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Characterizing the experiences and financial burden of menstrual hygiene management among Rwandan Lower Secondary School girls

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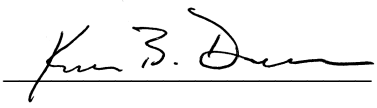
DECLARATION

I, Kirsten Beata Dodroe, hereby declare that the practicum capstone thesis has been written by me without any external unauthorized help, that it has been neither presented to any institution for evaluation nor previously published in its entirety or in parts. Any parts, words or ideas, of the thesis, however limited, which are quoted from or based on other sources, have been acknowledged as such without exception.

Signature:  Date: August 1st, 2022

DEDICATION

To my mother, Linda Kay Thorson, who has modeled what it means to persist as a woman of integrity, compassion, and grit.

To my father, Don Edward Dodroe, who in his life before my time at UGHE instilled in me a reverence for the natural world and an undying spirit of adventure.

And to the educators in my life, academic or otherwise, who have taught me to love the world and tirelessly question my place in it.

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ABSTRACT

Background: Menstrual hygiene management (MHM) is integral to a woman's health and requires access to clean sanitary products, resources to wash her body, and safe places to dispose of used menstrual products.
Objective: Describe the perceptions, practices, financial burden, and environmental factors that influence the experiences of menstruation for public, government aided, and private lower secondary school girls in Rwanda in 2022.
Methods: In this cross-sectional study, a quantitative survey was conducted at one randomly selected public, government aided, and private school in each of Rwanda's five provinces. The survey was administered in-person to menstruating girls in lower secondary school years 2 and 3 from March to June in 2022. The research team conducted a checklist surveying the water, sanitation, and hygiene (WASH) facilities and resources at each school. The quantitative survey described the participants' practices and preferences surrounding menstrual hygiene management and assessed the financial burden of menstruation. Students reported most frequently used MHM products during menstruation, source of information about MHM, and access to MHM WASH facilities and products. The annual cost of menstruation was calculated as a composite of the cost of MHM products and transportation required to access products. Quantitative measures were disaggregated by school type and reported descriptively with frequencies and counts. Quantitative analysis to test for the association between variables was conducted. WASH checklist data was reported with frequencies and counts.
Results: A total of 1,117 menstruating girls were surveyed at fifteen schools in Rwanda. Most girls used disposable sanitary pads while menstruating (89.3%). Lack of money was the primary barrier for not accessing the MHM supplies they needed (61.3%). Out of 645 respondents, 81.7% of girls missed four or fewer days of school per year due to menstruation. Girls also missed spiritual activities (43.2%), sporting activities (36.3%), and social activities (20.3%) due to menstruation. MHM cost girls a median of 4,000 RWF per menstrual cycle. There was a statistically significant difference in cost among school types, with girls from private schools spending the least on MHM. During site visits, researchers found that almost half of schools (n=7) had no water source on campus and most schools had pit latrines (n=13). Girls primarily disposed of used sanitary products in pit latrines at home and school (>78%). Ten schools had menstrual hygiene rooms on site.
Conclusion: Most surveyed girls who are enrolled in lower secondary school years 2 and 3 in Rwanda menstruate, though they do not always have sufficient resources to manage their menstruation safely and privately. MHM education, access to sanitary products, and WASH facilities is integral to a girls' engagement in school and social activities.

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List of Abbreviations

CSE: Comprehensive Sexual Education
LMIC: Low and middle income country
LSS: Lower Secondary School
MHM: Menstrual hygiene management
MINEDUC: Ministry of Education (Rwanda)
MIGEPROF: Ministry of Gender and Family Promotion (Rwanda)
MO: Microsoft Office
NGO: Non-governmental organization
OH: One Health
RTI: Reproductive tract infection
RWF: Rwandan franc
SES: Socioeconomic status
SHE: Sustainable Health Enterprises
SRH: Sexual and reproductive health
SPSS: Statistical Package for the Social Sciences (Software)
SSS: Senior Secondary School
UGHE: University of Global Health Equity
USD: United States dollar
UTI: Urinary tract infection
WASH: Water, sanitation, and hygiene
WHO: World Health Organization

CHAPTER ONE: INTRODUCTION

1.1 Background

Rwanda is a small, landlocked country in East Africa that has experienced unprecedented economic growth and development in recent decades (Clay et al., 2021). With the goal of becoming a middle income country by 2035 and a high income country by 2050, the Government of Rwanda has prioritized the engagement of women in all social, economic, and political sectors (Gender Monitoring Office, 2019). The nation's constitution mandates a minimum quota of 30% women in any decision-making body in the country. In 2008, Rwanda became the first country in the world to reach gender parity in its Parliament and has since maintained a female majority in Parliament and many other governing bodies (World Bank, 2021).

To continue the advancement of Rwanda's goals for gender equity, the country recognizes that it must invest in the health and education of its population, especially for children. While the Ministry of Gender and Family Promotion and the Ministry of Education both have set policy goals for promoting the safe and private management of menstruation for all women and girls, menstrual hygiene management is not included in Rwanda's Vision 2050, a strategic plan to facilitate the nation's economic and social development into a high income country (MINECOFIN, 2015).

With the intention of supporting the advancement of gender equity in Rwanda, our interdisciplinary research team from the University of Global Health Equity (UGHE) hopes to provide evidence-based research to inform interventions that promote the equitable engagement of Rwandan girls in all sectors and activities. UGHE is a private university based in the rural Northern province of Rwanda that educates health leaders to deliver more equitable and high-quality health services throughout the world. Within UGHE, the Center for One Health expands this mission by applying a cross-cutting, transdisciplinary approach to issues that lie at the intersections of human, animal, and environmental health. Since a girl's menstrual hygiene management (MHM) both impacts and is impacted by her social, economic, and physical environment, UGHE recognizes MHM as an issue that operates at the intersections of equity and One Health.

1.2 Organization of Report

This report is organized into six chapters and an appendix.

1. Introduction: Gives a brief overview of the background of this project and the organization of the report.
2. Literature review: Provides a comprehensive overview of the recent scientific literature about MHM in the context of Rwanda and the East African region. Justifies the research project and the intended beneficiaries of the research.
3. Methods: Outlines the sample population, project design, data analysis methodology, and

ethical considerations of the project.

4. Results: Reviews the key results of the data analysis and provides tables displaying study data.
5. Discussion: Interprets the study results within the context of the scientific body of research on MHM and discusses the limitations of the study.
6. Conclusion and recommendations: Provides final remarks and recommendations to improve MHM of school girls in Rwanda.
7. Appendix: Includes the consent forms and research instruments used in the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Overview of Menstrual Hygiene Management

Menstruation is the monthly shedding of the uterine lining that begins with menarche and concludes with menopause (Bobel et al., 2020). While the age of menarche varies with genetic, dietary, geographical, and environmental factors, most girls in East Africa begin menstruating between the ages of 8-16 years old, with a median age of 13.1 years (Bobel et al., 2020). Most women menstruate monthly for two to seven days, accumulating to an average of seven years spent menstruating throughout their lifetimes before the onset of menopause around the age of 50 years (World Bank, 2020).

MHM is defined as "using a clean menstrual management material to absorb or collect blood that can be changed in privacy as often as necessary for the duration of the menstruation period" (Sommer & Sahin, 2013). Safe and dignified MHM is integral to the full academic, social, and economic engagement of girls (HRW, 2017); (Sommer et al., 2016). Poor MHM puts girls at an increased risk for urogenital infection, absenteeism from school and social activities, dropout from school, and social harassment (Kerubo et al., 2016); (Miiro et al., 2018). Without social and political support to ensure equitable access to MHM products and knowledge, girls are at risk of missing educational and economic opportunities, resulting in the widening of an already disparate gender gap (HRW, 2017).

Comprehensive, location-specific, and evidence-based data about MHM is imperative to the development of policies and health interventions that promote the safe management of menstruation, yet the body of research about Rwandan school girls' experiences of MHM is lacking (Ndanyuzwe et al., 2021); (Murekezi et al., 2018). This necessitates further investigation into the experiences, barriers, and practices surrounding MHM among Rwandan adolescent girls.

