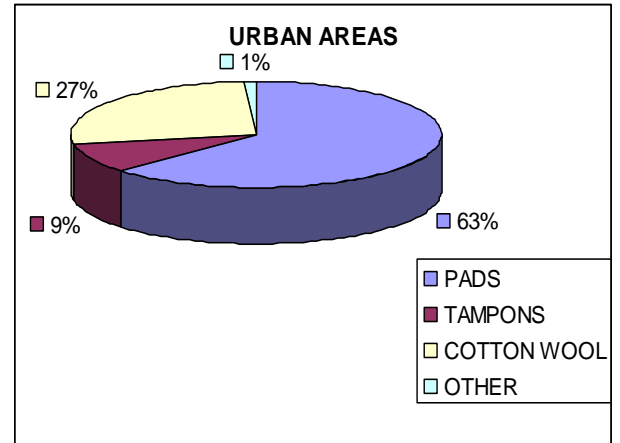


Figure 8: Sanitary protection usage-Urban area

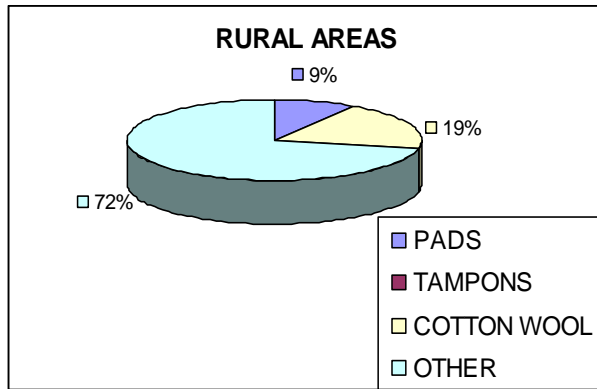


Figure 7: Sanitary protection usage - Rural area

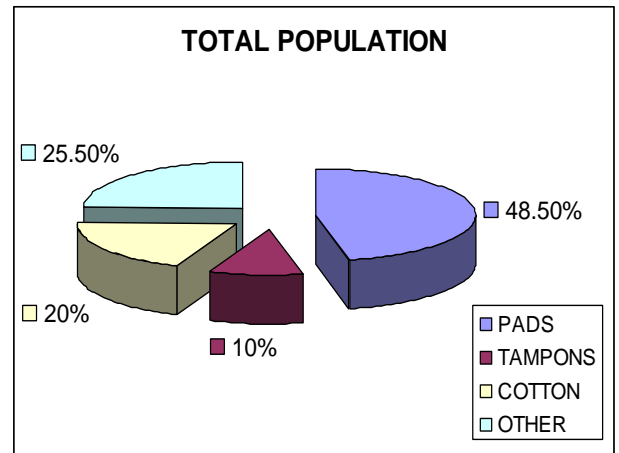


Figure 9: Cumulative sanitary protection usage -urban and rural

3.4. Disposal methods

The way women dispose their sanitary waste has been a cause of concern since most of the products contain poly ethylene backing which is non- biodegradable and hence might cause unprecedented pollution and blocking of drainages and water sources if disposed incorrectly. Figure 10 indicates the disposal methods of menstrual waists as follows: -

1. 29% burn.
2. 28% throw into the dust bin
3. 27% flash down the toilet
4. 15% wash (mostly re-usable protection)
5. 1% other

The results indicate that most women use the burning (29%) and dustbin (28%) methods of disposal. Although the dustbin method is correct, it has its social implications and

therefore there is a need to indicate on the sanitary packages how these products should be appropriately disposed to avoid litter and other environmental impacts such as water pollution.

The liquid retention test results in Figure 11 indicate that in general, the local sanitary products had a high water retention properties (15-43%) compared to imported products. This is attributed to the fact that local products are manufactured from the highly absorbent cotton fibres and imported products were observed to have small gelatin granules within their absorbent structure that affected the liquid retention properties of the pads. Gelatin granules are added to reduce sanitary pad licking therefore, when they absorb moisture they dissolve and turn into a gel and once all of

the granules gelatinize/ solidify they can no longer absorb more liquid.

