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INSPIRES: Investigating a reusable Sanitary Pad Intervention in a Rural Educational Setting

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Pilot Study: Evaluating the acceptability and short term effect of teaching Kenyan school girls to make reusable sanitary towels on absenteeism and other daily activities:
A partial preference parallel group, cluster randomised control trial.

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ABSTRACT

Aims and objectives: To assess the scale of the impact of menstruation on school attendance in Nyaza province, Kenya; to evaluate the acceptability and short-term impact of a reusable sanitary product as an alternative to other disposable pads amongst Kenyan schoolgirls; and to assess the feasibility of conducting a cluster randomised control trial.

Background: Problems adequately managing menstruation have been identified in women and girls from Less Economically Developed Countries and this may hinder educational development through increased school absenteeism. The Millennium Development Goals identified female empowerment as being a key tool in helping to address poverty and there is now a growing body of evidence that the education of girls has an impact on both local and national economies. Whilst good menstrual hygiene remains an important factor in maintaining the physical and mental wellbeing of women, menstrual hygiene management remains a poorly researched area, with the true impact of the problem still not clear.

Design: Partial preference, parallel group, cluster randomised control trial.

Setting: Six secondary schools and four primary schools in Nyaza province, Kenya (recruited through Omega, a local non-governmental organisation).

Study population: Initially, fourteen schools were assessed for eligibility with four being excluded (three did not meet inclusion criteria and one declined to participate). This left ten schools (302 pupils) being randomised to either the control (n= 159 pupils) or intervention (n= 143 pupils). There were five schools in each group. The control arm completed a questionnaire at baseline and follow-up but were not initially trained to make the reusable sanitary pad (although training was provided after the study finished). The intervention arm completed questionnaires at baseline and follow-up and received training in how to make the Mwezi reusable pad.

Main outcome measures: Primary outcome was to compare change in school absenteeism between baseline and follow-up in the control and intervention groups. Secondary outcomes were; to investigate how menstruation affects routine daily activities (including school attendance); to gain an insight into current menstrual hygiene management; and to evaluate the acceptability of teaching Kenyan schoolgirls how to make a reusable sanitary product.

Statistical analysis SPSS 19.0™ (SPSS Inc., Chicago, IL) was used to analyse the data. The primary outcome was calculated using the covariate-adjusted t-test. Sensitivity analysis was used to confirm the validity of the data.

Results: At baseline, 302 pupils were enrolled and 174 were followed-up a month later. Follow-up was possible in nine out of the ten schools. Absenteeism (mean number of days missed) decreased or stayed the same between baseline and follow-

up in all schools in the intervention arm, but increased or stayed the same in all control schools. There was a mean difference of 1.48 days of school missed when comparing the control and intervention groups at follow-up (p=0.077; 95% CI -3.17 : 0.21). At baseline, 50.2% of girls reported menstruation as a cause of school absenteeism. The majority of the girls (86.8%) wanted to buy sanitary towels but cost was identified by 71% as being a major barrier to this. At baseline, 91.2% of girls agreed that learning to use a reusable sanitary towel would be useful and 84.2% of girls in the intervention group used the Mwezi pad at some point. The most common negative feedback concerned the size of the pad.

Conclusions: This pilot study found promising evidence to suggest an association between menstruation and school absenteeism in Kenyan schoolgirls and found that a reusable sanitary product is potentially an acceptable method of addressing this problem. It was also found that it was feasible to carry out a cluster randomised control trial in schools of this Kenyan province. Reducing school absenteeism has been shown by others to benefit individual educational attainment and this effect may extend to improving local and national economies. More research is needed to investigate both the link between menstruation and school absenteeism; and the impact it has on quality of life.

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1. BACKGROUND

1.1 Introduction

Irise is an organization set up to support the empowerment of women and girls in East Africa. Our core values are Education, Empowerment and Evaluation. Over the last two years we have been looking specifically at the issue of Mentrual Hygiene Management after concerns raised by women, girls and school teachers in discussions about causes of school absenteeism. An under-researched area, Irise aims to generate research and resources on this issues to facilitate the work of other organizations who wish to address this problem in the population they are working with. This study pilots an educational approach to the problem through teaching schoolgirls to make a reusable pad from locally available materials. It aims to evaluate the impact of providing a sanitary product on school absenteeism as it is through this mechanism that better menstrual hygiene management may facilitate the empowerment of women.

1.2 Menstruation Hygiene Management

Menstruation Hygiene Management (MHM) in sub-Saharan Africa is a topic that has gained increasing attention in recent years from various actors, including the water and sanitation, education, anthropology and health communities[1], because of its potential impact on school attendance and employment. Table 1.1 summarises the current research and projects related to MHM in Sub Saharan Africa.

Table 1.1: A Summary of the research and projects related to MHM in Sub-Saharan Africa		
Place	Research	Projects
Uganda	Crofts (2012)	Afri pads, Makapads, WASH project, Forum for African Women Educationalists (FAWE)
Kenya		Huru International, Kisumu Medical and Education Trust (K-met), Sanitary Pads for Africa, FAWE, Zanaa,
Zimbabwe	Shangwa (2011) Averbach (2009)	
Nigeria	Adinma and Adinma (2008) Anieube (2009) Lawan (2010)	
Somalia		Galkayo Education Centre for Peace and Development (GECPD)
Ghana	Scott et al. (2010)	
Tanzania	Sommers (2009)	Grow and Teach
Rwanda		Sustainable Health Enterprises (SHE)
Ethiopia		Save the Children's Fund and Procter and Gamble
Malawi	Sally Piper Pillitteri (2011)	Creative Centre for Community Mobilization (CRECCOM)

1.3 Absenteeism

Anecdotally there are numerous reports of the impact menstruation has on school attendance by organisations working on the issue. Afripads[2] suggests that 'millions of girls living in developing countries like Uganda skip up to 20% of the school year simply because they cannot afford to buy mainstream sanitary products when they menstruate' and Sanitary Pads for Africa[3] states that 'a girl absent from school due to menses for 4 days in 28 days…loses 13 learning days, equivalent to 2 weeks of learning in every school term'. These facts have gone on to be quoted in the media, with the BBC[4] claiming 'It is estimated that an average girl loses more than a full month of classes in a school year' However it is unclear where these facts originated and there is a scarcity of reliable data on the topic. In Ghana Scott *et al*. reported that girls were missing as many as five days a month due to menstruation[5] but in Uganda Crofts and Fisher found that only 14% of girls reported missing school due to menstruation but that 91% said they knew girls who did[6] suggesting that the problem was perceived as bigger than it was or that girls were too embarrassed to report honestly. In Nepal Oster and Thorton found that although 47% of girls reported missing school because of menstruation their objective absenteeism was much lower[7] emphasising the need for an objective measure. The SHE campaign has

suggested that menstruation could also impact on a woman's economic productivity by reducing her ability to work[8] but there is currently no data in the literature to support this.

MHM is a multifaceted problem, as reflected in the broad spectrum of actors involved, and it is unclear which aspect is the most significant contributor to absenteeism. The main issues identified are lack of education, an unsanitary environment, pain and lack of an adequate sanitary product. These are discussed in more detail below.

1.3.1 Education

There is evidence that the lack of education and traditional beliefs surrounding menstruation may contribute to girls' missing school during menstruation. In Nigeria Adinma found that only 39.3% of their respondents perceived menstruation as a physiological process[9], similar levels were observed in Malawi[10] and qualitative deficits in girls' knowledge were recorded in Tanzania[11]. However Lawan ranked the knowledge of Nigerian school girls in his study as fair with the majority identifying menarche as a normal experience[12] difference may be due to the study populations with 93.8% of Lawan's participants having regularly using purchased sanitary pads compared to just 32.7% in Adinma's study[9], possibly an indicator of relative wealth. Crofts and Fisher also found that girls' level of knowledge was variable with only 2 groups out of 39 able to correctly respond to her activity on biological facts with girls in most remote areas scoring the lowest[6] suggesting that like so many poverty related issues those who are poor and rural are most vulnerable.

In Anieube *et al*'s cross sectional questionnaire study, girls who had not received pre-menstrual training were more likely to report that menstruation had negative effects on their schooling[13] and in Scott *et al*'s study a reduction in absenteeism was observed in the intervention group just receiving education[5] suggesting a link between lack of education and absenteeism.

Some of the beliefs that may contribute to this have been identified in a number of qualitative studies. With Crofts and Pillitteri, in Uganda and Malawi respectively encountering fears about safe disposal or washing of products in school due to beliefs that menstrual blood found on used cloth could be used in witchcraft against them [6,10]. In Tanzania Sommers' qualitative work revealed that fear and shame surrounding menarche was a common experience for girls in her study[11].

1.3.2 Environment

Those involved in sanitation have long been aware of the difficulties girls' face due to lack of appropriate facilities at school[1]. Lack of private toilets and places to wash and dispose of pads were highlighted as issues for girls trying to attend school during menstruation in qualitative work in Uganda[6], Malawi[10] and Zimbabwe[14].

1.3.3 Pain

Pain was identified as one of the most significant factors causing absenteeism in Crofts' work with 71% of girls who admitted staying at home doing so because of abdominal pains[6]. However only 4.9% of girls in Pillitteri's work identified aspirin as a desired intervention possibly due to the belief, reported by several girls, that it would make them sterile[10].

1.3.4 Product

Lack of an appropriate product was identified in most studies. Adinma found that only 32.7% of respondents were using sanitary pads with the most common material being toilet tissue, used by 41.3%[9]. Pillitteri reported that 95% of girls were using cloths in Malawi[10]. In Zimbabwe a small group of women identified cotton wool as the most commonly used commercial product (81%) and cloth as the most commonly used non-commercial product (70%).[15] As discussed previously, Lawan's study found much higher rates of sanitary pad use (93.8%) possibly because his study population consisted of urban, secondary school girls[12]. Crofts found that in high quality schools purchased sanitary pads were the most common product used compared to traditional methods and low cost products in poor quality schools[6] and it may be that Lawan has only captured the more fortunate girls in his sample.

The most significant problems identified with alternative products were leaking and the cloth falling out of the underwear. Leakage was identified as second only to high cost by a focus group asked to identify issues with the products they were using[15] and girls in Malawi reporting waiting until everyone had left the classroom after a lesson for fear they had leaked[10]. In Crofts' study one girl reported walking differently due to fear the toilet paper would fall out of her underwear[6] a concern reiterated in Pilliteri's work[10]. In Pillitteri's study 26% of girls prioritised sanitary pads as the most needed intervention[10] and Averbach's focus group in Zimbabwe identified the need for a cheap and affordable product[15].

Scott *et al* found that absenteeism was cut from 20% to 9% in the intervention receiving disposable pads[5]; the most convincing evidence so far that the evident need for a sanitary product may translate into reduced absenteeism. However the novelty of western researchers being in school may be a confounding factor responsible for this effect. In Nepal Oster found that the provision of menstrual cups did not have a significant impact on girls' absenteeism[7] however these results may not be applicable to East Africa.

1.4 Approaches to Sanitary Product Provision

This study focuses on the need to provide girls with a sustainable and adequate product. The following section outlines the different approaches already being used by organisations in Sub-Saharan Africa. These approaches are summarised in table 1.2.

Table 1.2: A Summary of the different approaches to sanitary product provision in Sub-Saharan Africa.		
	Model	
Product	Business	Education/Distribution
Reusable	Afripads Huru International Kmet GECPD	Mwezi Pad WASH Uganda CRECCOM FAWE
Disposable	Zanaa Makapads SHE	Sanitary Pads for Africa Save the Children and Procter and Gamble

1.4.1 Business models

There are a number of initiatives to set up local, sustainable businesses producing sanitary products in Sub-Saharan Africa. Current programs producing reusable products include Afripads[2] in Uganda, Huru International[16], Kisumu Medical and Education Trust (K-met) [17] in Kenya and Galkayo Education Centre for Peace and Development (GECPD) [18] in Somalia. All these initiatives employ local people to produce an affordable reusable pad, made from textiles ranging from simple cotton to fabrics with more sophisticated absorbency.

Programs producing disposable products include Zanaa[19] in Kenya, Makapads[20] in Uganda, and Social Health Enterprises (SHE) [8] in Rwanda. These businesses aim to produce biodegradable pads from local materials.

This approach has the advantage of providing jobs locally, contributing to the local economy, and has the potential to produce an alternative high quality product. SHE estimate that for every business they invest in, approximately 100 jobs are created and 100,000 girls and women have access to affordable pads[8]. However ensuring that all schoolgirls have access to these alternative, cheaper products is a slow process. Zanaa, in Kenya, have already invested eight years into developing their business model and products[19]. Additionally these models are not easily replicated by small organisations who want to address the problem in the communities that are not currently covered by these initiatives.

1.4.2 Education/Distribution models

This approach can be split into two groups: projects that provide teaching on how to make a reusable project from locally available materials and those that distribute disposable pads. Both may also deliver menstruation teaching.

Projects that provide teaching to girls on how to make a reusable pad include WASH in Uganda[21], Creative Centre for Community Mobilization (CRECCOM) [22] in Malawi and Forum for African Women Educationalists (FAWE) [14, 23] in Uganda and Kenya.

The advantage of this approach is that it is easily replicable with WASH reporting that pad making skills were being transferred to other girls, outside of school by students who had been trained[21]. It is also sustainable with pads made from cheap, locally available materials with the opportunity for community ownership after the initial training has been delivered. There is the opportunity for local women's or tailor's groups to produce the pads with minimal external involvement. However it is impossible to guarantee the quality of pads and this is likely to vary depending on skill and available materials.