2.2 Menstrual Hygiene Management in East Africa

2.2.1 Girls' knowledge and perceptions of MHM

MHM knowledge can encompass a person's understanding of why menstruation occurs, its physiological effects, and how to manage it safely (UNICEF, 2019). Many school-aged adolescents lack information about the biological causes and effects of menstruation in East Africa (Oruku et al., 2015). Citing the experience of their first period as a "shocking and fearful event", 66% of adolescent girls in Uganda and Tanzania did not know about menstruation before menarche, (Tamiru et al., 2015). In a study of 209 Senior Secondary School (SSS) girls in Rwanda, 72-79% of girls reported receiving information about menstruation before menarche, with the predominant sources being from their mothers, female teachers, or friends (Murekezi et al., 2018). However, 43% of surveyed girls aged 16-18 years old were able to identify the uterus as the source of menstrual blood, with the remaining 57% reporting "I don't know", "vagina", or "abdomen", signaling that the information girls receive may not be comprehensively informative or accurate (Murekezi et al., 2018). In a quantitative assessment of MHM knowledge among adolescent students in rural Rwanda, 13% of female students and 5% of male students had "good" or "excellent" knowledge of the biomedical causes and effects of menstruation (Isano et al., 2022). Most students correctly identified bleeding and abdominal pain as normal parts of menstruation, though many believed that menstruation was an illness or a curse (Isano et al., 2022).

Education is critical to the promotion of safe MHM and reproductive health (Boosey et al., 2014); (Chinyama et al., 2019); (Jewitt & Ryley, 2014). In 2015, the Ministry of Education of Rwanda drafted a Comprehensive Sexual Education (CSE) curriculum to be included in the general course of study for secondary school students (HDI, 2019). However, after the introduction of this curriculum, its implementation has not been well-documented throughout the nation, raising concern that it is not being widely taught (HDI, 2019).

2.2.2 Menstrual Hygiene Management Practices of Girls in East Africa

Within East Africa, there is a growing body of research surrounding the MHM practices of school-aged girls (Hennegan et al., 2016); (Boosey et al., 2014); (Jewitt et al., 2014); (Isano et al., 2022). The access and availability of MHM products vary regionally, with girls in urban areas in Rwanda having greater access to a variety of MHM products than girls in rural areas (SHE, 2021). In a study of adolescent girls in rural northern Rwanda, 91% of girls reported ever using reusable and disposable sanitary pads during menstruation, as well as cloth (19%) and newspaper or tissue paper (0.7%) (Isano et al., 2022). In rural Uganda, it was found that girls primarily used reusable pads (32%), followed by cloth (19%), just their underwear (13%), disposable pads (8%), toilet paper (7%), cotton wool (7%), or mattresses and other materials from the home (5%) (Hennegan et al., 2016). Another study among Ugandan school girls found cloth to be the most commonly used absorptive material, followed by purchased sanitary pads,

toilet paper, and cotton (Boosey et al., 2014). In western Kenya, girls reported using reusable sanitary pads (24%), cloth (24%), toilet paper (8%), cotton wool (7.7%), mattress or blanket (7.8%) (Wilson et al., 2014).

Natural materials are sometimes used for the absorption of menstrual discharge by adolescent girls in East Africa. In some areas, girls have reported using cotton wool, cow dung, goat skins, ash, leaves, or bark from trees to absorb their menstrual blood (Tamiru et al., 2015). These products may introduce unsafe bacteria or agents into the vaginal or urinary tract, increasing the risk of reproductive or urinary tract infections (Smith et al., 2020). Qualitative studies have found that girls who use goat skins or other natural materials for MHM are concerned about leaking and staining their clothes, not being able to change their products at school, and not having discrete locations to dispose of their used products (Tamiru et al., 2015). In some Ugandan and Tanzanian communities where girls do not have access to commercial MHM products, menstruating girls squat over a hole they have dug for the duration of their periods, which prevents girls from attending school, social activities, or engaging in household chores (Tamiru et al., 2015).

Materials that are inserted vaginally, such as tampons and menstrual cups, are used less frequently than non-inserted products throughout East Africa, though some NGOs are promoting them as more sustainable or sanitary methods for managing menstrual health (Mason et al., 2015). Made of silicone or other synthetic materials, menstrual cups are malleable cups that are inserted vaginally and are used to catch menstrual blood (Mason et al., 2015). They must be removed and rinsed with clean water every 4-12 hours throughout the menstrual cycle to remove any residual menstrual fluid left on the cup after use (Mason et al., 2015). At the end of a girl's menstrual cycle, the cup must be emptied and boiled to kill any remaining bacteria on the cup (Mason et al., 2015).

In rural areas, inserted products are less common than in urban areas due to their high cost, lack of availability, or the social belief that the inserted products take a girl's virginity (Hennegan et al., 2016); (Boosey et al., 2014). These materials may be found in urban communities, though girls in both urban and rural locations have reported being afraid of the anticipated pain caused by inserting materials vaginally (Hennegan et al., 2016). Some interventions that provided tampons or menstrual cups coupled with education about their proper use garnered social acceptance of the products over time, though others found that they would not be culturally appropriate regardless of the provision of educational interventions (Shannon et al., 2021). Additionally, if girls do not have access to clean water and private facilities to empty and clean their cups, they are at risk of acquiring a reproductive tract infection (RTI) (Mason et al., 2015).

The use of hormonal contraceptives to regulate or reduce menstruation is uncommon in East Africa due to a worry that contraceptives that disrupt menstrual flow could permanently interfere with a woman's ability to bear children (Sedgh et al., 2016). Girls and unmarried women were also concerned that seeking contraceptives would imply that they were sexually active,

warranting unwanted social stigma associated with premarital sex (Sedgh et al., 2016).

To acquire MHM products, some girls engage in transactional sex to raise funds for sanitary supplies (Phillips-Howard et al., 2015); (Oruko et al., 2015). This puts girls at high risk of acquiring sexually transmitted diseases, becoming pregnant, experiencing domestic violence, or dropping out of school (Phillips-Howard et al., 2015). These outcomes have their own associated cost, as they can lead to long-term illness, poverty, or exclusion from economic activity (Phillips-Howard et al., 2015); (Oruko et al., 2015).

2.2.3 Role of Parents and Grandparents in Menstrual Hygiene Management

Parents of school-aged girls in East Africa play a critical role in MHM as sexual reproductive health (SRH) educators, providers of MHM supplies, and protectors for their daughter's wellbeing as they menstruate (Miiro et al., 2018). However, there is no uniformity in the role of a parent in their child's menstrual health as there is great variation in the culture surrounding MHM throughout East Africa (Kamangu et al., 2017); (Coast et al., 2019). In rural Uganda, mothers are cited as the primary SRH educators for their daughters, as menstruation is viewed as an issue that should be kept within the female community by both men and women (Miiro et al., 2018). Dissimilarly, the responsibility of SRH education is assumed by grandmothers in Western Kenya, as mother-daughter communication about MHM is considered inappropriate once a girl reaches sexual maturity (Jewitt et al., 2014); (Miiro et al., 2018). Women in Tanzania have reported hesitancy towards discussing SRH with their daughters, noting that "in our culture discussing sexual matters is rare. Everybody is shy about it. These cultures, taboos, and traditions are passing from generation to generation" (Kamangu et al., 2017).

Although cultural taboos surrounding MHM persist throughout the region, parents and guardians do help their menstruating children throughout East Africa (Coast et al., 2019); (Kamangu et al., 2017); (Miiro et al., 2018). Mothers offer this support by teaching daughters how to use menstrual products, protecting daughters from the stigma of male family members, or washing their daughters' clothes when their menstrual blood leaks (Shannon et al., 2021). Some mothers in East Africa purchase MHM products for their daughters or give their daughters money to buy supplies, such as pads, pain-relieving medications, or soap for self-cleaning (Shannon et al., 2021). In households in which parents were not supportive of their menstruating daughters, some girls in Uganda reported saving bits of soap after washing the family's laundry to wash their own menstrual clothes privately (Boosey et al., 2014). In a study of MHM practices in Western Kenya, some parents encouraged their daughters to obtain MHM supplies from their boyfriends or friends since they could not afford the products themselves (Oruku et al., 2015).