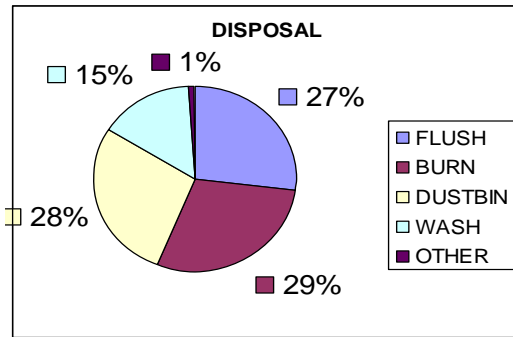


Figure 10: Disposal methods

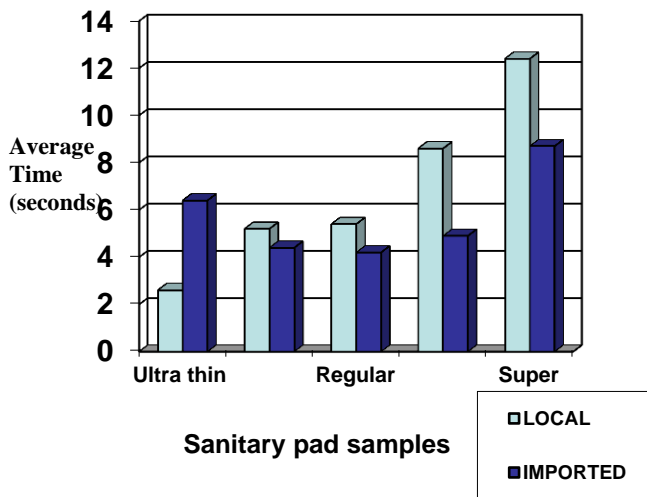


Figure 11: Liquid Retention
8. Absorption

The absorption test results in Figure 12 indicate good absorption characteristic by both imported and locally made products however in general, the imported pads performed better. The ultra-thin imported pads gave the best results of 15.6% better than the local pads indicating the possibility of super absorbent polymers within its structure. In the regular pads, both the pads, that is, the imported and local showed a slight difference in absorption (1.14%).

The absorption and wicking is a desired characteristic of sanitary pads as it allows the incoming fluid to be distributed along the entire structure of the pad and at same time allowing retention of the exudates to eliminate licking problems.

3.4. Strike through

The strike through results in Figure 13 show that in general, locally made sanitary pads exhibited poor strike through properties compared to imported products. Ideally thicker structures should be able to prevent strike through compared to thinner structures as the mass of fibres absorb the exudates. It was therefore expected that the products with good strike through properties would show smaller stained areas and the ones with poor strike through larger areas. The pads that showed extremely high strike through (48.3-51.76%) properties indicates a very porous and permeably structure that will be susceptible to licking during use.

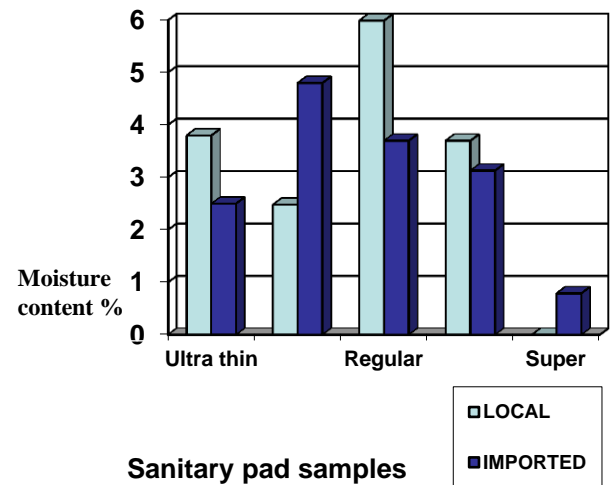


Figure 12 Absorption

4. CONCLUSION

The results show that imported sanitary pads are preferred by Zimbabwean women (47%) due to their desirable performance characteristics such as comfort, odour control, size, absorption, sticking of adhesive, packaging and strike through. Women using local products account for 39% and those using both imported and local products 14%. A significant number of women in rural areas (72%) are still using other methods despite the introduction of modern methods due to prohibitive costs of sanitary pads.

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