Projects that distribute disposable pads include Sanitary Pads for Africa[3] which is a partnership between The Lions and Rotary clubs who distribute pads in Kenya, and a partnership between Procter and Gamble and Save the Children who distribute disposable pads in Ethiopia[14]. The Kenyan government has recently pledged to provide all primary school girls with pads in response to increasing political pressure to address the issue[24]. This approach has been criticised as unsustainable by Crofts[6], Pillitteri[10], Sommers[1] and SHE[8] because of issues of waste disposal and because the provision of pads does not cultivate local business or encourage community ownership of the problem. Averbach's focus group of grown women reported that sanitary protection was still a problem for them[15] and SHE have voiced concerns about the effect lack of products may have on a woman's ability to work[8]. This approach may help girls while they are at school but it does not provide a long-term solution for the women they will become.

1.4.3 Reusable products

Reusable products are not unknown in the West with some women opting to use homemade products[24] or purchase commercially produce ranges of reusable pads for environmental reasons[25]. Crofts found that although Afripads were inferior to *Always* disposable pads, there was only a small difference in the absorbency of the cheapest disposable pad and an Afripad winged liner suggesting that these products can be adequate. An advantage clearly identified by Ugandan schoolgirls, was that they last for up to a year, making them 11 times cheaper than a year's supply of *Always* pads[6]. The Mwezi pad is a new design created and developed by an independent researcher in Kisumu, Kenya in consultation with K-met[7]and Rural Extension for Africa's Poor (REAP)[26]. The Mwezi pad design was chosen by Irise for use in this pilot trial and detailed explanation of its design and training are included in chapter 2, section 2.4.

The potential disadvantage of a reusable product is the need to wash and dry it. Girls in Malawi reported drying their menstrual cloths under their beds and often wearing them damp which caused itching. The belief that menstrual cloths could be used in witchcraft contributed to their disinclination to dry their cloths outside in the sun[10]. Sommers reported that Tanzanian boarding school girls faced particular problems due to lack of a private area for washing and drying menstrual cloths[11] and Averbach's focus group reported that shame prevented them from drying and ironing their cloths hygienically [15]. Girls in Malawi also reported a lack of water and soap and for this reason would have preferred a disposable product[10]. Similarly

Averbach's focus group identified problems cleaning cloths due to lack of water[15] but Crofts found that access to water was very varied with the time taken to fetch water ranging from less than a minute to fifty minutes[6].

A water shortage poses a serious disadvantage to a reusable product but embarrassment and shame may not be insurmountable. A case study in Bangladesh records how a girls group were able to discuss the risks of drying cloths inside and together overcame their embarrassment and the judgement of their community and began drying them on baskets over the embers of the fire[27]. Crofts has suggested that girls could be encouraged to dry their cloths and underwear outside covered by a piece of light cloth or by placing them in the bottom of a basin on a roof[6].

1.4.4 Disposable Products

Disposable products can be split into non-biodegradable purchased pads like *Always* and newer designs like those pioneered by Makapads and SHE. Menstrual cups will also be discussed. Crofts found that *Always* pads were by far the most absorbent when compared to an afripad, makapad and a cheap disposable pad. The cheap disposable pad was marginally more absorbent than a Makapad[6]. However the disadvantage of purchased pads is waste disposal. Crofts identified that female pit latrines would fill up more quickly because they were used to dispose of *Always* pads that were not very biodegradable[6]. In Malawi one school had an open pit of used pads which were removed by dogs and birds[10] and Crofts encountered similar arrangements in Ugandan schools[6]. In Scott's study girls reported burying their disposable pads despite being instructed not to do so[5].

Products like Makapads have the advantage of being biodegradable and nearly as absorbent as a cheap disposable pad. PadBack, a project based on the Makapads design which was part of the INDEX design challenge, has suggested that similar pads could be made around the world from materials ranging from papyrus in East Africa to Bamboo fibres in India and Nepal[28]. However Crofts has highlighted that these products need more development with half of the fifteen girls she asked expressing dissatisfaction with Makapad to the point that if it had been purchased rather than given they would not have bought it again. She has highlighted that the pads are too thin and wingless leading to leaking and that the sticky adhesive strips do not adequately keep the pads in place. Additionally although Makapads claim to be 99% biodegradable no research has yet been carried out to ascertain exactly how long they take to decompose[6].

Menstrual cups are another product that should not be dismissed. Despite fears that girls would not be happy to use them, Oster's study in Nepal found that 60% of the school girls were happy to use the product[7]. A variation of the traditional menstrual cup is *Duet*, a cervical cup that can be used for contraception, STI prevention and menstruation. Although the older women in Averbach's focus were happy to use *Duet* themselves, they felt that the product would not be appropriate for sexually inexperienced girls and were concerned it would encourage promiscuity[15]. A regular

menstrual cup may last for 10 years[7] and *Duet* for 1 year[15] making them much cheaper and potentially more sustainable than giving disposable pads.

1.5 Summary

The current research on MHM in Sub Saharan Africa is mainly qualitative and descriptive. There is a lack of quantitative data on the scale of the problem and no rigorous exploration of the exact link between menstruation and absenteeism. Scott *et al*'s study is the first to try and establish this kind of link and to explore a possible solution.

1.6 Aims and Objectives

Our study aims to investigate an educational approach through teaching girls to make a reusable Mwezi pad in schools. This approach is quickly and easily replicable and may help small organisations and individual communities to address MHM whilst businesses, to provide an affordable product, are being developed and scaled up. Our aims and objectives are:

- To evaluate whether school absenteeism is altered by teaching schoolgirls to make reusable sanitary towels.
- To evaluate the acceptability of training schoolgirls to make reusable sanitary towels.
- To obtain an insight into menstrual hygiene management, and how menstruation affects daily life (including school attendance), in Kenyan schoolgirls.
- To obtain an insight into other reasons for absenteeism in Kenyan schoolgirls.
- To assess the feasibility of undertaking a cluster randomised control trial in a Kenyan school setting.

2. METHODS

2.1 Study design

This was a partial preference, parallel group, cluster randomised control pilot study. Ten schools in rural Kenya (302 pupils) were randomised to either intervention (n= 5 schools, 143 pupils) or control (n = 5 schools, 159 pupils). Figure 2.1 depicts a visual timeline of the events throughout the study. Both groups were asked to complete questionnaire 1 at baseline (see appendix for examples of all questionnaires) which attempted to obtain the current practices of the girls with regards to; menstruation management; effects of menstruation on daily life; attending school; and demographics. The intervention group followed questionnaire 1 (see appendix) with a training session on how to make a reusable Mwezi sanitary pad and were provided with enough equipment to make three pads.

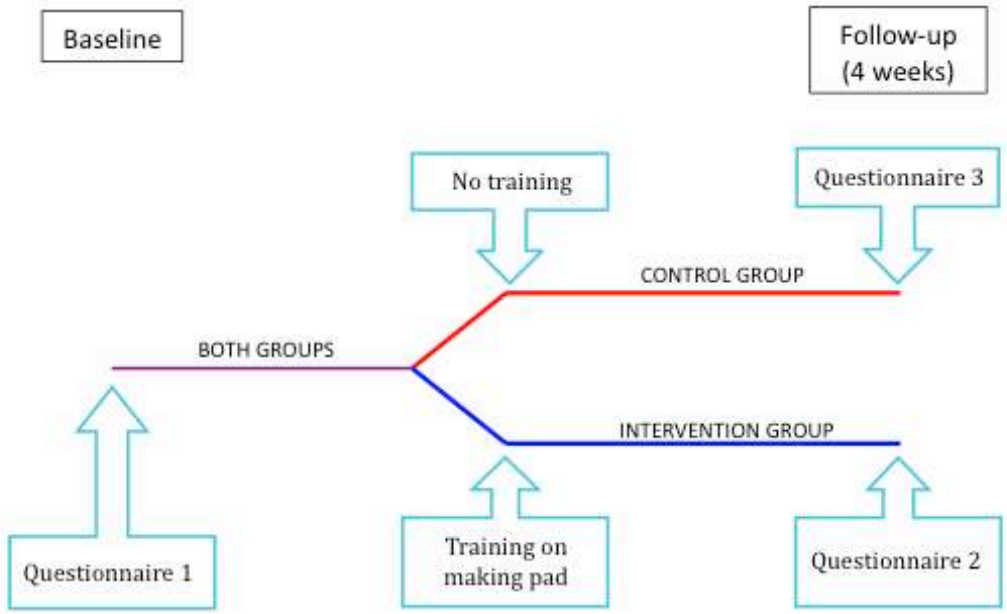
At follow-up (four weeks later) the control group were given questionnaire 3 (see appendix). This questioned, over the last four weeks, the effect of menstruation on their daily living and attendance at school, and attempted to ascertain their level of absenteeism and possible reasons for this. The intervention group were given questionnaire 2 (see appendix) which contained the same questions as questionnaire 3, but additionally questions to answer on; the acceptability of the idea of a reusable sanitary pad; accessing needed equipment; and the acceptability of the making and upkeep of a reusable Mwezi sanitary pad.

All outcomes were self-reported on questionnaires carried out in class with an Irise facilitator and a local university student acting as a translator. Girls were asked to sit apart from each other and it was emphasised that this was not an exam and was an anonymous way for girls to report their experiences honestly.

Girls were given an instruction booklet to help them make the sanitary towels whilst at home and in order to minimise the risk of infection this included instructions with diagrams on how to wash and dry the pad correctly as well as being explained in the teaching session. Girls who were in the control group were offered the training workshop with teaching on making the reusable sanitary pads after they had completed the trial as a thank you for taking part and so they would not miss out.

The study was carried out in Nyanza province in Western Kenya in non-urban primary and secondary schools.

Figure 2.1 – Diagram to illustrate the timeline of events during the study for each group.



2.2 Study population

2.2.1 Participant recruitment and randomisation

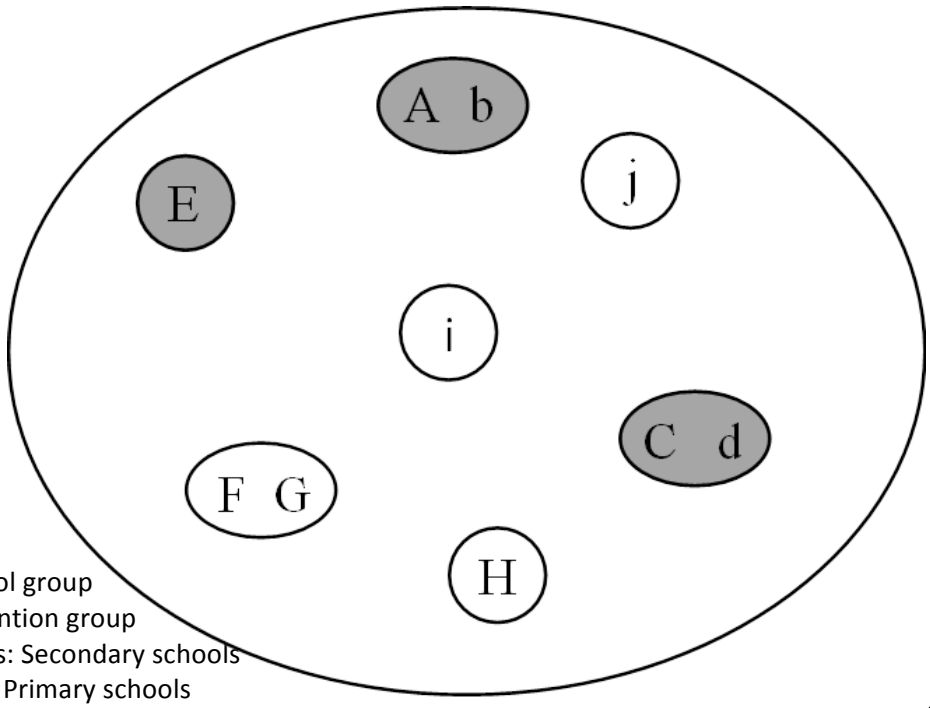
Randomisation was at the cluster level, where each school was classed as a different cluster. There were four primary schools and six secondary schools in the study. Half of these were assigned to each arm, giving five schools in each arm. Schools were recruited through Omega, a local NGO. Some restriction existed within the allocation of groups due to the close proximity of the schools and therefore the possibility of the groups being influenced by each other. Figure 2.2 shows the randomisation restrictions.

2.2.2 Inclusion and exclusion criteria

The study excluded any girls who had not started menstruating. We decided to include four primary schools in our study. Often in Kenyan primary schools there are girls which are much older than the average UK age for that year group because they have to pass certain exams in order to move on a class. This means girls who have had to re-sit a lot of exams are much older than some of their classmates. In most countries girls are estimated to start their periods around the age of moving between primary and secondary school. Sommer's recommends interventions for menstrual hygiene management to be targeted at the top of primary school and beginning of secondary school[1]. Additionally, it is likely that the poorest girls will

drop out of school before reaching secondary school and in order to represent fully girls from all ranges of the socio-economic spectrum it therefore seems sensible to include primary schools in the study.

Figure 2.2 – Diagram to represent the restrictions met when randomising schools to intervention arm due to the proximity of the schools. (A) and (b) were in the same area and so had to be allocated to the same group. (C) and (d) were in the same area and so had to be allocated to the same group. (E) had to be allocated to the intervention group as another school in the area, not involved with the research, was receiving general teaching by Irise. (F) and (G) were in the same area and so had to be allocated to the same group.