Studying the intergenerational transfer of SRH and MHM knowledge, studies in Rwanda have found that 81% of parents or guardians do not discuss reproductive health with their children (Bushaija et al., 2013).The parents attributed this hesitancy towards discussing personal health with their children to their self-perceived difficulty of mentioning biological terms in

Kinyarwanda (39%), a personal lack of knowledge about SRH and MHM topics (55%), and cultural taboos about sexuality (31%) (Bushaija et al., 2013). Parents are less likely to educate their children about reproductive health if they are over the age of 40, have not received education beyond primary school, are male, or work in a lower-income profession, such as farming or herding (Bushaija et al., 2013). One Rwandan mother noted, "In ancient times, parents used to sit and talk to the children. They used to tell them what might happen (with menarche). Nowadays, it is rare to see parents talking to their children" (Coast et al., 2019). Without comprehensive education from parents or caregivers, girls may experience fear or confusion when they first menstruate (Sumpter et al., 2013); (Coast et al., 2019). (Shannon et al., 2021).

2.2.4 Role of Teachers in Menstrual Hygiene Management

Teachers can play an important role in the MHM of adolescent girls by providing educational resources, social support, and MHM products to menstruating students (Boosey et al., 2014); (Miiro et al., 2018); (Shannon et al., 2021). In qualitative accounts of the relationship between teachers and menstruating students, it was often reported that female and male teachers play different roles in MHM in East Africa (Miiro et al., 2018). Female teachers were reported to be primarily supportive of menstruating students, whereas male teachers expressed attitudes ranging from ambivalence to condescension towards menstruating students (Miiro et al., 2018); (Shannon et al., 2021). In an examination of the role of teachers in MHM throughout East Africa, male teachers often lacked information about the process of menstruation and its management, citing it as a "female issue" that did not concern them (Boosey et al., 2014). Male teachers sometimes contributed to the stigma surrounding menstruation by verbally harassing students, beating them for bleeding on chairs or their uniforms, or publicly shaming them in front of the class (Miiro et al., 2018); (Sommer et al., 2021).

The role of female teachers in a student's experience of menstruation varies (Hennegan et al., 2019); (Sommer et al., 2010); (Miiro et al., 2018). In a systematic review of girls' experiences of menstruation in low and middle income countries (LMICs), researchers found that female teachers often serve as the primary advocate for their menstruating student's needs, such as private restroom facilities, sanitary products, or discretion if they bleed through their clothing (Hennegan et al., 2019). In a survey of adolescent girls and teachers in rural Uganda, female teachers who lived close to the school reported that they would let menstruating girls go to their homes to wash their bodies and clothes after the girls' menstrual products leaked (Miiro et al., 2018). However, support from female teachers is not unanimous for female students, as qualitative accounts from girls in East Africa have also found that both female and male teachers instigate feelings of shame surrounding menstruation (Miiro et al., 2018); (Sommer et al., 2010).

2.3 Factors Impacting Menstrual Hygiene Management in East Africa

2.3.1 Financial

In Rwanda, the most commonly used disposable pads range from 1000-1200 RWF ($1.00-$1.43 USD) for a pack of ten, a price point that is often unaffordable for girls, especially in rural settings (Murekezi et al., 2018). Reusable cloth pads are sold for 2000-4000 RWF ($2.00-4.00 USD) in Rwanda and can last over 12 months if properly cared for (Murekezi et al., 2018). Recently, the Rwandan-based NGO Sustainable Health Enterprises began to produce biodegradable pads and sell them in rural areas for 700 RWF ($0.67 USD) for a pack of ten (Murekezi et al., 2018). While these single-use products are less economically and environmentally sustainable than reusable pads, they do not require the same water, sanitation, and hygiene (WASH) infrastructure to maintain. Additionally, reusable pads require soap, which can be costly over time, or water, which girls may be required to fetch, taking time away from their studies or household responsibilities (Lumutenga et al., 2017). Leading interventions to reduce the cost of MHM products, researchers in East Africa taught girls how to sew their own reusable pads out of readily available materials, reducing the cost of menstruation and providing girls in remote communities with access to MHM products (Wilson et al., 2014).

While menstrual cups can last for up to ten years if properly cared for, they have a high initial price point of 24,000-31,000 RWF ($22-30 USD), making them financially inaccessible to many school-aged girls (Shannon et al., 2021). Menstrual cups do not require soap or hang-drying after washing, lowering their comprehensive economic cost and reducing the social stigma associated with their maintenance (Shannon et al., 2021). Menstrual cups are mostly found in urban settings, though efforts on behalf of NGOs to provide girls with economically sustainable and discrete MHM products are making them increasingly common in rural East African communities (Mason et al., 2015).

On the other end of the financial spectrum, natural absorptive materials, like goat skin, ash, or cow dung are usually free and predominantly used by girls in either extremely remote or low income communities (Tamiru et al., 2015).

2.3.2 Water, Sanitation, and Hygiene (WASH)

Safe and adequate WASH facilities and resources at schools are integral to the health of school-aged children since unsafe WASH conditions put girls at risk of developing reproductive tract infections (RTIs), missing school due to menstruation-related shame, or acquiring a secondary diarrheal infection due to poor hygiene (IHME, 2015). In the context of MHM, WASH facilities are private and safe places to wash one's body and MHM products, change and dispose of MHM products, and change clothing (Morgan et al., 2017). WASH products include accessible clean water, soap, and sanitary waste disposal facilities (WHO, 2018); (Shannon et al., 2021).

Access to WASH facilities at schools varies greatly throughout Eastern Africa (Morgan et al., 2017). A study of 2208 rural schools in Rwanda, Ethiopia, Kenya, Mozambique, Uganda, and Zambia found that fewer than 23% of rural schools in the countries had clean water on site, fewer than 25% of schools had enough sanitation facilities to accommodate the student body, and fewer than 20% had private changing or washing facilities for menstrual hygiene (Morgan et al., 2017). Although few schools had access to clean water on campus, the proportion of schools with access to water sources within walking distance of the campus varied greatly (Ethiopia: 78%, Kenya: 44%, Uganda: 33%, Rwanda: 24%. Mozambique: 3%) (Morgan et al., 2017).

Of the 468 rural schools surveyed in Rwanda, a higher proportion had access to improved sanitation facilities on campus (68%) or within walking distance of campus (20%) compared to the regional average (47%, 17%) (Morgan et al., 2017). Among these 468 schools, 76% of schools had access to improved and safe water sources (Morgan et al., 2017). In Rwanda, 35% of surveyed schools met the World Health Organization's guidelines for handwashing facilities and improved sanitation facilities on site (Morgan et al., 2017). Of the surveyed parameters of MHM WASH facilities in Rwandan schools, it was found that 95% had separate-sex bathrooms, 38% of bathrooms had a door, and 39% had a waste disposal bin (Morgan et al., 2017). Beyond Morgan et al.'s study, there is little research specifically into MHM WASH facilities at schools in Rwanda, leaving a gap in the literature pertaining to the physical infrastructure that supports safe MHM in Rwanda.

Girls' MHM practices are influenced by their WASH environment at home and at school (Oduor et al., 2015); (Hennegan et al., 2016). In a study of MHM WASH practices in rural Western Kenyan schools, researchers found that while changing the material used to absorb menstrual fluid, 51% of girls dropped their material onto the floor of the latrine (Oduor et al., 2015). Of these girls, 24% reported brushing off their absorptive material and reusing it and 6% gave it to someone else for use (Oduor et al., 2015). In qualitative responses, girls reported they dropped their absorptive material while in the latrine because they felt rushed to return to class, they had to use one hand to hold the latrine door closed, or they were surprised when another girl entered the latrine without permission (Oduor et al., 2015).