Key
White: Control group
Grey: Intervention group
Capital letters: Secondary schools
Small letters: Primary schools

2.3 Questionnaire development

The questionnaire was developed in the context of previous research in this area. Questions on daily activities affected by menstruation were taken from the activities that girls' said were commonly affected by menstruation in the qualitative part of Scott's study[5]. Open space questions were used to gain better insight into girls' opinions of menstruation but were asked via statements about the *general* impact of menstruation on girls rather than the individual. This was in light of the difference between how girls reported personal impact and general impact of menstruation observed in Tracey Croft's qualitative work[6].

Questions about washing and drying were included as there is a risk that reusable products could pose potentially increased rates of infection if not washed and dried correctly. This is an area which has been discussed in the literature but no clear outcomes have been found. In conversation this concern was also raised by Linda Scott. More research is clearly needed to define the links, but in the meantime we felt it was essential to promote good hygiene related to the pad in light of the potential risk.

The Lived In Poverty Index was included to assess socio-economic status. This is a measure which has been formulated by the Afrobarometer studies[29] and is calculated by averaging the results of questions focused on activities of daily living (ADLs) such as whether the participant's family had enough food, water, fuel, medicine, school expenses and cash in the last year. As the questions are standardised the scores are universally interpreted as 0 being no lived poverty and 5 being a constant absence of all basic necessities.

The questionnaires were developed with input and advice from academics at Sheffield Medical School and The School of Health and Related Research. Tracey Crofts kindly read the research materials and offered advice and the research was briefly discussed with Linda Scott.

2.4 The Mwezi Pad training

This study investigated the feasibility and acceptability of teaching girls and women to make a reusable product from locally available materials. Mothers in initial discussion groups had been interested in this approach[31] and we choose to pilot the Mwezi Pad. This design had been developed by an independent researcher in Kisumu, Kenya in consultation with K-met, a local organization already promoting a reusable product[17], and women from Rural Extension for Africa's Poor (REAP) an organisation interested in simple interventions that local communities could replicate[26]. Figure 2.3 displays an example of the Mwezi pad.

Figure 2.3: The Mwezi Pad

The product development included research into designs commonly used in the West[24] and the final design was chosen because of a number of advantages. The basic equipment (needle, thread, cotton, plastic and towel, press studs) needed to make the Mwezi pad were available locally and were relatively cheap. See figure 2.4 for an example of the equipment used.

Figure 2.4: A Mwezi kit containing the cotton, plastic, towel, press studs and needle and thread needed to make a Mwezi pad.

The design was easy to wash because the base pad and absorbent material could be separated and making it less embarrassing to dry outside because once separated the patterned circular base pad and strip of towel were hard to recognise as a sanitary pad. The pad could also be closed like a purse (see fig 2.5) making it less recognisable as a sanitary pad so that girls' could transport it easily. Malawian school girls reported that boys would grab their cloths out their bags and embarrass them suggesting that disguise of the product was an important factor in acceptability[10].

Figure 2.5: Mwezi pad closed for storage

The design addressed the two major concerns with current products identified in the literature review; leaking and fear of a sanitary product falling out of the underwear. The Mwezi pad reduced the risk of leaking through including a plastic layer in the base pad and the pad is securely fixed in the underwear by wings fastened by one or two press studs and the absorbent material is held in place by straps (See fig 2.6).

Figure 2.6: The Mwezi pad securely positioned in the underwear.

The girls were given a printed hand out, adapted from the original Mwezi Pad Patterns, to remind them how to make the pad (available in appendix). Instructions about washing and drying and information on the risk of infection or irritation of a

damp or poorly washed pad was worn were included. The workshop included a discussion of these instructions and a quick activity to ensure the girls had understood. Crofts suggestions of ways to dry the pad outside and avoid embarrassment through placing them in a high rimmed basin or covering them with a thin cloth[6] were included in the discussion.

2.5 Statistical Analysis

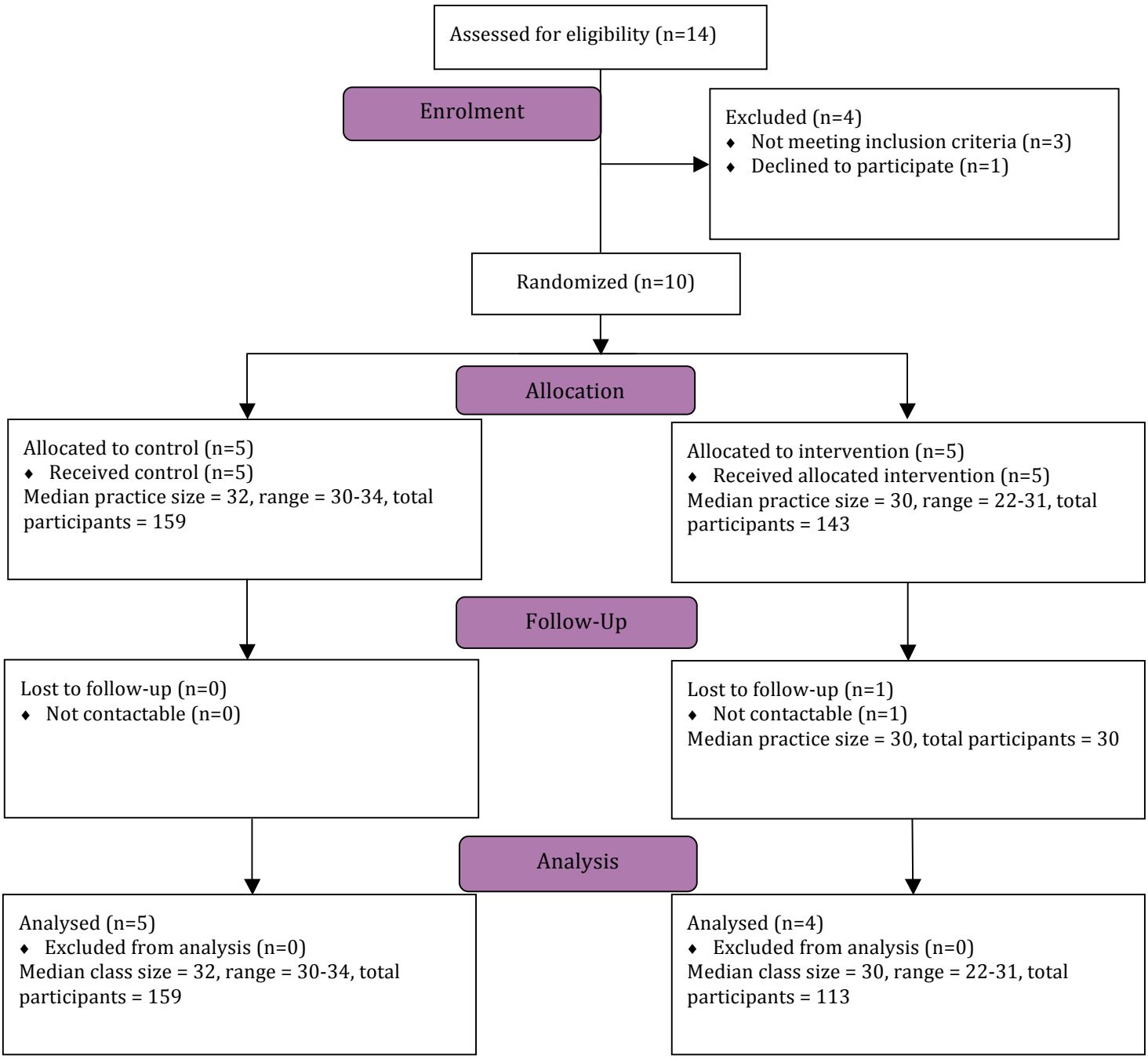
SPSS 19™ was used to analyse the data. Covariate adjusted t-test were used to calculate the primary endpoint. The Afrobarometer questions[29] included in the questionnaire were used to calculate the Lived Poverty Index (LPI). Data for primary and secondary endpoints was predominantly analysed using individual schools to define the cluster group. In order to validate these results a sensitivity analysis was performed using regions as the definition for the cluster instead of school. These results were then compared. This was important because the close proximity of some of the schools may have led to contamination and therefore sensitivity analysis was paramount.

When comparing intervention group to control, the intervention group results at follow-up were broken down into 'as treated' and 'full analysis set'. The 'as treated' group included all girls who reported using the pad at sometime throughout the four weeks study period whereas the 'full analysis set' included all girls in the intervention group, except those participants for which follow-up data on the primary endpoint (days of school missed at follow-up) was unavailable. For some analysis it was important to only include girls who had used the pad, i.e. the 'as treated' group, whereas for other analysis the 'full analysis set' group was more appropriate. See figure 2.3 for visual representation of the study group sizes at varying analytical stages.

2.6 Ethical Arrangement

Ethics approval was received from The University of Sheffield and Great Lakes University in Kisumu.

Figure 2.3 – Diagram illustrating the study flow and analysis group sizes.



3. BASELINE DEMOGRAPHICS

3.1 Introduction

Before analysing the results from the questionnaires at baseline and follow-up, it was important to get an idea of the group's demographics at baseline as these factors could potentially be confounders of the results. It was hoped that the control and intervention group would be as similar as possible (whilst still employing a valid randomisation technique) so that any difference observed was less likely to have been influenced by demographics.

3.2 Methods

The demographic information was collected via the questionnaire with a university student translator to assist if there were problems with understanding the questions.

3.3 Results

Table 3.1: Baseline Demographics of our study population

Demographic group		Number of girls*	
		Control group N=159	Intervention group N=143
Age	Mean	15.5	15.4
	Standard Deviation	1.93	1.48
School	C1	33 (20.8)	N/A
	C2	34 (21.4)	N/A
	C3	32 (20.1)	N/A
	C4	30 (18.9)	N/A
	C5	30 (18.9)	N/A
	I1	N/A	30 (21.0)
	I2	N/A	30 (21.0)
	I3	N/A	30 (21.0)
	I4	N/A	22 (15.4)
	I5	N/A	31 (21.7)
Type of school	Primary	60 (37.7)	57 (39.9)
	Secondary	99 (62.3)	86 (60.1)
Orphan status	Both parents alive	81 (50.9)	69 (48.3)
	One parent alive	44 (27.7)	47 (32.9)
	Both parents dead	34 (21.4)	24 (16.8)
Lived Poverty Index	Mean	1.85	1.59
	Standard Deviation	0.76	0.78

*Number of girls (proportion in group)
C1-5= Control school 1-5 I 1-5= Intervention school 1-5

Table 3.1 compares the baseline demographics of the control and intervention groups. The mean age was similar in both groups but the control schools educated girls of a wider range of ages (11-26 years). The groups had a similar distribution of primary and secondary school students.

Figure 3.1 presents data on the LPI; a measure used to assess poverty based on six questions about everyday necessities (see section 2.3). The median LPI was similar across all schools visited although the ranges differed quite markedly in both the control and intervention groups (as reflected in the similar standard deviation results). The overall mean LPI was 1.73. A table with the raw data for the LPI for each school has been included in the appendix. Figure 3.2 gives an indication of the reasons behind our LPI results as it highlights the prevalence of basic necessities that are absent from these schoolgirls' lives.

3.4 Discussion

Baseline demographics were similar between control and intervention groups, suggesting that any potential change in school absenteeism between baseline and follow-up is less likely to be a result of demographic effects. In particular, the distribution of students within primary and secondary schools showed around 40% of each group being in primary school and the mean age of the girls differed by only 0.1 years. It was important to find out the ages of the girls as it could not be assumed from the data on which type of school they attended, that this would be similar. The reasons for this have been outlined already in section 2.2.2.

In accordance with previous research[29] poverty is a key factor in influencing the rates of school absenteeism and therefore it was important to gauge an impression of the social and economic circumstances of the study population. This was achieved using the LPI. The finding that the LPI in the control and intervention groups were not markedly different is important as it helps to remove a potentially significant bias from the results obtained. However, within each school quite a large range of LPI values were observed, reflecting a relatively large difference in material wealth between girls attending the same school. This is a salient point when considering access to equipment for making the reusable Mwezi pad in the future (an issue discussed in section 7.1.3).

Figure 3.1: Box plot comparing the Lived Poverty Index between each school

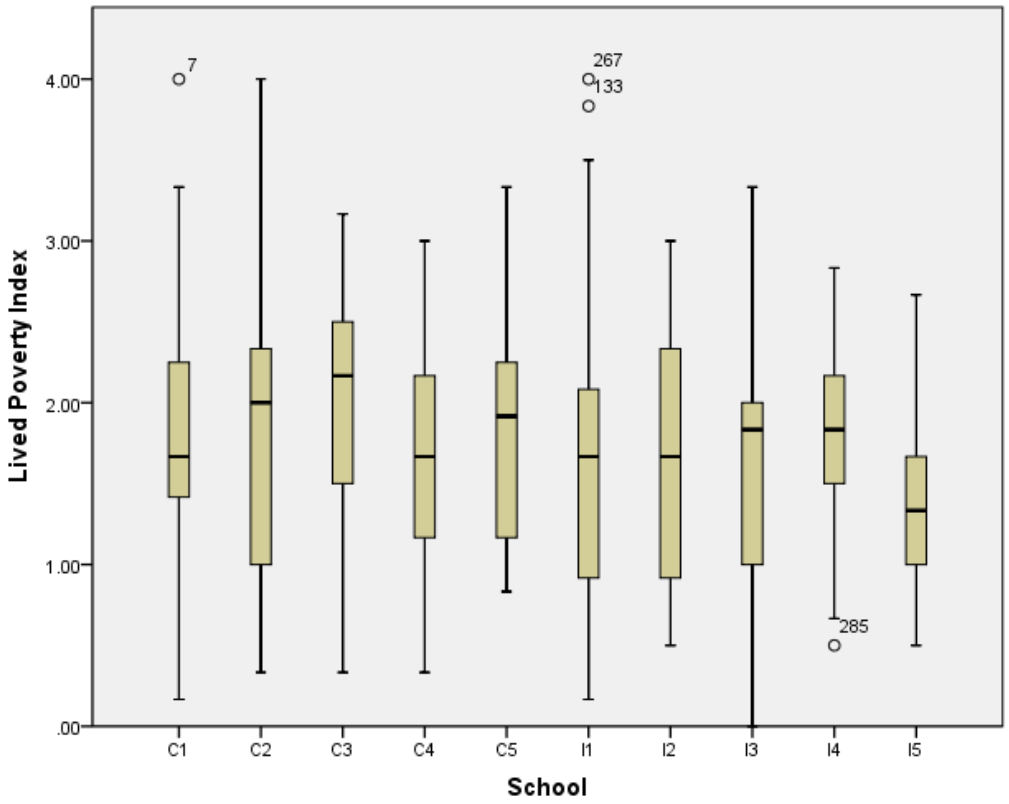
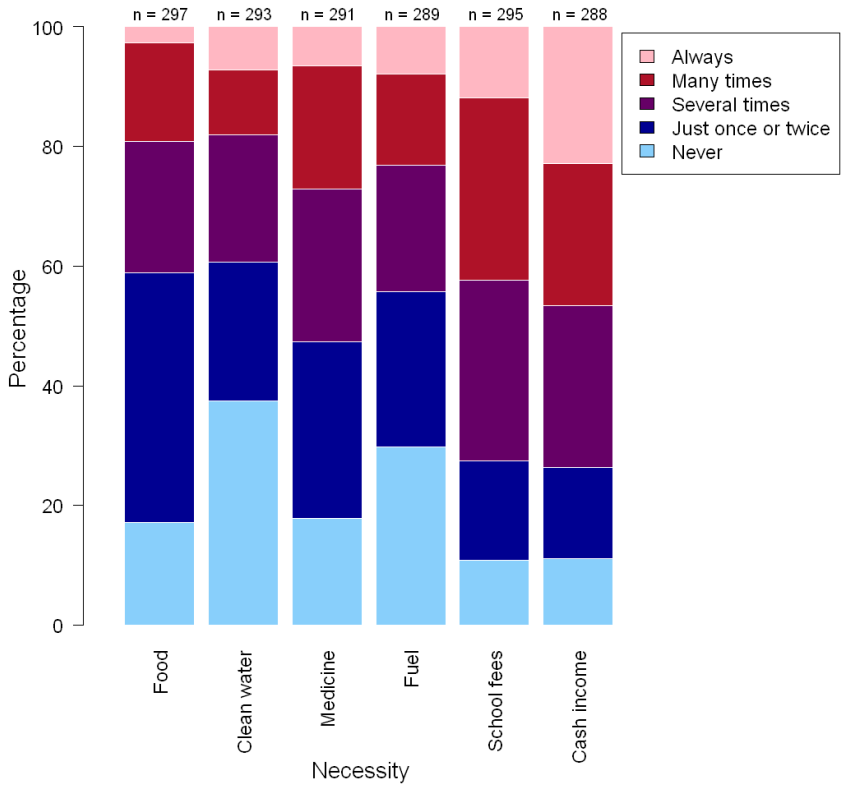


Figure 3.2: Stacked bar graph highlighting the proportion of our study group that go without everyday necessities



4. General Absenteeism

4.1 Introduction

In order to measure the effect of teaching the participants how to make a reusable Mwezi pad our primary endpoint was to measure school absenteeism through mean number of days missed at follow-up. The effect of inadequate MHM on education and potential prospects for future employment are often discussed but very little quantitative research has been down to attempt to measure this association. Our pilot study endeavoured to quantify absenteeism in a small cohort of schoolgirls in Kenya with the hope of gathering enough evidence to show further work is needed. One of the secondary endpoints included the proportion of children missing school. This endpoint focuses on the binary response: was school missed at all in the month between baseline and follow-up? This is subtly different to the primary endpoint and provides another, perhaps more crude angle to measure the level of absenteeism seen in our cohort. With the results found from these two endpoints, sample calculations can be made to provide greater detail on the feasibility of conducting future studies.

4.2 Methods

The measurement for the primary endpoint was taken through self-reported questionnaires and was calculated by the number of days missed of school in the study period. Due to the small number of clusters, analysis was performed at the cluster level, resulting in a modified t-test between control and intervention groups. The covariate adjusted t-test was used to test for differences between the two groups. This method adjusts for potential predictors: in this case age and number of days of school missed in the last month at baseline. For the secondary endpoint, proportion of children missing school, a cluster adjusted chi-squared test was used.

The data collected on the primary endpoint and the 'proportion of girls missing school' was used to estimate the intra-cluster correlation (ICC). This is a measure of how similar participants within a cluster are. It is important to be aware of the ICC as it is used in the analysis of the proportion of children missing school and therefore affects the results seen. This was calculated using the ANOVA method. For all calculations the ICC as estimated for the primary endpoint is used and the standard deviation of the change from baseline to follow-up in this endpoint. Sensitivity analysis, using region as the definition for the cluster instead of school, was applied to all calculations in this chapter in order test the robustness of the data.

4.3 Results

Table 4.1 shows the results for the mean number of days missed in each group. For all schools in the intervention group the mean number of days of school missed decreased or stayed constant; schools in the control group either stayed constant or increased. The results for each school for this measurement have been shown in figure 4.1 and the mean results are visually represented in figure 4.2.

Table 4.1: Table showing mean number of days missed in each study arm at baseline and follow-up.			
Mean number of days missed over 4 weeks		Control	Intervention
Baseline	Mean (days)	2.35	2.01
	Standard deviation (days)	2.58	2.14
	Valid N (participants)	79	70
Follow-up	Mean (days)	3.16	1.32
	Standard deviation (days)	4.37	1.89
	Valid N (participants)	80	73

Figure 4.1: Line graph showing the number of days missed for each school – divided by groups

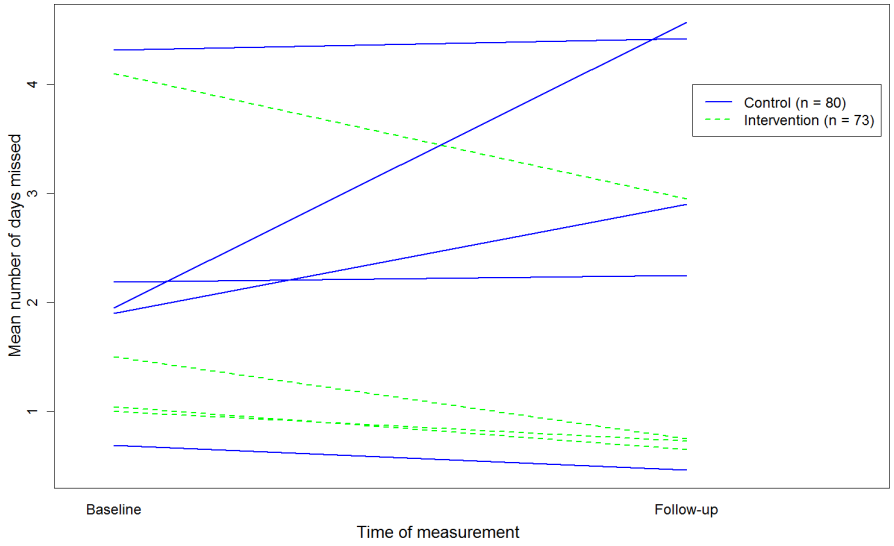
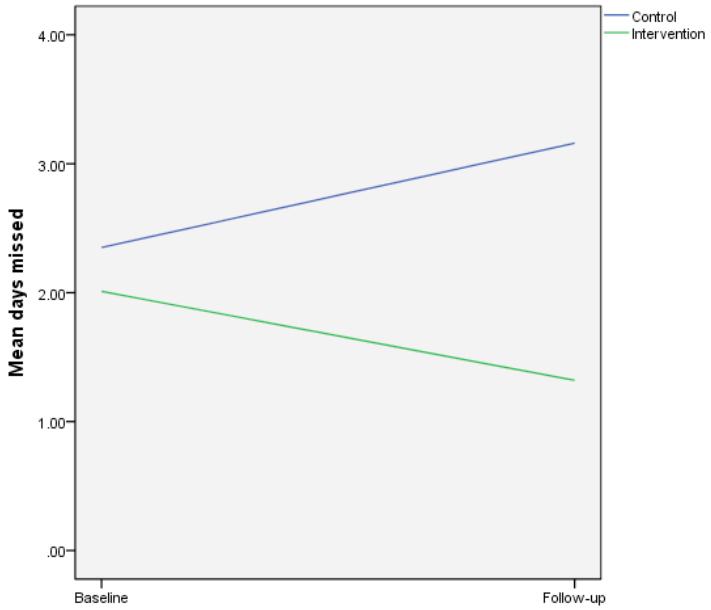


Figure 4.2: Line graph showing the mean number of days missed for control and intervention groups.



A covariate adjusted t-test of group mean number of days missed, control group vs intervention group, showed a result that was close to the 95% significant level (2.01 mean days (±2.14) vs 1.32 mean days (±1.89); P=0.077; 95% CI -3.17: 0.21). Table 4.2 summarises these results.

Table 4.2: Results for primary endpoint using the 'full analysis' data set.

Reduction in mean number of school days missed	-1.48
P-value (95% CI)	0.077 (-3.17: 0.21)

Sensitivity analysis, using the region as the definition for the cluster instead of school, was performed and a similar number of mean days difference was found (1.35 fewer days missed in the intervention group, with 95% CI -3.93: 1.24). However, as there were only seven clusters in this analysis the result was less statistically significant (P=0.221).

Secondary analysis found that the proportion of children missing school at any time was higher at follow-up in the control group (73.4%) than the intervention group (47.1%). Table 4.3 summaries the results of both groups.

Table 4.3: Proportion of children missing school in both study arms at baseline and follow-up

Was school missed at all?	Groups*			
	Control		Intervention	
	Yes	No	Yes	No
Baseline	58 (73.4)	21 (26.6)	46 (65.7)	24 (34.3)
Follow-up	58 (73.4)	21 (26.6)	33 (47.1)	37 (52.9)

* Value is the total number of girls who responded (% of group).

The control group proportion of girls missing school remained constant over the study period whereas the intervention group proportion dropped by 18.6% (see table 4.3).

A chi-squared test for the proportion of girls missing school over the study period showed a non-significant result (p=0.120). This result is summarised in table 4.4. When using sensitivity analysis the result remained non-significant (p=0.230).

Table 4.4: Results of the chi-squared test for proportion of girls missing school at follow-up.

Chi-square statistic (degrees of freedom)	2.42 (1 df)
P-value	0.120

Table 4.5 shows the frequency at which different potential causes of absenteeism affected the lives of the whole cohort of girls (control and intervention). This is visually represented in figure 4.3.

Table 4.5: Results showing level of effect of varying causes of absenteeism on whole cohort.

	Never (%)	Once or Twice (%)	Several Times (%)	Many times (%)
Housework	86.0	8.10	2.20	3.70
Looking after other children	82.0	10.9	3.40	3.80
Illness	11.8	46.0	30.9	11.4
Menstruation	49.8	19.2	17.3	13.7
Lack of money	23.4	25.7	26.9	24.0

Figure 4.3: Stacked bar graph showing how frequently girls reported missing school due to various causes of absenteeism.

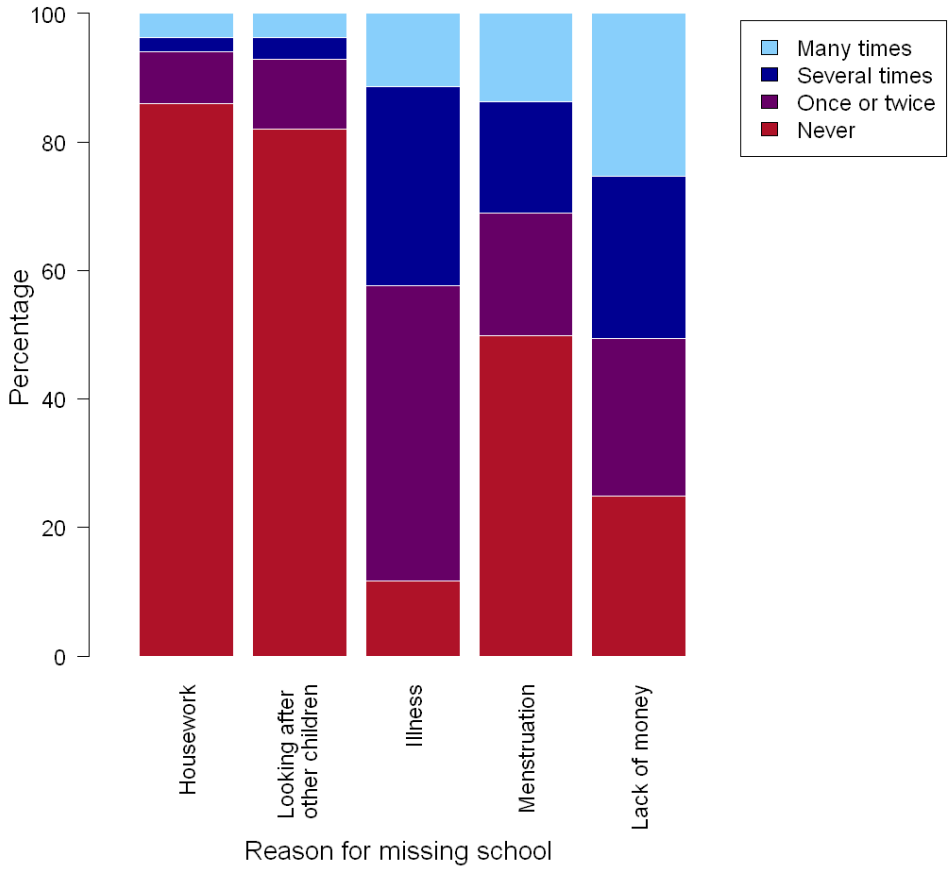


Table 4.6 shows the estimates of the ICC based on the data collected for the primary endpoint and data for the 'proportion of girls who missed school' endpoint. Using sensitivity analysis the ICC values were similar to the main analysis, with ICC estimate

of 0.157 for the primary endpoint and 0.241 for the 'proportion of children missing school 'endpoint.