2.3.3 Social Stigma

Stigma can be impinged by external social forces, like families or communities, or by internalized narratives of shame or self-doubt (Holland et al., 2020). In a mixed methods study of four East African countries, 68% of women and girls reported experiencing social stigma and shame surrounding menstruation, noting that this stigma directly challenged their ability to safely manage their menstrual hygiene (Bobel et al., 2020). Stigmatizing or ignoring menstruation can contribute to the practice of unsafe MHM that may lead to infection, poor sexual and reproductive health, or lost educational or occupational opportunity (Girod et al., 2017). In some regions in Southern and Eastern Africa, women are thought to pollute their environment with menstrual blood and are required to stay home during their menstrual cycle to protect harvests,

water sources, and their community (Scorgie et al., 2015). This stigma also limits the intergenerational sharing of knowledge about MHM and sexual reproductive health (Bobel et al., 2020). In Uganda, mothers reported feeling uncomfortable discussing menstruation with their daughters so they did not approach the subject, leaving many girls unknowing of the causes of menstruation and how to manage the process hygienically (Bobel et al., 2020).

The social stigma associated with menstruation is particularly apparent in schools in East African countries (Hennegan et al., 2016); (Sommer et al., 2010); (Sommer et al., 2015). In an examination of the relationship between menstruation and shame in East Africa, researchers observed frequent reports of students experiencing shame when they had to carry their soiled pads throughout the school day or transport them home from school (Sommer et al., 2015). Girls further reported worries that their reusable pads would fall out of their underwear or not sufficiently absorb their menstrual blood, causing leakage onto their clothing and public embarrassment (Sommer et al., 2015); (Mason et al., 2015). In Uganda, school-aged girls reported supporting each other during menstruation by sharing MHM products, covering the skirts of their friends when leakage occured, or helping their friends wash blood stains out of their clothing at school (Hennegan et al., 2016). This support is protective against bullying in school, especially by boys in their class or community (Hennegan et al., 2016). Commenting on the shame associated with MHM at school, one Ugandan school girl noted, “The boys laugh at us, when you soil your uniform and you aren’t aware. Instead of them letting you know, they call their friends to tell them how you have soiled your uniform” (Miiro et al., 2018). This stigma can deter girls from attending class while they are menstruating, making it challenging for girls to equitably engage in the social and academic benefits of school (Miiro et al., 2018).

2.4 Consequences of Poor Menstrual Hygiene Management in East Africa

2.4.1 Biomedical

Girls may experience medical challenges during menstruation or as a result of MHM, including pain or urogenital infection (Sumpter et al., 2013); (Nabwera et al., 2021). In a systematic review of the health consequences of MHM, researchers found that female students who reported experiencing moderate to severe pain during menstruation are 30% more likely to be absent or disengaged during class, 64% more likely to not participate in social activities, and 21% more likely to be uncomfortable performing household chores (Sumpter et al., 2013). Among school-aged girls in Uganda and Rwanda, the most common physical complaints during menstruation were abdominal and back pain (Miiro et al., 2018); (Isano et al., 2022). This relationship makes the provision of pain medication to adolescent girls an important part of MHM (Kerubo et al., 2016).

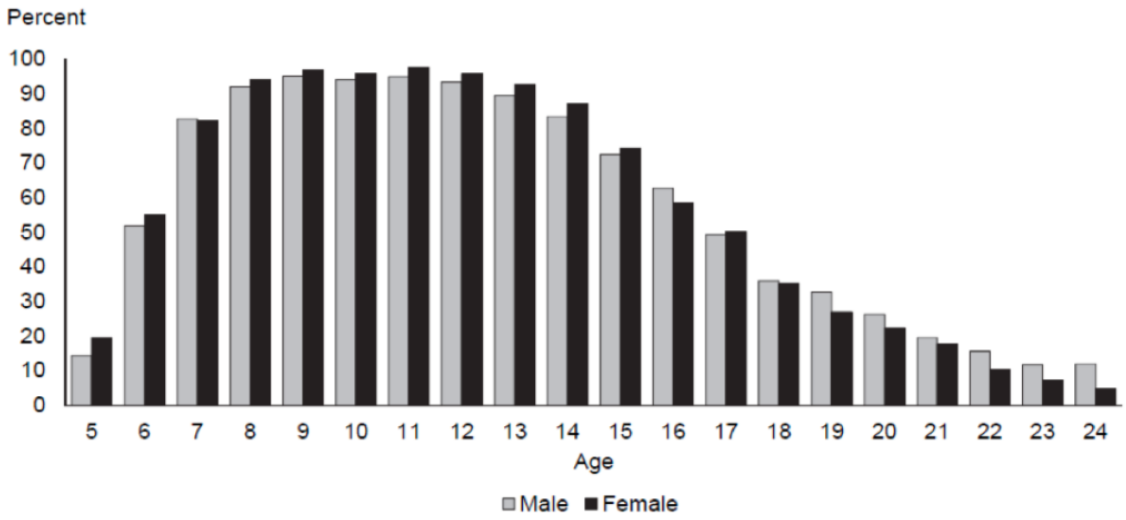
Women and girls are at risk of developing RTIs, urinary tract infections (UTIs), bacterial vaginosis, or vulvovaginal candidiasis as a result of their MHM practices (Sumpter et al., 2013); (Nabwera et al., 2021). These infections can be introduced into the urogenital area through improper hygiene during menstruation and possibly materials used for blood absorption (Sumpter et al., 2013). If menstrual clothes, reusable pads, or menstrual cups are not properly washed and dried between uses, they can facilitate the growth of fungus or bacteria in the genital area (Das et al., 2015). In a study of the reproductive health of rural school girls in Western Kenya, the most prevalent infections were Bacterial vaginosis (18%), *Candida albicans* (9%), *Chlamydia trachomatis* (3%), *Trichomonas vaginalis* (3%), and *Neisseria gonorrhoeae* (1%) (Kerubo et al., 2016). These infections put women at a two to six-fold increased risk for developing long-term adverse health consequences, including ectopic pregnancy, infertility, cervical cancer, infant and fetal health complications, pelvic inflammatory disease, and acquiring HIV/AIDS (Ali et al., 2007); (Sumpter et al., 2013); (Sommer et al., 2015); (WHO, 2013). Infections caused by poor MHM can also contribute to urogenital itching, abnormal discharge, and unpleasant odors, putting women at risk of experiencing discomfort or social stigma (Hennegan et al., 2016).

A study of schoolgirls in Kenya found that 28% of girls had at least one RTI, with the risk of infection increasing linearly with age (Kerubo et al., 2016). The risk for symptoms associated with infection, such as vulvovaginal itching or abnormal discharge, is also correlated with the type of sanitary product girls use (Murekezi et al., 2019). In a study of RTIs among school girls in rural Western Rwanda, girls who “always” used disposable sanitary pads during menstruation were 65% less likely to have vulvovaginal symptoms as compared to girls who “never” used disposable pads (Murekezi et al., 2019). Though these infections are easily treatable through topical antifungal creams, oral antibiotics, antifungal medications, and behavioral changes, girls in low income or remote settings may not have access to necessary treatment (Kerubo et al., 2016).

There is presently little research about the relationship among MHM, WASH, and reproductive health that is specific to the context of Rwandan girls (Murekezi et al., 2019). Further information is necessary to understand the prevalence of vaginal and reproductive tract infections among Rwandan school girls and their relationship with environmental and social factors.

2.4.2 Menstruation-Related School Absenteeism and Dropout

Missing school as a result of menstruation impedes a girl's ability to engage in social and academic activities that are critical to development (Grant et al., 2013). Girls may be absent from school during menstruation due to a lack of MHM products or WASH facilities on campus, a fear of social stigma or harassment from teachers and other students, or pain due to menstrual cramps (Oruko et al., 2015); (Jewitt & Ryley, 2014). Among school-aged girls in Rwanda, school attendance declines by approximately 13% after age every school year beginning after age 12, which correlates with the time at which most girls experience menarche (NISR, 2012); (MINEDUC, 2018).