With the ICC estimate, calculations of sample sizes can be made which will aid decisions for future studies. Table 4.7 summaries the sample sizes needed for a full scale cluster trial to detect a difference of *d* with 90%, 85% and 80% power, for various values of *d* and *N* (number of individuals per cluster); alpha is fixed at 0.05 [5]. Here the endpoint is 'number of days of school missed'.

Table 4.6: Summary of ICC estimate for the study cohort.

Endpoint	ICC estimate (95% CI)
Number of school days missed	0.173 (0.055: 0.484)
Proportion of children missing school	0.226 (0.086: 0.555)

Table 4.7: Summary of sample size calculations with varying values of power*			
Fixed by investigators			M (number of clusters per arm)
d (difference)	N (individuals per cluster)	Power	
0.5	20	90	242
		85	207
		80	181
	25	90	233
		85	199
		80	174
	30	90	226
		85	193
		80	169
0.75	20	90	108
		85	92
		80	81
	25	90	104
		85	89
		80	78
	30	90	101
		85	86
		80	75
1.0	20	90	61
		85	52
		80	46
	25	90	59
		85	50
		80	44
	30	90	57
		85	49
		80	43
1.25	20	90	39
		85	33
		80	29
	25	90	38
		85	32
		80	28
	30	90	37
		85	31
		80	27
1.5	20	90	27
		85	23
		80	21
	25	90	26
		85	23
		80	20
	30	90	26
		85	22
		80	19

*ICC = 0.173, standard deviation = 3.75, alpha = 0.05 – values used in all calculations.

4.4 Discussion

It has been shown by the results of this chapter that it is feasible to conduct a cluster randomised control trial in a Kenyan school setting. These results demonstrate a trend towards reduced absenteeism in the intervention group, with absenteeism increasing or staying the same in the control group. There was a mean difference of 1.48 days of school missed in schools, after accounting for covariates, when comparing the intervention group to the control group at follow-up. This demonstrates some evidence towards a beneficial effect and is a very encouraging result in terms of efficacy for the reusable Mwezi pad training and support for future work. The results of the covariate adjusted t-tests were close to the 5% significance level (p=0.077, 95% CI -3.17; 0.21). The associated confidence interval was relatively wide showing that the true difference in number of days between groups could therefore be as high as 3.17 fewer days missed in the intervention arm to 0.21 more days missed. This P-value provides further evidence of the benefits of the intervention; however, a zero difference cannot be ruled out. The small numbers of participants and particularly the small number of clusters involved in our pilot study mean that the results can only be thought of as preliminary results. Additionally, small numbers reduce the likelihood of producing a significant result.

When measuring the ICC it was found that the study result was equal to 0.173 for the primary endpoint. When comparing this ICC estimate to the literature it was found that our result was very high compared to other studies[8], with only studies that involved numerous families members showing ICC estimates as high. This suggests that the girls within the schools influence each other's behaviour, attitudes and responses heavily, although completion of the questionnaires was carefully supervised so that very little conferring could occur. A high level of ICC in a study such as ours is not very surprising considering the amount of time the cluster spend as a group and have known each other, prior to the study. In many ways our style of teaching on the training of the Mwezi pad actively encourages group discussion and to seek support from the other participants and therefore it is not a negative result to find a high ICC, but it does mean the results of the statistical t-test are less likely to show significance.

There was a mean reduction of 1.48 days of absenteeism, after accounting for covariates, in those schools randomised to the intervention. This is equivalent to a 68.8% reduction in absenteeism. Prior to the intervention, girls were missing approximately 9.9% of school days and this fell to 3.1%. In Scott's study baseline absenteeism was higher, ranging from 23.81-11.10%[5]. However they observed a similar effect size, with absenteeism being cut by slightly over half (from 21% to 9%), the equivalent of approximately 6 days per term. There was also a reduction in the proportion of children missing school in the intervention group, with a difference between the groups at follow-up of 26.3%. This, however, was not significant at the 5% significance level (p=0.120). For both the primary endpoint and the 'proportion of girls missing school' endpoint the intervention group showed a slightly lower value at baseline compared to the control group. This is unfortunate, as having groups that begin as even as possible can give more strength to the result at follow-up. However,

the change seen between the groups is markedly different in that for both endpoints the control group either increase or remain the same at follow-up whilst the intervention group reduce considerably.

In the context of general absenteeism, illness, lack of money and menstruation were the three top causes, with 88.3%, 76.6%, and 50.2% of girls reporting missing school at the minimum of at least once or twice for those reasons in the last month respectively. However, these three factors are interrelated and therefore it is difficult to separate out their individual causal effect. Girls may miss school during menstruation because they cannot afford sanitary towels and this will overlap with absenteeism related to lack of money. Also, girls may miss school because of period pains which they perceive as illness, for example in Adinma's study only 39.3% recognised menstruation as a physiological process[9]. These absences will overlap with illness-related absenteeism. It is difficult to determine the relative impact of these three factors individually, however it is clear that they regularly affect the school attendance of a significant proportion of schoolgirls in our study.

On all results included in this chapter sensitivity analysis, using randomised region instead of school as the cluster, was performed. Throughout, the results showed close correlation with the main analysis.

When looking at the results of the sample size calculations a cluster randomised trial based on the design of this study appears to be feasible. For example, a study wishing to detect a difference of 1 day with 90% power could do so by recruiting 59 schools per arm at 25 participants per school, or 61 schools per arm at 20 participants per school. This provides further evidence for a larger scale research project to be undertaken.

5. MENSTRUATION RELATED ABSENTEEISM

5.1 Introduction

Following the analysis of data on general absenteeism, the questionnaire took a more focussed approach in trying to establish whether there was a relationship between girls menstruating and missing school. Previous research[2] has suggested that this is a barrier to girls' attendance rates and the questionnaire aimed to see whether this cohort in East Africa also reported similar problems.

5.2 Methods

Firstly, the questionnaire at baseline aimed to ascertain whether for the whole group, menstruation was a cause of absenteeism:

"In a normal month, how often have you missed school because of the following reasons; housework; looking after younger brothers or sisters; illness; menstruation; lack of money?"

The results from this question have been highlighted previously in table 4.5. At two subsequent points in the questionnaire there were then further opportunities for girls to volunteer a link between periods of menstruation; increased absenteeism from school; and the effect of menstruation on routine daily activities. The first of these questions was:

"In the average month, how often does menstruation make you; miss school, miss work; stay indoors; not walk far; unable to carry out daily activities like cooking or fetching water; avoid being around me or boys; or be unable to play with other children?"

The girls were asked to estimate how often this happened and the results for each response are highlighted in figure 5.1. Table 5.1 focuses specifically on the effect of menstruation on missing school taken from this question. The second question requested a quantitative estimate as an answer:

"How many days of school did you miss last time you menstruated?"

5.3 Results

Table 5.1 and 5.2 compare the responses of the control and intervention groups when asked further questions about how menstruation affected school absenteeism, at both baseline and at follow-up.

At baseline, roughly 53% of the whole cohort missed school due to menstruation. This figure is derived from adding the proportions of girls in both groups who responded saying that menstruation made them miss school either "once or twice" or "never" and then dividing by two (as there are two groups). See calculation below.

Table 5.1: The effect of menstruation on school absenteeism			
How often does menstruation make you miss school?		Group*	
		Control	Intervention
Baseline	Never	58 (41.7)	66 (52.8)
	Once or twice	52 (37.4)	42 (33.6)
	Several times	29 (20.9)	17 (13.6)
Follow-up	Never	41 (47.1)	45 (61.6)
	Once or twice	34 (39.1)	19 (26.0)
	Several times	12 (13.8)	9 (12.3)

* Value is the total number of girls who responded with that answer (% of group)

Mean number of girls missing school at baseline due to absenteeism:

37.4 + 20.9 + 33.6 + 13.6 = 105.5

105.5 / 2 = 52.75 %

Figure 5.1: The proportion of girls who thought that menstruation impacted on some of their routine daily activities (at baseline)

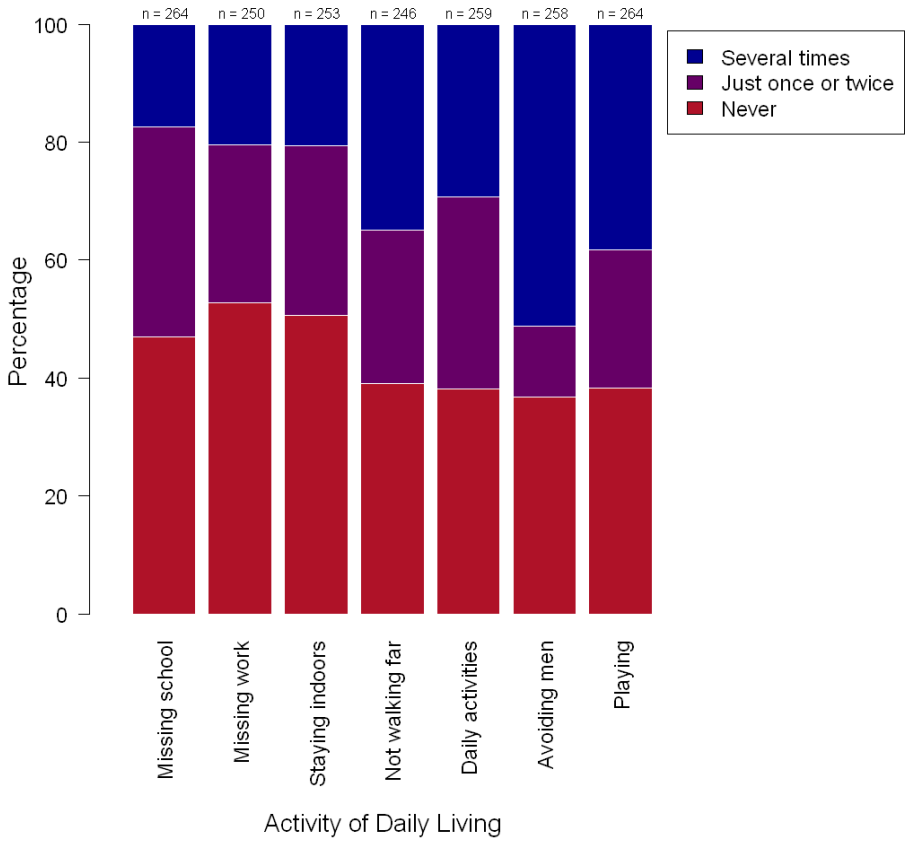


Figure 5.1 suggests that of the activities included in the questionnaire, their interaction with males was most effected by menstruation (51.2% of the girls asked reported it to have some effect). At follow up, it was found that in both the control and intervention groups the proportion of girls reporting that menstruation *never* made them avoid men had increased, but this effect was greater in the intervention group. Tables with the raw data representing the effect of menstruation on daily activities, is included in the appendix.

Table 5.2: The number of school days missed due to menstruation

How many days of school did you miss last time you menstruated?	Group*	
	Control	Intervention
Baseline	137 (1.88)	127 (1.43)
Follow-up	83 (1.59)	73 (1.04)

*Value is the total number of days in each group (mean number of days)

Table 5.2 shows that in both groups the number of days missed during menstruation reduced between baseline and follow-up but that this difference was slightly more pronounced in the intervention group. At baseline, the mean number of school days missed due to menstruation was 1.66 (for the whole cohort). This figure was obtained using the calculation below:

1.88 + 1.43 = 3.31

3.31 / 2 = 1.655 days

5.4 Discussion

The questionnaire asked the girls to initially volunteer a link between menstruation and increased absenteeism from school by asking:

"In a normal month, how often have you missed school because of the following reasons; housework; looking after younger brothers or sisters; illness; menstruation; lack of money?"

The results from this question have already been highlighted in section 4 (table 4.5) and they suggested that 50.2% of the whole cohort cited menstruation as a cause to some degree of missing school. This figure was derived from the following calculation:

19.2 + 17.3 + 13.7 = 50.2%

This was an important initial finding as it supports an association between menstruation and absenteeism and provided a premise for the questionnaire to go

on and verify and explore this link further. In order to validate this result, another question was asked which aimed to essentially obtain the same information but by asking the question in a slightly different way. This question was:

"In the average month, how often does menstruation make you; miss school, miss work; stay indoors; not walk far; unable to carry out daily activities like cooking or fetching water; avoid being around me or boys; or be unable to play with other children?"

The results from this question found that 52.3% of girls reported menstruation made them miss school at baseline. Interestingly, this figure is close to the result from the previous question detailed in table 4.5 (50.2%) suggesting that the findings when exploring this association in slightly different ways are reproducible, hence improving the validity of both the results and of the questionnaire as a method of obtaining this data.

In both groups, responses suggested that menstruation had less of an effect on the girls missing school at follow-up compared to baseline as a higher percentage reported "never missing school" because of their period; this effect was seen to be more pronounced in the intervention group though (61.6% versus 52.8%). The percentage of girls reporting being absent either once, twice or several times from school, reduced at follow-up as well in the intervention group.