Source: NISR et al. (2016)

Figure 1. School enrollment as a proportion of the total youth population in Rwanda (NISR et al., 2016)

In Rwanda, 22% of girls reported missing school during their last menstrual period, with 76% of students attributing their absence to physical discomfort, 40% reporting a lack of proper MHM products, and 24% for fear of teasing or menstrual leakage (Isano et al., 2022). Another study found that 78% of rural Rwandan girls missed 1-2 days of class during their last menstrual cycle (Murekezi et al., 2018). Similarly, in a study of Ugandan school girls, 28% reported missing at least one day of school during their last menstrual cycle, while 7% reported missing school on non-menstruation days (Miiro et al., 2018). Miiro found that both female and male students

reported missing 1-2 days of school per month, though female students attributed this absenteeism to menstruation, while male students attributed it to a lack of school fees (Miiro et al., 2018). While 34% of girls in rural Malawi missed school during menstruation, cohabitating with a grandmother and spending more time on school work reduced the odds of school absenteeism while menstruating by 24% (Grant et al., 2013). Beyond missing school, girls in Rwanda also reported not participating in sporting events, social activities, and church/worship services as a result of menstruation (Isano et al., 2022).

In schools with inadequate WASH facilities in East Africa, rates of school absenteeism were significantly higher among post-menarche girls than in schools with adequate WASH facilities (Sommer et al., 2016). Girls in East and Southern Africa cited the lack of private changing and cleaning facilities at school as the primary reason for not attending school during menstruation, followed by insufficient clean water and soap to wash their bodies (Sommer et al., 2016).

Chronic school absenteeism may lead girls to drop out of school (Secor-Turner, 2016). In a study of adolescent girls and their teachers in Tanzania, 24% of teachers and 44% of students agreed that menstruation was the leading cause of school dropout (Tamiru et al., 2015). A qualitative study of secondary school girls in Western Kenya found menstruation to be a common cause of dropout, with one girl noting, "(menstruating) can lead to dropout because each and every time you absent yourself from school, your performance will be poor and you will decide to drop out of school" (Oruko et al., 2015). Dropping out of school puts girls at risk of unwanted pregnancy, decreased workforce participation, and gender-based violence (Wynne, 2022).

2.4.3 Menstrual Hygiene Management as a One Health Issue

One Health (OH) is the "collaborative, multisectoral, and transdisciplinary approach with the goal of achieving optimal health outcomes by recognizing the interconnection between people, animals, plants, and their shared environment" (CDC, 2022). Though there is little in the body of scientific literature that characterizes MHM as an OH issue, the ways in which girls and women manage their menstrual health have the potential to greatly impact the environment and the animals which live in it (Elledge et al., 2018). In LMICs, women generate an average of 44,254 cm3 of sanitary pad waste per year (Truyens et al., 2013). Within LMICS, this waste, as well as other menstrual hygiene products, is primarily disposed of in pit latrines or toilets, through burning or incineration, or by burying the waste in dug pits (Truyens et al., 2013); (Elledge et al., 2018). These disposal techniques can threaten the health of the environment through the introduction of hazardous biowaste into soil, air, and water (Truyens et al., 2013); (Elledge et al., 2018).

Pit latrines are designed to allow organic material to naturally decompose over time, a process that is disrupted when inorganic materials, like sanitary products, are introduced into the waste management system (Truyens et al., 2013). Plastics used in the production of sanitary products take up to 100 years to degrade, causing the accumulation of biowaste over time (Olsson &

Larson, 2014). When pit latrines are emptied with vacuums, sanitary pads can damage the machinery, which may be difficult to repair in limited resource settings (Elledge et al., 2018). Similarly, flushing sanitary products into toilets can break or clog sewage infrastructure, potentially leading to the spillage of raw sewage into the environment (Elledge et al., 2018). Soil, water, and air systems can be further contaminated by menstrual waste through disposal in dug pits (Robinson et al., 2021). Accounts of scavenging animals consuming sanitary products or removing the waste from waste pits and distributing it throughout the environment highlight the health impacts of menstruation on both animals and the environment, as the *E. coli* strains found in menstrual discharge may be pathogenic for exposed humans or animals (Robinson et al., 2021); (Khan et al., 2018); (Scott et al., 2013).

Most manufactured disposable sanitary products that are sold in East Africa are made of a combination of bleached cotton, polymeric plastics, and adhesive agents (Olsson & Larson, 2014). Growing cotton is highly water and fertilizer intensive, and accounts for 11% of the world's agrochemical use and 25% of the world's pesticide use (Olsson & Larson, 2014). These chemicals contaminate the effluent water used to process and bleach cotton with potentially carcinogenic compounds, including surfactants, alkalis, and inorganic salt agents (Khatri et al., 2015). The bioaccumulation of these compounds through continued exposure is toxic to humans and animals, creating a health concern for ecosystems and communities surrounding production facilities (McWilliams et al., 2002). Furthermore, the production of the thermoplastic and elastomeric polymers used in disposable sanitary products requires crude oil and natural gas, compounds that are linked to the hastening of the progression of climate change (Johanneson et al., 2013).

Burning plastic-containing sanitary pads can pollute the air with chemicals that have a mutagenic effect on cells in the respiratory system if inhaled (Alabi et al., 2019); (Scott et al., 2013); (Roxburgh et al., 2020). Sanitary pad incinerators remove most hazardous compounds released by the burning of plastic out of the air, though their filters require frequent changing and maintenance to be fully effective (Alabi et al., 2019). If properly maintained, sanitary pad incinerators present a cost-effective, sustainable method of disposal for MHM waste (Alabi et al., 2019).

2.5 Knowledge Gaps and Statement of Purpose

2.5.1 Research Priorities and Gaps in Rwanda

The Republic of Rwanda has asserted that free, compulsory, and basic education is a right for every child in Rwanda (Gender Monitoring Office, 2019). The Rwandan Ministry of Education (MINEDUC) seeks to assess the impacts of menstruation and its management on school enrollment rates among girls (MINEDUC, 2017). Presently, MINEDUC lacks clear data about the potential impact of providing MHM and WASH facilities and resources on school absenteeism (Tessema et al., 2021). The Republic of Rwanda requires context-specific, comprehensive, and scientifically rigorous data to inform interventions to promote the safe and dignified MHM of Rwandan school girls.

The present body of research includes qualitative accounts of girl's experiences with MHM and quantitative reports of their perceptions and practices surrounding MHM, though it does not describe the economic and social costs of menstruation (Murekezi et al., 2018); (Coast et al., 2019); (Isano et al., 2021). Additionally, further research is required to understand the costs of menstruation-related school absenteeism among menstruating Rwandan girls, as school absenteeism and dropout limits women's personal and economic security over the course of their lifetimes (Miiro et al., 2018).

2.5.2 Justification of Study

There is a growing movement to contextualize MHM not solely as a hygiene issue, but as a human rights issue (WHO, 2022). By characterizing MHM as a human rights issue, stakeholders are encouraged to expand their efforts in supporting safe and affordable MHM beyond solely providing WASH resources and affordable absorptive materials, but to also include the restructuring of the social, political, and economic climate that shapes a girls' experience of menstruation (Thomson et al., 2019). The World Health Organization recently proposed an international call to action to ensure people who menstruate have "access to information and education about menstruation; the menstrual products they need; water, sanitation, and disposal facilities; competent and empathic care when needed; to live, study and work in an environment in which menstruation is seen as positive and healthy not something to be ashamed of; and to fully participate in work and social activities" (WHO, 2022).

Presently, the Republic of Rwanda, NGOs, Intergovernmental Organizations (IOs), and nonprofits are working to improve the safety and affordability of MHM for school girls in Rwanda (UNFPA, 2022). Organizations such as Sustainable Health Enterprises (SHE), Kasha, Imbere Heza, and the Imbuto Foundation strive to educate Rwandan youth about SRH and MHM (SHE, 2021); (KASHA, 2022); (Uwezo Youth, 2021); (Imbuto, 2021). These programs train volunteers or employees to visit communities to provide educational workshops throughout Rwanda, with the goal of addressing period poverty, or the "lack of access to menstrual products, hygiene facilities, waste management, and education, which can cause physical, mental, and

emotional challenges" (Michel et al., 2022); (UNFPA, 2022). Additionally, organizations have worked to establish MHM rooms in schools, engage youth in peer SRH education platforms, and develop policies targeting adolescent SRH (UNFPA, 2022). In 2019, Rwanda removed the Value Added Taxes on sanitary products in accordance with guidance from the East African Legislative assembly and local SRH NGOs (Isimbi, 2020). However, there has been little research to monitor the outcomes of these interventions in alleviating period poverty (Murekezi, 2018). SRH advocates still cite the unaffordability and inaccessibility of MHM products throughout the country, especially in rural areas (UNFPA, 2022).

To further Rwanda's commitment to protecting its citizens' human rights, it is necessary to grow the body of evidence-based scientific literature pertaining to MHM in order to develop interventions and policies that protect the full academic, economic, and social engagement of girls. To support this effort, this study seeks to describe the practices and perceptions, financial costs, and environmental factors that shape the experience of menstruation for school-aged girls. This research not only sought to benefit Rwandan school girls, but all stakeholders who are engaged in MHM/SRH in Rwanda to support their development of policies, interventions, and services with evidence-based research.

2.5.3 Problem Statement

There is limited knowledge about the different perceptions, practices, financial burden, and environmental factors that shape MHM among public, government aided, and private Lower Secondary School girls in Rwanda.

2.5.4 Broad Objective

Describe the perceptions, practices, financial burden, and environmental factors that influence the experiences of menstruation for public, government aided, and private Lower Secondary School girls in Rwanda in 2022.

2.5.5 Specific Objectives

1. Describe perceptions and practices of Rwandan LSS2 and LSS3 girls about MHM in 2022 at public, government-aided, and private schools in 2022.
2. Calculate financial costs of MHM practices for Rwandan LSS2 and LSS3 girls at public, government-aided, and private schools in 2022.
3. Describe MHM WASH facilities and resources at Rwandan LSS in 2022 at public, government-aided, and private schools in 2022.

CHAPTER THREE: METHODS

3.1 Setting

Located in East Africa, Rwanda is a densely-populated low income country with a population of approximately 13 million people (Clay et al., 2021). In Rwanda, there are three primary types of schools, including public, government aided, and private. Public schools are funded entirely by the government and tend to have lower income students (MINEDUC, 2018). Government-aided schools are funded by the government, the student's family, and collective community associations, and have primarily low to middle income students (MINEDUC, 2018). At private schools in Rwanda, tuition is paid in full by the student's family, and most students come from middle to high income households (MINEDUC, 2018). These schools are both day and boarding schools, as well as single-sex and coeducational. Lower Secondary Schools (LSS) typically have students ages 12-15 years old and may be combined with Senior Secondary Schools (SSS), which typically have students ages 15-18 years old. In 2018, there were a total of 1,728 Secondary Schools in Rwanda, including 522 public schools, 892 government aided schools, and 314 private schools (MINEDUC, 2018). Public and government aided schools have approximately 400 enrolled students per school, while private schools have approximately 250 enrolled students per school (MINEDUC, 2018). The majority of these students speak Kinyarwanda fluently and have varying degrees of English language skills.

3.2 Study Design

This was a quantitative cross-sectional study, consisting of a quantitative survey administered to study participants, a descriptive WASH checklist completed by the research team, and photographs of WASH facilities at schools to provide context to the researcher's observations.

3.3 Sampling and Sample Size

This study was conducted at 15 LSS in the five provinces of Rwanda. Surveys were conducted at the three school types in each province (public, government aided, and private) to collect data from students of wide-ranging socioeconomic backgrounds. Schools were randomly selected through stratified random sampling from a 2016 MINEDUC list of all LSS in Rwanda. The study team member randomized schools and selected one school of each type in each province, for a total of fifteen schools.

The target population for the study were Rwandan girls in LSS2 and LSS3 who were enrolled in school. The study did not include girls in LSS1 because a smaller proportion of the mostly 11-13 year-old population would have reached menarche at the time of the survey (MINEDUC, 2022). Most LSS students are between the ages of 12-15 years old, though range in age between 11-21 years old due to a nationwide school-year repetition rate of 10.6% in Secondary School (MINEDUC, 2022). By the time girls reach Senior Secondary School (SSS), approximately 29% of students have permanently dropped out of school (MINEDUC, 2019). Therefore, LSSs have a

more representative sample of all menstruating Rwandan girls than SSSs (MINEDUC, 2019).

To calculate the target sample size, we used the following formula:

$$n = \frac{z^2 \times \hat{p}(1-\hat{p})}{\varepsilon^2}$$

$$n = \frac{1.96^2 \times 0.5(1-0.5)}{0.05^2} = 384.16$$

Figure 2. Target sample size calculation

Table 1. Target sample size calculation variables

Variable	Parameter	Value
n	Sample Size	
z	Z-Score (95%) Confidence Interval	1.96
$\hat{p}$	Response Distribution	0.5
ε	Margin of Error	0.05

To reach the sample size of 384 participants, at each randomly selected school, all LSS2 and LSS3 girls were invited to participate in the quantitative study. Anticipating a participation rate of 80%, our target was to invite 480 students to participate in the study. We expected this lower participation rate because it was challenging to gain parental consent before the survey administration.

In 2018, there were 1,575 registered LSSs in Rwanda, with a total of 128,242 enrolled LSS2 and LSS3 girls (MINEDUC, 2019). The average class size in LSS is 33 pupils (MINEDUC, 2019). In LSS, 53% of enrolled students are female, while 47% are male (MINEDUC, 2019). With this data, we expected an average of 17 female students enrolled in each class. Sampling LSS2 and LSS3 students, we anticipated surveying 34 students per school.

Dividing 480 targeted students by 34 students per school required us to sample 15 schools. To meet the target sample size through data collection at 15 schools, we randomly selected one public, government aided, and private school in each of the five provinces (Northern, Southern, Eastern, Western, Kigali City).

Figure 3. Lower Secondary School site visit locations. Displays the locations of the 15 randomly selected schools visited in Rwanda. (Source: Vectorstock.com).

All eligible girls, regardless of whether or not they menstruated, were invited to participate in the quantitative survey to protect the privacy of their menstruation status. There were 31 girls who reported that they have never menstruated; their responses were excluded from the study since they could not respond to questions regarding their MHM practices. With this exclusion, the final sample size of the study was 1,117 girls.

3.4 Inclusion and Exclusion Criteria

Girls were recruited for the study at the 15 randomly selected schools. They were eligible to participate in the study if they:

1. Had written or oral comprehension of English or Kinyarwanda.
2. Were enrolled in a selected school.

3. Attended school on the day of the site visit.
4. Were enrolled in LSS2 or LSS3.
5. Had begun menstruating.

Girls at selected schools are ineligible to participate if they:

1. Did not have written or oral comprehension of English or Kinyarwanda.
2. Were not enrolled in the selected school.
3. Did not attend school on the day of the site visit.
4. Were enrolled in LSS1 or SSS4-7.
5. Had not begun menstruating.

Girls who did not meet these criteria were excluded. If a girl did not have written or oral comprehension of English or Kinyarwanda, she would have been excluded from participation in the survey since the survey has not been methodically translated into other languages.

3.5 Data Collection Method

Once a school was randomly selected from a directory of LSS in Rwanda, a study team member called or visited the Head of School to explain the study and request the Head of School's consent to conduct the study at the school. If administrators at a selected school were not responsive after three attempted calls on different days throughout a one-week period or if the Head of School was unwilling to allow students to participate, a study team member approached the next randomly selected school of the same type in the same province. If the Head of School did agree to participate in the study, the study team member established a date for the data collection visit.

At some schools in Rwanda, the Head of School was able to provide informed consent on behalf of the parents. At schools where the Head of School was not able or willing to provide consent on behalf of the parents, consent forms were delivered to the school at least two days before the site visit. During this delivery, the study was explained to the Head of School, and the consent forms were given to the students to be brought home to their parents.

Data were collected during a one-day site visit at each school. A quantitative survey was administered to students to analyze their practices, knowledge, financial and environmental factors pertaining to MHM. A quantitative WASH checklist completed by a research team member collected data about the WASH facilities and resources that were available on campus at the time of the site visit. With the permission of the Head of School, photographs of the WASH facilities were taken by the study team members to provide more context to the condition of the WASH resources on the campus.

On the day of the site visit, a team of at least two female UGHE researchers visited the school to administer a quantitative survey, complete a WASH checklist, and photograph WASH facilities. At least one of these team members spoke Kinyarwanda. The research team first met with the

Head of School to provide further information about the research study, answer any questions, and share the plan for the dissemination of the research.