At baseline, our data showed that on average, menstruation was responsible for the girls questioned missing 1.66 days of school. Despite being a lot less than the five days reported in previous research by Scott *et al*[5], this was further (quantitative) evidence for an indication to explore this secondary endpoint (whether menstruation was related to school absenteeism). Table 5.2 also shows that the mean number of days missed due to menstruation was lower in the intervention group at follow-up (1.04 versus 1.59), however the baseline figures for both groups also suggested that fewer days of school were missed in this group too. There is the possibility that simply talking about menstruation and providing some education around this issue in a group environment could have had an effect on these results; indeed Scott *et al* observed reduced absenteeism in a group of girls who were solely provided with education[5].

Oster's work highlighted the need for an objective measure of absenteeism as the girls in her study had an exaggerated perception of the effect that menstruation had on school attendance[7]. Unfortunately, in this study logistical constraints prevented registration of the girls every day, however in a larger study this would be essential.

These results are encouraging in providing pilot evidence for menstruation being a key factor in school attendance and furthermore that there is a link between addressing menstrual hygiene and reducing school absenteeism. However, we cannot assume that the reduction in school absenteeism is due to our intervention. This is in part because there was much variation amongst the quality of the Mwezi sanitary pad made by the girls during the workshops (as verified by the Irise

facilitators); this study did not provide a standardised, identical intervention to all participants.

6. CURRENT MENSTRUATION MANAGEMENT

6.1 Introduction

This section reports on girls' knowledge of menstruation management products and their current menstrual hygiene practices.

6.2 Methods

Girls from both groups were asked to indicate on the questionnaire 1 at baseline which products they had heard of from a list of tampon, sanitary pad and menstrual cup. They were also asked to select which products they usually used during menstruation from a list of cloth, tampon, purchased sanitary pad, menstrual cup, and toilet paper with the option to write additional products not included in the list. As well, they were asked to indicate whether they had bought sanitary pads in the last six months and whether they had ever wanted to buy sanitary pads but been unable to. They were also given some statements about access to sanitary pads and asked to indicate whether they agreed or disagreed with them.

6.3 Results

6.3.1 Girls' knowledge of sanitary products

By far the most well-known product was the sanitary pad, with 248 of participants (89.5%) having heard of it alone. A further 10 (3.6%) and 11 (4.0%) had heard of tampons and menstrual cups as well as sanitary pads respectively. Seven participants (2.5%) had heard of tampons alone, and only one (0.4%) had heard of all three products.

6.3.2 Girls' current methods of menstruation management

As shown in figure 6.1, girls reported using a number of alternative materials for menstrual hygiene management: cloth (24%), toilet paper (8%), cotton wool (7.7%), mattress or blanket (7.8%). There were three groups of girls, as illustrated in figure 6.2; girls who always used disposable pads (51%), girls who reported using a mixture of purchased pads and other materials (20%) and a group of girls who always used alternative materials (29%).

Figure 6.1: Bar graph showing Girls' current product use

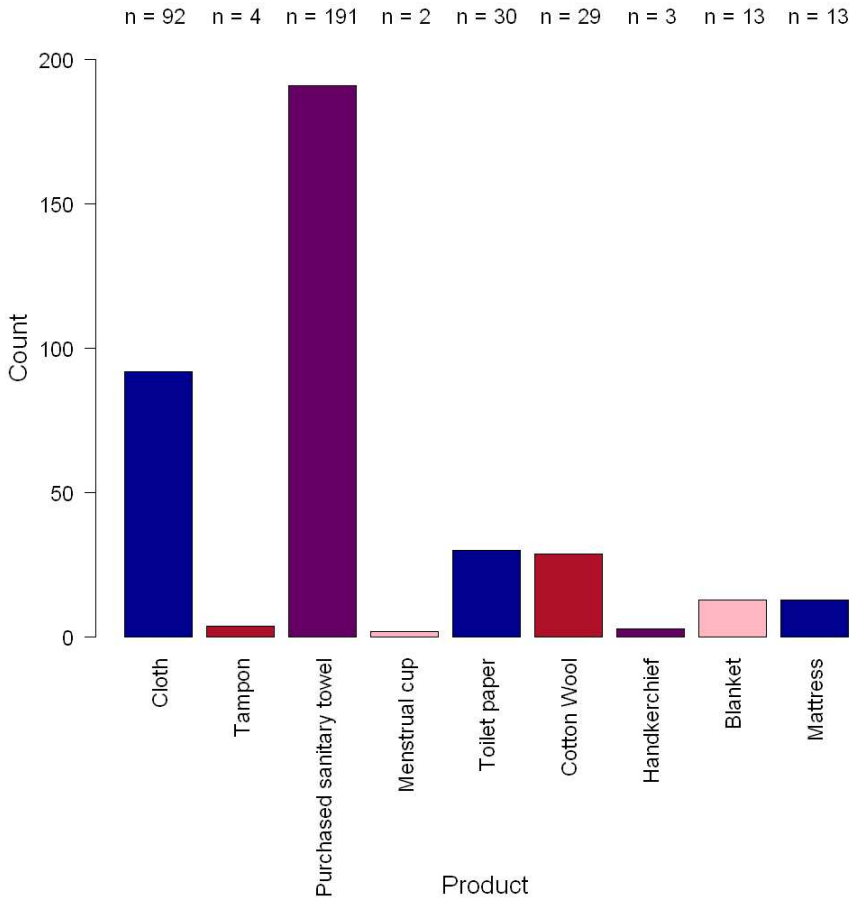


Figure 6.2: Venn diagram to represent the proportions of girls using purchased and non-purchased product

6.3.3 Girls' Access to Sanitary Pads

The majority of participants (237, 86.8%) had wanted to buy sanitary pads in shops but had been unable to at some point in the past with 43.2% reporting that they had not bought sanitary pads in the last 6 months. Table 6.1 summarises girls' responses to statements about the availability of sanitary pads.

Table 6.1: Summary of girls' responses on availability of sanitary pads

	Response*		
	Agree	Disagree	Unsure
Girls are unable to buy sanitary towels	189 (65.6)	62 (21.5)	37 (12.8)
Girls do not have enough money to buy sanitary towels	205 (71.0)	46 (15.9)	38 (13.1)
There are no sanitary towels in the shops	23 (8.4)	217 (78.6)	36 (13.0)

* Value is the total number of girls who responded with that answer (% of group)

6.4 Discussion

The reported product use in this study differs slightly from that observed in the literature. Half of girls used pads compared to 32.7% in Adinma's study[9] and 93.8% in Lawan's study[12] in keeping with Crofts observation that pad use varied depending on the population[6]. Sanitary pads were the most commonly purchased product in our study compared to cotton wool in Averbach's older study population in Zimbabwe[15]. Approximately half of girls were using alternative materials (not sanitary pads, menstrual cup or tampons) with 24% using cloths compared to 95% in Malawian schoolgirls[10] and 81% of the group of older Zimbabwean women[15]. Until this variation between populations, possibly affected by age, socioeconomic status and rural compared to urban, has been further quantified it cannot be assumed that results from one population can be extrapolated to another. This highlights the need for assessment of each new population to guide the type and strategy of a menstrual hygiene management intervention.

In Pillitteri's study girls reported being unable to buy pads because the cost was prohibitive and they were often unavailable in the shops[10]. In this study the cost was identified as a more significant factor with 71.0% agreeing that girls' could not afford to buy sanitary pads but only 8.4% agreeing with the statement that there were no sanitary pads in the shops.

Interestingly the proportion of girls using alternative materials for some or all of the time (49%) is similar to the proportion of girls (53%) reporting absenteeism due to menstruation (see chapter 5, section 5.4) perhaps suggesting that lack of purchased sanitary pads is the main reason for absenteeism rather than period pain, lack of appropriate facilities at school or even health education which were suggested as important factors in the literature review. Additionally the subgroup of girls that reported missing school several times during menstruation as compared to the group that only missed it once or twice may reflect girls who were able to buy

disposable products some of the time compared to those who were never able to buy them and used the least effective materials like mattress.

7. EVALUATION OF THE MWEZI PAD AND TRAINING SESSION

7.1 Introduction

As one of the secondary endpoints, Irise wanted to carry out an evaluation of the acceptability of the reusable sanitary pad that was being used as the "intervention" and also of the actual teaching session that instructed the girls how to make the Mwezi pad. This was not only because it is a pilot study, but also because it was always agreed that the design of the Mwezi pad was not a finished one and needed to be constantly re-assessed and evaluated in order to improve its functionality and therefore hopefully its usage amongst our target audience. This data is then intended to be used for future research in the region, carried out by either Irise or one of the charities that we collaborate with.

7.2 Methods

The questionnaire asked first of all whether the girls used the reusable sanitary pad in the month between baseline and follow-up. Those who said they did either some or all of the time, were assigned into the "as treated" set and it was only their responses that were analysed in this part of the study. The questionnaire asked specific questions about; the acceptability of the concept of a reusable pad; how comfortable it was; opinions on how easy it was to make the pad and to access equipment; and also thoughts on washing and drying the pad. Each of these questions are highlighted in the tables and figures in section 7.3

7.3 Results

7.3.1 Acceptability

The results discussed here are only relevant to the intervention group.

When asked before the workshop, 91.4% of the girls agreed that it would be useful to learn to make a reusable sanitary pad. Table 7.1 highlights the responses received when questioned on the acceptability of the Mwezi pad specifically. It shows that an overwhelming majority of the intervention group (95.2%) thought that learning how to make a reusable sanitary towel was a useful skill to have although only just over half of the girls said they used the Mwezi pad all the time (56.6%). Further evaluation of the sanitary pad was only completed by a sub-group of 64 girls from the intervention cohort (those that had used the Mwezi pad either all or some of the time). However, the remaining 15.8% of the group who admitted to never using the pad, were asked why and their responses are summarised in figure 7.1.

Table 7.1: The general acceptability of the Mwezi sanitary pad at follow-up

Question and answer		Response*
Was it useful to learn how to make reusable sanitary towels?	Yes	79 (95.2)
	No	3 (3.60)
	Unsure	1 (1.20)
Did you use the pads?	All of the time	43 (56.6)
	Some of the time	21 (27.6)
	Never	12 (15.8)
Would you recommend the towels to others?	Yes	74 (94.9)
	No	4 (5.10)
How comfortable were the pads?	Comfortable	50 (76.9)
	Adequate	10 (15.4)
	Uncomfortable	5 (7.70)

* Value is the total number of girls who responded with that answer (% of group)

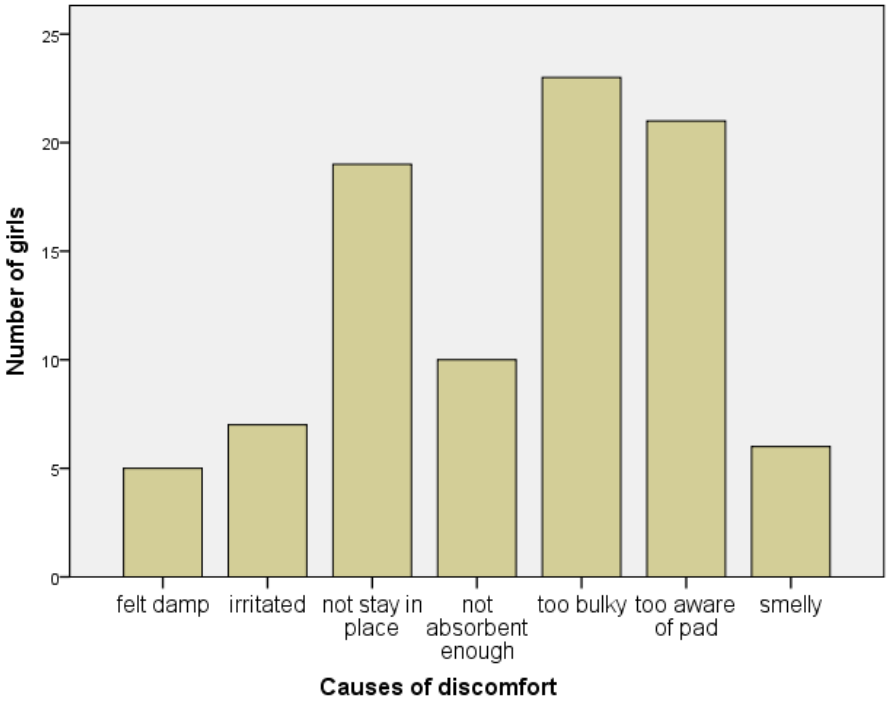
Figure 7.1: Reasons for the girls not using the Mwezi pad (paraphrased)

- I did not finish making it
- I did not have a pair of scissors
- I didn't use it due to the condition it is in
- If you use them you can't walk very well
- The materials are not available
- I did not have enough materials due to lack of money
- Because it was very big and you can't walk far with it
- I forgot how to make it
- I could not find the cloth

Reasons for the pad being uncomfortable were more extensively researched. These are represented in figure 7.2 and include the collected responses from all of the girls that used the pad (ie regardless of whether they rated the pad as being "comfortable" or "uncomfortable").

The most frequently reported reason for the pad being uncomfortable was its size with 29.9% of girls reporting that they were "too aware of the pad being there" and 37.3% reporting that the pads were "too bulky."

Figure 7.2: The number of girls reporting different causes of discomfort



7.3.2 Making the Mwezi pad

A clear majority (98.6%) of girls who used the pad said that they would make a new one when the first one had worn out, however when trying to get an idea as to why girls would not bother to make it again, there were no clear reasons indicated. A table of the responses is included in the appendix. Of the group, 46.9% of the girls thought making the towels by hand took too long and 21.4% thought they were too difficult to make. Furthermore, despite just over 80% of the intervention group using the reusable Mwezi pad for some or all of the time, 57.7% of the cohort agreed with the statement that the pads "don't work well."