The researchers then asked the Head of School to gather all female LSS2 and LSS3 students who had consent from their parents or the Head of School into a meeting space where they could have privacy from male students, other female students, and school staff. These meeting spaces included campus dining halls, classrooms, sports fields, and a church. During most of the site visits, a teachers or staff member was present for the survey administration. If this staff member was male, they would be asked to leave when it was time for the research team to answer the student's questions about MHM and SRH.

Once the students were gathered, the research team introduced themselves, the study, and its plan for dissemination. The researchers clearly stated that all participation in the study was voluntary, and if the students wanted to participate, they must provide signed assent on the consent forms. The students who completed the consent forms were then given a survey. They were asked to not discuss answers with each other but were invited to ask the researchers questions. If they asked the researchers the answers to knowledge-based questions, they were told to give their best guess as an answer.

Once the students completed the self-administered surveys, the surveys were collected by a research team member. The research team members checked the surveys for completion and clarity. If any answers were missing or unclearly filled out, the research team member invited the student to fill them in or clarify her answer. This research team member was responsible for keeping the surveys with her until returning them to a UGHE office, at which point the surveys were stored in a safe file cabinet or entered into the collection form. After the data was entered into the form, the paper surveys were stored in a secure file cabinet at UGHE.

If a student had been unable to read the survey due to visual impairment or an inability to read English and Kinyarwanda, a female Kinyarwanda-speaking data collector would have verbally administered the survey in a private location with the exact verbiage used in the survey and recorded the student's answers onto the paper survey tool. No students expressed a need for this service over the course of the study.

After the students filled out the survey, they were provided with small pieces of paper on which they were invited to anonymously write any questions about MHM and SRH. The data collection team answered these questions in English with Kinyarwanda translation. A study physician was available over the phone to answer any questions the data collection team was unable to answer. Students were also invited to share any reflections about the quantitative survey or their experiences with MHM. These conversations were not recorded or used for the purposes of data analysis.

Researchers requested permission to complete the WASH checklist and take photographs from the Head of School at the beginning of the site visit. During the site visit, a research team

member completed a brief checklist of available WASH materials at the school. This checklist included a review of the available WASH supplies in the bathroom, the privacy of the sanitation infrastructure, and the availability of an MHM room. The research team members took photographs of the WASH facilities and resources to verify the items on the checklist as raw data. **3.6 Data Collection Tools**

Quantitative Survey

The quantitative survey was developed to assess the experiences of LSS2 and LSS3 girls in Rwanda pertaining to MHM. The survey instrument was developed in 2020 by Rwandan, Burundian, Ugandan, and Canadian UGHE scientific researchers, and medical personnel for the specific use of this project. The survey instrument had 46 multiple choice questions with one open-ended short answer question. Questions assessing the financial costs of MHM allowed respondents to fill in blank answers about resources spent on MHM in Rwandan francs. The survey was developed in English, translated into Kinyarwanda by native speakers, and back-translated into English to ensure the accuracy of the translation. The survey was provided in both Kinyarwanda and English to ensure students had the most comprehensive understanding of the survey material. The survey was pre-tested with four female Rwandan UGHE medical and graduate students who provided feedback about the content and translation of the survey instrument.

Students at the selected schools filled out the quantitative survey anonymously on paper.

The quantitative survey includes five sections:

1. Demographics
2. Menstrual Knowledge
3. Menstrual Practices and Sanitary Product Use
4. Financial burden of MHM and Barriers of Access
5. Menstruation-related Absenteeism

WASH checklist and photographs

The environmental factors impacting MHM were also identified through the WASH checklist. The WASH checklist was developed by the student researcher and research team in 2022 to assess the WASH facilities and resources on campus. Miiro et al.'s WASH observation checklist was used as a reference when developing the WASH checklist.

The WASH checklist included:

1. The availability of soap, water, toilet paper, and waste disposal receptacles at the school.
2. The source of water.
3. The presence of an MHM room, the type of bathroom facility, and the separation of these

facilities by gender.

Photographs of WASH facilities expand upon the information gathered through the WASH checklist by providing the context of cleanliness, privacy, and availability of WASH resources.

3.7 Data collectors

Each data collection team had at least one Kinyarwanda speaker to facilitate the administration of surveys, answer questions posed by students, teachers, and Head of Schools, and provide translation for non-Kinyarwanda speaking research team members. The data collection team also had at least one health professional who was capable of factually answering questions about menstruation, MHM, and SRH. This team member was a physician or public health researcher with professional experience in MHM. Since MHM and SRH are sensitive topics within the Rwandan context, all research team members who conducted site visits were female to ensure female students felt as comfortable as possible discussing the topics openly. Before data collection visits, all research team members reviewed MHM literature within the East African context to ensure the information provided to students is culturally competent and factual.

A female data collector was hired to assist with administrative duties, coordination with school leadership, translation, and data collection and entry. She accompanied the research team on most site visits. This person was hired for four weeks throughout the data collection period and received training in the study protocols, confidentiality of data, and her role in facilitating administrative activities. A research team member reviewed expectations for coordinating with school leaders in a professional manner. This training was provided by the student researcher before the data collector began her work.

Two enumerators were hired for three weeks to enter the quantitative survey data. These enumerators were trained by a research team member to practice inputting the data from the surveys into a Google Form. The enumerators first watched a research team member enter two forms as she reviewed the steps of entry, then practiced inputting three surveys as the research team member watched and provided feedback. Once the research team member agreed that the enumerators could accurately enter the surveys, they were given surveys to enter independently. The enumerators were asked to translate any survey answers provided in Kinyarwanda into English as accurately as possible.

The data collector and enumerators were required to speak Kinyarwanda and English, be able to conduct themselves professionally and respectfully in all contexts, have excellent computer and Microsoft Office skills, and be able to balance many competing tasks at once. The data collector and enumerators were instructed that all information about the study must be kept private and not shared or discussed outside the research team. After they completed data entry, the enumerators were required to return all study data to the research team for safe storage. The data collectors and enumerators all signed a contract committing themselves to maintain the confidentiality of

the study data.

3.8 Data management

Each survey was assigned a study identification number. The surveys were free from any personally identifying information. Every computer that was used in processing the data was password-protected and only accessible by designated research team members. Data was not discussed outside of the context of the research project or with people who are not a part of the research team.

After a site visit, the data collector or a research team member entered the quantitative survey responses into a Google Form. The responses were exported into an Excel spreadsheet, which was downloaded and imported into SPSS (IBM v. 28.0.1.1) software.

The quantitative WASH checklist data was input into a separate Google Form. This data was compiled into an Excel spreadsheet and analyzed in MO Excel. The WASH photographs were uploaded to a secure MO One Drive folder. Once the WASH photographs were uploaded to the One Drive, they were deleted from the phone or camera used to take them.

Before the quantitative surveys were given to the enumerators for entry, a research team member randomly selected 12 surveys that were to be given to each enumerator and took pictures of every page of data. As the enumerators entered the surveys, the research team member would cross-reference the photographs with the data entered into the Google Form to ensure the enumerators were entering the data correctly. If any inconsistencies with the quality of data entry arose, the research team member addressed them promptly with the enumerator team and corrected them in the Google Form. These photos were stored on a password-protected mobile device and deleted immediately after the quality check was completed.

3.9 Measures

The following variables were measured with the quantitative survey and WASH checklist. Data was disaggregated by school type (public, government aided, and private) for each measure.

1. The most frequently used sanitary products during menstruation.
2. The annual cost of menstruation.
3. Days of absenteeism from school due to menstruation per year.
4. The presence of a MHM room at schools was reported descriptively.

3.10 Data analysis

The original quantitative survey data and WASH checklist data were saved on OneDrive as Excel spreadsheets and in SPSS to prevent data loss. Another copy of the data was used for analysis. The quantitative data from the survey and WASH checklist were analyzed descriptively on IBM SPSS Version 28.0.1.1. The photographs of WASH facilities and resources provide visual context to the physical setting of the schools, though were not formally analyzed for the purposes of this

project.

In Rwanda, school type is a significant indicator of a girls' Ubudehe category, her parent's occupation, and her parent's education level. When conducting the data analysis, variables were disaggregated by school type, as it serves as an informal proxy for a girls' socioeconomic status (SES) (MINEDUC, 2018).