7.3.3 Washing and drying the Mwezi pad

The majority of the "as treated" group (97.1%) washed the sanitary pads in the intervening month between baseline and follow-up, with 100% of those reporting using both soap and water. This data, along with opinions on the availability of these resources is summarised in table 7.2.

Table 7.2: The acceptability of washing the Mwezi sanitary pad		
		Response*
Did you wash the sanitary towels	Yes	68 (97.1)
	No	2 (2.90)
Did you use soap?	Water	0 (0.00)
	Soap and water	68 (100)
There was enough soap to wash the pads	Strongly disagree	3 (4.20)
	Disagree	3 (4.20)
	Not sure	0 (0.00)
	Agree	26 (36.1)
	Strongly agree	40 (55.6)
There was enough water to wash the pads	Strongly disagree	11 (15.3)
	Disagree	13 (18.1)
	Not sure	0 (0.00)
	Agree	31 (43.1)
	Strongly agree	17 (23.6)
It's embarrassing to fetch extra water to wash the pads	Strongly disagree	17 (23.9)
	Disagree	9 (12.7)
	Not sure	2 (2.80)
	Agree	20 (28.2)
	Strongly agree	23 (32.4)
It's embarrassing to wash the pads where people can see	Strongly disagree	34 (47.2)
	Disagree	16 (22.2)
	Not sure	3 (4.20)
	Agree	13 (18.1)
	Strongly agree	6 (8.30)

* Value is the total number of girls who responded with that answer (% of group)

Results suggest that the girls on the whole agreed that they had enough soap to wash the pads but opinion was more divided over whether they had enough water; 66.7% agreed to some degree that there was enough but the rest of the group disagreed. Only around 25% of the girls were embarrassed to wash the pads where there was the risk of being seen however when questioned about drying the pad, 40.3% found it embarrassing to leave them outside to dry. Table 7.3 summarises opinions from the girls who washed the pad, on drying it afterwards.

Table 7.3: The acceptability of drying the Mwezi pad		
		Response*
Where was the pad dried?	Inside	3 (4.50)
	Outside	60 (89.6)
	Sometimes inside, sometimes outside	4 (6.00)
After drying was it dry or wet?	Wet	2 (3.00)
	Dry	64 (97.0)
	Damp	0 (0.00)
It's embarrassing to leave the pads to dry outside	Strongly disagree	31 (37.8)
	Disagree	17 (20.7)
	Not sure	1 (1.20)
	Agree	18 (22.0)
	Strongly agree	15 (18.3)
The pads don't dry quickly enough	Strongly disagree	19 (23.5)
	Disagree	15 (18.5)
	Not sure	3 (3.70)
	Agree	31 (38.3)
	Strongly agree	13 (16.0)
It's better to dry the pads outside	Strongly disagree	8 (9.80)
	Disagree	2 (2.40)
	Not sure	0 (0.00)
	Agree	14 (17.1)
	Strongly agree	58 (70.7)

* Value is the total number of girls who responded with that answer (% of group)

7.3.4 Accessing equipment

Almost half (46.8%) of the girls in the intervention group agreed or strongly agreed that it was difficult to find the right equipment and/or materials to make the reusable Mwezi pad. Further questions were asked about the specific items that were difficult to source and these results are summarised in table 7.4. It shows that a sewing machine was the hardest piece of equipment to find, with around four fifths of the girls asked having difficulties finding one. It was rare however for a lack of underwear to act as a barrier to making the reusable pad.

The appendix also summarises the relative costs of these pieces of equipment.

Table 7.4: The proportion of girls in the intervention group who had difficulty sourcing specific resources	
Equipment	Proportion who admitted difficulty accessing equipment (%)
Scissors	56.0
Needle and thread at home	34.6
Sewing machine	80.1
Plastic	58.9
Underwear	8.60

7.4 Discussion

7.4.1 Making the Mwezi pad

The girls were asked before and after the workshop whether it would be useful to learn how to make a reusable sanitary product. The majority agreed beforehand that it would (91.4%) and this proportion rose to 95.2% of girls after having had the teaching and participated in the workshop. Furthermore, 94.9% reported that they would recommend the pads to others. This suggests that before we delivered our teaching these schoolgirls perceived a need for education and interventions to address their menstrual hygiene management problems; and that perhaps more importantly they were open to the idea of a reusable sanitary product as a potential option for helping to tackle this issue.

It was found that 64 girls in the intervention group (84.2%) said they used the Mwezi pad either all or some of the time during their period between baseline and follow-up. These were assigned as the “as treated” group and it was only their responses that could be analysed on further evaluation of the pad. Further analysis of the reasons why some of the girls did not use the pad are summarised in figure 7.1. It is important to note that these responses were volunteered by the girls and were not suggested by the questionnaire. When asked for their opinion on the comfort of the pad, 60 girls responded that it was either comfortable or adequate. It was most commonly reasons relating to its size that made the pad unsuitable; 29.9% of girls reported that they were “too aware of the pad being there” and 37.3% reported that the pads were “too bulky”. However, these views were suggested by the questionnaire and were not reasons freely volunteered by the girls interviewed. Also, it is important to note that some of the girls who reported such causes of discomfort, were also the same girls who still rated the pads as being “comfortable” or “adequate.”

The Irise facilitators remarked on the wide variation in the standard of sanitary towel that was produced across the different schools in the intervention group and because of the fact that the intervention (the finished product) provided to the girls was not identical for each person, it is not possible to establish whether these flaws

were inherent in the design of the pad or were caused by poor tailoring whilst making the pads. In order to try and answer this question the Mwezi pads would have had to be made by the same person with some kind of quality control measures in place to check the pads before they were distributed and this defeats one of the main premises of the study; to evaluate whether providing teaching on how to make a reusable pad was an acceptable intervention for Kenyan school girls. We tried to address this issue as far as possible within the confines of this study by providing the girls with enough resources (including thread and fabric) to make another two reusable pads in addition to the one made in the workshop, so that all girls were using very similar resources and hence factors such as household income (and therefore quality of equipment used) should have had less of an effect on the pad made. Of course there was no way of controlling the girls' previous experience with sewing and this would have had an effect on the quality of the product.

Information collected in our evaluations at follow-up is being used to continually develop the pad design and training and alternatives and variations suggested by women and girls have been incorporated into the teaching resources. The design used in this pilot study is by no means a finished prototype and one of the important steps to take in the future is to continue evolving this design to create a more user-friendly, comfortable, easy to make product that fulfils its role in improving menstruation and hygiene management for these girls.

With regards to actually making the reusable Mwezi pad, 21.4% of the girls thought that they were too difficult to make (a table with this data can be found in the appendix). This could potentially support the reports from the Irise facilitators that the standards of sewing ability varied quite markedly across the group and that furthermore, a collaborative approach to making these pads whereby different people fulfil different roles in the manufacturing process could be of benefit. For example, our data suggests that around 20% of girls had access to a sewing machine and therefore these could be used instead of sewing by hand (improving the quality and speed of production). The more experienced girls could fulfil this role whilst those with less prior experience could purchase the resources needed or cut out the fabric ready for use, for example. It is intended that measures such as these would help to reduce the wide variation in quality of pad made and may also help to reduce inequalities observed in accessing the right equipment (46.8% of girls either agreed or strongly agreed that it was difficult to find the right materials/ equipment). This was despite conducting some local research beforehand to try and find the cheapest materials that could be sourced locally, but that were adequate for the intended purpose.

7.4.2 Washing and drying the Mwezi pad

When analysing the responses regarding washing and drying the Mwezi pad after it had been used, 33.4% of those who washed it either agreed or strongly agreed that they did not have sufficient water to do so. Interestingly, this figure is close to what we found when calculating the LPI; just fewer than 40% of the girls we studied reported going without clean water either always, many times, or several times. It is

especially important to identify these girls as they are the ones who may be at an increased risk of irritation or infection if they continue to use these reusable pads without washing and drying them properly. The teaching sessions emphasised as much as possible the importance of washing and drying the pad correctly and this was detailed in the handout distributed to the girls who took part. In parts of East Africa that have heavy rain during the wet season, drying a reusable product may be more problematic. A case study of an education program in Bangladesh that aimed to improve how women used cloth during menstruation, found that placing cloths on cane baskets over the cooling embers of the cooking fire was an effective way of drying them quickly[27]. This may be an alternative to drying pads in the sun.

Both Crofts and Scott[5 & 6] found that menstruation was an embarrassing subject. Crofts found that girls were embarrassed to dry their reusable Afripads where people could see. Despite anticipating a similar problem in this study, 69.4% of girls reported that they were not embarrassed to wash the pads where people could potentially see, or to leave the pads to dry outside (58.5%). This may have been because the training session included information on a technique reported in Crofts work, where women place their pads in the bottom of a container with a rim and then place that container on a roof so the pads can dry in the sun without passers-by seeing them. Furthermore, the pad design can be taken apart into a base pad and a strip of absorbent material that are both not easily recognisable as part of a sanitary pad (particularly if it is made from patterned, bright material). Emphasis on these points during training aimed to make the girls feel more comfortable washing and drying it properly and therefore reduce the chance of any adverse health consequences.

7.4.3 Accessing equipment

Table 7.2 summarises the proportion of girls who perceived a difficulty in accessing specific pieces of equipment. The variation in opinion over the affordability and availability of equipment is likely to be due to the wide range of LPIs observed within the schools, with some girls reporting much higher level of deprivation than others. Additionally, schoolgirls may not have direct access to money and spending even a small amount on a needle and thread may require their mother's help. It is important to note however, that although around 80% of girls perceived a difficulty in accessing a sewing machine (the hardest piece of equipment detailed in the question) a sewing machine is not an essential resource needed to make the pad.

This data highlight the potential place for a community-based approach to a reusable sanitary pad project. The poorest girls, who are the ones most likely to need help with menstrual hygiene management, are also the ones least likely to be able to afford the equipment. If teachers, mothers and girls worked together they would be able to buy the materials in bulk in order to purchase higher quality equipment at a cheaper price. Additionally they would be more able to make the initial investment as part of a group, perhaps with poorer girls allowed to pay for their pads in small weekly or monthly payments. In a school led project these small payments could be

collected monthly and eventually used to fund making the next set of pads when the current ones wore out.

8. LIMITATIONS

There were many practical issues during data collection. Language was a barrier to accurate data collection as in some schools and there may have been problems comprehending the format and the questions in the questionnaire. Irise pre-empted this to be a potential problem and therefore enlisted the assistance of a local university student to act as a translator.

Menstruation is a taboo topic and girls were embarrassed to talk about it. The questionnaire was anonymous to try and make it easier for girls to answer honestly, however personal reservations about the issue may have resulted in underreporting of the true scale of the problem. The questionnaires were carried out in a classroom setting; students were asked to sit apart from each other; and teachers were asked not to intervene, however on occasion these rules were not always adhered to and peer or teacher pressure may have influenced girls' responses.

Furthermore, the true impact of menstruation related absenteeism may be higher as girls could have viewed absenteeism due to menstrual cramps as sickness rather than menstruation related absenteeism. This difference was not clearly defined in the questionnaire and would therefore need to be addressed should a larger study be carried out. These terms are all subjective and therefore it is hard to avoid the fact that different girls will perceive a different meaning from each question/ response option. They may also have reported absenteeism due to not being able to afford sanitary pads as lack of money related absenteeism. These three areas overlap in reality so it is difficult to differentiate between the impacts of each factor.

A third potential reason for underestimating the scale of this problem is that the girls most likely to have been absent may indeed have been t home during the study and therefore would not have contributed any data. Additionally, as a result of high rates of absenteeism, these girls may have been less likely to understand the questionnaire and communicate their views and experiences.

Although both groups completed a questionnaire at baseline, the additional workshop and inevitable discussion about menstruation may have had an effect on absenteeism independent of the provision of a reusable product. In Scott's study[5], similar reductions in absenteeism were observed in the group receiving education alone as the groups who also received donated sanitary pads. This qualitative finding potentially suggests that girls felt more able to talk about menstruation as a result of being part of the study.

Only 57.6% of participants were analysed for the primary outcome at follow-up. One school (in the intervention group) was lost to follow-up entirely due to being on holiday at the time of the second visit. These were the result of logistical problems and were unavoidable in a pilot study that relied on many external contributors who were not under the "control" (so to speak) of the project facilitators. Perhaps in future research, longer periods of time would be spent in the regions visited in order

to co-ordinate and communicate with the schools to ensure that as many girls took part as possible.

As mentioned in section 7.4, this data does not make it possible to validate the Mwezi reusable pad. Girls made their own pads and trainers observed a broad range of skill and quality of the finished product. The feedback on the pad does not therefore enable commentary on the pattern and design of the pad, although commonly reported issues in the research and other evaluations are being used to evaluate the design and suggest improvements.

The sample size was quite small and therefore detecting a statistically significant result at the 5% level was less likely. However, as a pilot study we were not aiming for conclusive results but rather to assess the feasibility of a larger, future study.

9. CONCLUSIONS

9.1 The bigger picture

This section tentatively attempts to put a menstrual hygiene management intervention in the context of other school-based interventions designed to reduce absenteeism and have a subsequent effect on educational achievement and potentially future wages. If an intervention to provide girls with a reliable product could reliably result in mean reduction of 1.48 days in a month this would equate to 18 extra days of school a year and approximately half a year's (180 days) extra schooling over a ten year school career. Considering that current data indicates that an extra year of schooling in Sub-Saharan Africa can equate to a 10% increase in wages this intervention has the potential to have a long-term impact on girls' outcomes.

9.2 Overall Conclusion

The study shows a trend towards reduced absenteeism in the group trained to make reusable pads that warrants further investigation particularly considering its potential impact on education achievement and long-term economic productivity. Baseline data indicated that menstruation impacts approximately 5 out of 10 girls, causing them to miss school at least once or twice during their period and that 5 out of 10 girls struggle to afford sanitary towels. The concept of a reusable product was acceptable to the majority of schoolgirls although a significant proportion would struggle to access and afford the equipment without help. A community-based approach would be needed to create a scheme to locally produce a reusable product feasible for the poorest girls. Girls were less embarrassed to be seen washing and drying the pad than expected suggesting that the design and methods provided during training to avoid embarrassment may have been effective.

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11. APPENDIX

Questionnaire 1: Given to both the control and intervention groups at baseline

Question Sheet 1
Number:
Age:

Please mark the responses that are true for you or write your response in the space provided.

31. Missing School

It can often be difficult to get to school every day, even when you are trying your hardest.

1. How many days of school have you missed in the last four weeks?
……

2. In a normal month how often have you missed school because of the following reasons?

	Never	Once or twice	Several times	Many times
Housework				
Looking after younger brothers and sisters				
Illness				
Menstruation				
Lack of money				

Are there any other reasons? (please write them here)……

Menstruation

Menstruation can make life more difficult for girls. It can be embarrassing but it's important to talk about it.

3. Which of these products have you heard of?

Tampon	
Sanitary Pad	
Menstrual Cup	

4. What do you normally use during menstruation?

Cloth	
Tampon	
Purchased sanitary pad	
Menstrual Cup	
Toilet paper	

Other (please them write here)……

5. Have you bought sanitary pads in the last six months?

Yes No

6. Have you ever wanted to buy sanitary pads but been unable to?

Yes No

7. Please mark whether these statements are true for you:

	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
Girls are unable to buy sanitary pads					
Girls do not have enough money to buy sanitary pads					
There are no sanitary pads in the shops					

Are there any other reasons? (please write them here)……

8. In the average month how often does menstruation make you:

	Never	Once or twice	Several times
Miss school			
Miss work			
Stay indoors			
Not walk far			
Unable to carry out daily activities like cooking or fetching water			
Avoid being around men and boys			
Unable to play with other children			

9. How many days of school did you miss last time you menstruated?

0 1 2 3 4 5 6 7 8 9 10 10+

10. I miss school during menstruation because:

	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
Of worries my skirt could become stained					
Menstruation can cause bad pains					
There isn't anywhere for girls to wash and change at school					

Are there any other reasons? (please write them here)……

Your family

This section asks questions about your home and family so we know a little bit more about what life is like for you outside school.

11. Please select the one that applies to you:

My mother and father are both alive.	
My mother is alive but my father has died.	
My father is alive but my mother has died.	
My mother and father have both died.	

12. Over the past year have you or your family gone without….

	Never	Once or twice	Several times	Many times	Always
Enough food to eat					
Enough clean water for home use					
Medicine or medical treatment					
Enough fuel to cook your food					
School expenses for fees, uniforms or books					
A cash income					

Mwezi Sanitary Pads

13.Do you think it would be useful to learn how to make reusable sanitary pads?

Yes No Not sure

Comments……

	Yes	No	Not sure
14. Do you have a pair of scissors you can use?			
15. Do you have a needle and thread you can use?			
If No would you be able to buy a needle and thread?			
16. Do you have a sewing machine at home or belonging to a friend or relative that you can use?			
17. Would you be able to get/buy some plastic bags or another form of cheap plastic?			
18. Do you have underwear (pants)?			
19. Is your underwear well fitted?			

Please write any other comments below:

Questionnaire 2: Given to the intervention group at follow-up

Question Sheet 2
Number:
Age:

Please mark the responses that are true for you.

Missing School

Last time we saw you we asked questions about school. Please answer these questions again.

1. How many days of school have you missed in the last month?
……

2. In the last month how often have you missed school because of:

	Never	Once or twice	Several times	Many times
Housework				
Looking after younger brothers and sisters				
Illness				
Menstruation				
Lack of money				

Menstruation

Menstruation can make life more difficult for girls. It can be embarrassing but it's important to talk about these issues.

3. In the last month how often has menstruation made you:

	Never	Once or twice	Several times
Miss school			
Miss work			
Stay indoors			
Not walk far			
Unable to carry out daily activities like cooking or fetching water			
Avoid being around men and boys			
Unable to play with other children			

4. How many days of school did you miss last time you menstruated?

0 1 2 3 4 5 6 7 8 9 10 10+

The Mwezi Sanitary Pads

Last time we were here we taught you how to make reusable 'Mwezi' sanitary pads. We would like to know what you think of them.

5. Do you think it was useful to learn how to make reusable sanitary pads?

Yes	
No	
Maybe	

Comments……

6.Did you use the Mwezi sanitary pads last time you menstruated?

Yes all the time	
For some of time	
No, not at all	

If No please state why you didn't use them:
……

If you used them at all please complete questions 8-15

Wearing the Pads

7. Would you tell a friend to use Mwezi sanitary pads?

Yes	
No	

8. How comfortable were the pads (mark one response):

Comfortable	
Adequate	
Uncomfortable	

9. Please select any causes of discomfort (mark all the ones that were true for you):

Leaked	
Felt damp	
Irritated	
Did not stay in place	
Not absorbent enough	
Too bulky	
Too aware of the pad being there	
Smelly	

Other (please specify)……..

Making

10. Would you make the Mwezi sanitary pads again when the ones you have wear out?

Yes	
No	

11. Please mark the responses that are true for you:

	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
Making the Mwezi sanitary pads by hand takes too long					
The materials/equipment are too expensive					
They are too difficult to make					
They don't work very well					
It's difficult to find the right materials/equipment					

Washing and Drying

12. Did you wash the mwezi sanitary pads?

Yes	
No	

13. If Yes did you use?

Water	
Soap and water	

14. Please mark the responses that are true for you:

	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
There was enough water to wash the mwezi sanitary pads					
There was enough soap to wash the mwezi sanitary pads					
It's embarrassing to wash the mwezi sanitary pads where people can see					
It's embarrassing to fetch extra water to wash the mwezi sanitary pads					

Please write any other comments here ……

15. Where did you dry your mwezi sanitary pad?

Inside	
Outside	
Sometimes inside and sometimes outside	

16. When you next used the mwezi sanitary pad after drying was it?

Wet	
Dry	
Damp	

17. Please mark the statements about drying the Mwezi sanitary pads that are true for you:

	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
It's embarrassing to leave the mwezi sanitary pads to dry outside					
The Mwezi sanitary pads don't dry quickly enough					
Its better to dry the mwezi sanitary pad outside					

Please write any other comments below:

Questionnaire 3: Given to the control group at follow-up

Question Sheet 3
Number:
Age:

Please mark the responses that are true for you.

Missing School

Last time we saw you we asked questions about school. Please answer these questions again.

1. How many days of school have you missed in the last month?
……

2. In the last month how often have you missed school because of:

	Never	Once or twice	Several times	Many times
Housework				
Looking after younger brothers and sisters				
Illness				
Menstruation				
Lack of money				

Menstruation

Menstruation can make life more difficult for girls. It can be embarrassing but it's important to talk about these issues.

3. In the last month how often has menstruation made you:

	Never	Once or twice	Several times
Miss school			
Miss work			
Stay indoors			
Not walk far			
Unable to carry out daily activities like cooking or fetching water			
Avoid being around men and boys			
Unable to play with other children			

4.How many days of school did you miss last time you menstruated?

0 1 2 3 4 5 6 7 8 9 10 10+

Please write any other comments below

Table 11.1: The LPI for each school visited

		School										
		Total	Bunde	Tiengre	Nyalunya	Yago	Buoye	Disii	Kochogo	Kanyamedhu	Oginga Odinga	Songhar
Lived Poverty Index	Valid N	274	31	30	30	29	28	24	23	29	20	30
	Mean	1.73	1.87	1.87	1.96	1.67	1.86	1.67	1.69	1.61	1.77	1.37
	Standard Deviation	0.78	0.82	0.88	0.72	0.79	0.63	1.10	0.79	0.78	0.62	0.52
	Percentile 25	1.17	1.33	1.00	1.50	1.17	1.17	0.92	0.83	1.00	1.50	1.00
	Median	1.67	1.67	2.00	2.17	1.67	1.92	1.67	1.67	1.83	1.83	1.33
	Percentile 75	2.33	2.33	2.33	2.50	2.17	2.25	2.08	2.33	2.00	2.17	1.67
	Range	4.00	3.83	3.67	2.83	2.67	2.50	3.83	2.50	3.33	2.33	2.17

The perceived effect, at baseline and follow-up, of menstruation on daily activities (including only those girls who responded on both occasions)

TABLE 11.2: EFFECT OF MENSTRUATION ON MISSING WORK

		Intervention group			
		Intervention		Control	
		Count	Column N %	Count	Column N %
How often does menstruation make you miss work, baseline	Never	72	62.1	60	44.8
	Once or twice	23	19.8	44	32.8
	Several times	21	18.1	30	22.4
How often does menstruation make you miss work, follow-up	Never	41	58.6	40	49.4
	Once or twice	24	34.3	29	35.8
	Several times	5	7.1	12	14.8

TABLE 11.3: EFFECT OF MENSTRUATION ON STAYING INDOORS

		Intervention group			
		Intervention		Control	
		Count	Column N %	Count	Column N %
How often does menstruation make you stay indoors, baseline	Never	72	59.0	56	42.7
	Once or twice	33	27.0	40	30.5
	Several times	17	13.9	35	26.7
How often does menstruation make you stay indoors, follow-up	Never	45	64.3	33	39.3
	Once or twice	16	22.9	30	35.7
	Several times	9	12.9	21	25

TABLE 11.4: EFFECT OF MENSTRUATION ON WALKING FAR

		Intervention group			
		Intervention		Control	
		Count	Column N %	Count	Column N %
How often does menstruation make you not walk far, baseline	Never	51	44.3	45	34.4
	Once or twice	27	23.5	37	28.2
	Several times	37	32.2	49	37.4
How often does menstruation make you not walk far, follow-up	Never	22	34.4	31	37.8
	Once or twice	24	37.5	24	29.3
	Several times	18	28.1	27	32.9

TABLE 1: EFFECT OF MENSTRUATION ON CARRYING OUT DAILY ACTIVITIES

		Intervention group			
		Intervention		Control	
		Count	Column N %	Count	Column N %
How often does menstruation make you unable to carry out daily activities, baseline	Never	55	45.5	44	31.9
	Once or twice	35	28.9	49	35.5
	Several times	31	25.6	45	32.6
How often does menstruation make you unable to carry out daily activities, follow-up	Never	41	56.9	37	43.5
	Once or twice	19	26.4	30	35.3
	Several times	12	16.7	18	21.2

TABLE 11.6: EFFECT OF MENSTRUATION ON AVOIDING MEN

		Intervention group			
		Intervention		Control	
		Count	Column N %	Count	Column N %
How often does menstruation make you avoid men, baseline	Never	56	45.9	39	28.7
	Once or twice	12	9.8	19	14.0
	Several times	54	44.3	78	57.4
How often does menstruation make you avoid men, follow-up	Never	38	52.1	27	31.8
	Once or twice	10	13.7	22	25.9
	Several times	25	34.2	36	42.4

TABLE 11.7: EFFECT OF MENSTRUATION ON PLAYING

		Intervention group			
		Intervention		Control	
		Count	Column N %	Count	Column N %
How often does menstruation make you unable to play, baseline	Never	55	44.4	46	32.9
	Once or twice	24	19.4	38	27.1
	Several times	45	36.3	56	40
How often does menstruation make you unable to play, follow-up	Never	24	33.8	26	30.2
	Once or twice	31	43.7	30	34.9
	Several times	16	22.5	30	34.9

Table 11.8: Views on making the Mwezi sanitary pad

		Count	Column N %
Would you make the pads again when the current ones wear out?	Yes	72	98.6
	No	1	1.40
Making towels by hand takes too long	Strongly disagree	20	25.3
	Disagree	19	24.1
	Not sure	3	3.80
	Agree	19	24.1
	Strongly agree	18	22.8
Difficult to find the right materials/equipment	Strongly disagree	11	14.3
	Disagree	21	27.3
	Not sure	9	11.7
	Agree	19	24.7
	Strongly agree	17	22.1
The materials/equipment are too expensive	Strongly disagree	31	39.7
	Disagree	20	25.6
	Not sure	3	3.80
	Agree	13	16.7
	Strongly agree	11	14.1
They are too difficult to make	Strongly disagree	33	44.0
	Disagree	21	28.0
	Not sure	5	6.70
	Agree	5	6.70
	Strongly agree	11	14.7
They don't work well	Strongly disagree	14	17.9
	Disagree	16	20.5
	Not sure	3	3.80
	Agree	22	28.2
	Strongly agree	23	29.5

Table 11.9: The cost of buying the resources needed to make the reusable Mwezi pad

Piece of Equipment	Percentage of girls who had or could access equipment (%)	Estimated cost (£ cheapest-most expensive)
Scissors	44.0	0.16-0.55
Needle and thread at home	65.4	-
No needle and thread at home but able to buy	14.8	0.24
Sewing machine	19.9	-
Plastic	41.1 (15.6 unsure)	0.39-0.78
Underwear	91.4	-
Cotton	-	0.31-0.78
Fastenings	-	Button: 0.01-0.04 Press stud: 0.04-0.08
Absorbent material	-	0.23-1.55