For all categorical variables, a Pearson's Chi Square test of homogeneity was used to compare the frequencies by school type. For tables containing more than 20% of cell counts that are less than five, a Fisher's Exact test was performed. Fisher's Exact tests have more statistical power for comparing cells with small counts ($n<50$), though they have less statistical power than Pearson's Chi Square test when comparing cells with large counts ($n>50$) (Kim, 2017); (Bolboaca, et al., 2011). To use the test with the greatest statistical power for each analysis, either a Pearson's Chi Square test of homogeneity or a Fisher's Exact test was performed. Cell count was used to determine the appropriateness of a Pearson's Chi Square test of homogeneity or Fisher's Exact test for all subsequent statistical analyses throughout the report. Statistical significance was established with p-values less than 0.05.

Demographics

Demographic data was analyzed descriptively and reported with percentages and counts. Categorical variables were compared with Pearson's Chi Square test of homogeneity or Fisher's Exact test.

The mean and standard deviation were used to analyze continuous variables (age, age of menarche of participants).

Objective 1: Describe perceptions and practices of Rwandan LSS2 and LSS3 girls about MHM in 2022 at public, government-aided, and private schools in 2022.

Categorical data about MHM was reported descriptively with percentages and counts. Participants that did not respond were excluded from the statistical analysis because this study did not seek to compare whether or not a student responded to a question, but rather analyze the difference among responses. The frequency and count of "no response" was still reported for each question. Answers such as "unsure" and "I don't know" were still included in the statistical analysis because not knowing the answer to a question is indicative of a lack of knowledge, which is important to assess when designing evidence-based MHM interventions. Statistical significance was established with p-values less than 0.05.

For questions for which participants could select multiple categorical answers, including questions about MHM perceptions, practices, and preferences, data were reported with percentages and counts. A Pearson's Chi Square or Fisher's Exact test was conducted for each response type (ex. count of girls who selected that they frequently use sanitary pads vs. number

of girls who did not select that they frequently use sanitary pads) to test for the significance of the difference of response counts among school types.

The annual number of days of menstruation-related absenteeism from school and work were transformed into a categorical variable since many girls reported that they either do not work, did not miss school, or did not respond to the question. This data was disaggregated by school type and analyzed with a Pearson's Chi Square or Fisher's Exact test. Reasons for menstruation-related absenteeism were reported with percentages and counts and analyzed with a Pearson's Chi Square or Fisher's Exact test.

Objective 2: Calculate financial costs of MHM practices for Rwandan LSS2 and LSS3 girls at public, private, and government-aided schools in 2022.

All costs were calculated and reported in Rwandan francs. A one-sample Kolmogrov Smirnov test was conducted to test for the normality of data. This test found that the distribution of costs was non-parametric for each cost-related variable. The financial cost of MHM (including lowest, typical, and highest amount spent on MHM per cycle; cost of travel to purchase MHM products; and cost of additional MHM products) were reported with medians and interquartile ranges. These medians were disaggregated by school type. A Kruskal-Wallis test was used to compare the median cost of MHM by school type. Statistical significance was established with p-values less than 0.05.

To find the median cost of menstruation per menstrual cycle, the median of each of the variables pertaining to the average cost of menstruation was calculated. This included the cost of MHM products, the cost of additional products purchased during menstruation (ex. pain medications), and the cost of transport to access these products. It was estimated that girls menstruate approximately once a month, so the per-cycle cost of MHM was multiplied by 12 to calculate the annual cost of menstruation (Hillard, 2014).

Objective 3: Describe MHM WASH facilities and resources at Rwandan LSS in 2022 at public, private, and government-aided schools in 2022.

The presence of WASH facilities and products in schools gathered through the WASH checklist was reported with percentages and counts. This data was disaggregated by school type.

Categorical data gathered about access to WASH facilities and products gathered through the quantitative student survey was reported with percentages and counts and disaggregated by school type. Independent categorical variables were analyzed with a Pearson's Chi Square test of homogeneity or a Fisher's Exact test. Questions for which participants could select multiple answers were analyzed independently with a Pearson's Chi Square test of homogeneity or a Fisher's Exact test. Statistical significance was established for p-values less than 0.05.

3.11 Ethical Considerations

Vulnerable populations

This study was conducted at LSS schools in Rwanda with adolescent minors who are considered a vulnerable population. The research team first approached the Head of School of the school to propose a site visit and explain the purposes of the study. If the Head of School gave permission, the research team gained consent from the students' guardians before collecting site visit data. Guardians were informed that their consent to the participation of their children in the study was completely voluntary. Due to the vulnerability of this population, participation in the study was made explicitly voluntary and the recruitment process was free from coercion. The risk of psychosocial stress during the administration of the quantitative survey was low.

Assessment of risks to participants

There were no anticipated risks to participation in the study. The surveyed students did not give any biological or physical samples for the purposes of the study, eliminating the risk of bodily harm as a result of participation in the study. The research team strove to maintain a positive, supportive, and open attitude when interacting with the students to facilitate a comfortable environment throughout the duration of the site visit.

Assessment of benefits to participants

Schools, Head of Schools, teachers, and students were not financially compensated for their participation in the study. Students were provided with one sample sanitary pad after their participation in the study. Students may have benefited from the knowledge exchange that occured when the research team answered their questions about MHM and SRH.

Medical or psychosocial support

We did not find a need for medical or psychosocial support as a result of the study. After the completion of the quantitative survey, students were given the opportunity to share reflections from their participation in the study and ask any questions about MHM, menstruation, or the study.

Information and consent process

Before the research team met with students, two research team members visited the school to explain the study and its purposes to the Head of School. The research team members answered any questions about the study, explained the consent process, and made it clear that participation is voluntary. The research team members distributed parental consent to students. The consent and informational form was developed in English and will be provided in both Kinyarwanda and English. To participate in the study, students must gain their parent's signature on the consent form and provide their own signature of assent. In boarding schools that allow Head of Schools to consent on behalf of the parent, the research team sought consent from the Head of School.

Even if a student's parent, guardian, or Head of School consented to their participation, they were not required to participate in the study. We informed students that their participation was voluntary and did not have any impact on their academic or social standing. Students provided the signed assent to the research team before completing the study. The students were allowed to withdraw at any point throughout the study. Before the students were administered the quantitative survey, a research team member informed them that if they choose to withdraw, they could stop filling out the survey and write "Withdraw" or "Kuvamo" on the front page of their survey. They were permitted to remain in the classroom or leave the class for the duration of the survey administration.

Protection of privacy and confidentiality

To protect the privacy of student's responses to the quantitative survey, they were spaced as far apart as possible while taking the survey to limit their ability to see other participant's responses. The students were informed that their participation in the survey was not mandatory and they could skip any questions. The quantitative survey was filled out anonymously. Though data of non-menstruating students was excluded from study results, to protect the privacy of student's menstrual status, all LSS2 and LSS3 were allowed to participate in the study if they had their guardian's consent. Teachers and male students were not present in the room during the follow up conversation to ensure students can speak openly.

After the site visit was completed, survey responses were entered into the secure data collection platform on password protected laptops. The results from the WASH checklist were uploaded into a secure data collection platform. Photographs taken of WASH facilities and resources will be uploaded to a password-protected OneDrive folder. Only members of the research team have access to the uploaded data and photographs. The research team was instructed to not discuss study information with anyone who is not directly engaged with the study or divulge study results to any third party organizations before the completion of the study.

De-identification of data

Survey results, WASH checklist results, and WASH photographs were de-identified of student identity. Surveys do not contain any personally identifiable information. Each survey was referred to by its survey identification number throughout the data entry and analysis process. All results data will be aggregated before publication.

Safekeeping of data

Throughout the course of the study, only research team members had access to the raw study data. This group includes a physician, a One Health researcher, a Masters candidate, the data collector, and the enumerators.

After the quantitative surveys and WASH checklists were uploaded into the data aggregation

platforms, the hard copies will be stored in a locked file cabinet at UGHE for ten years. After ten years, the physical copies will be destroyed. Once the photographs of WASH facilities and resources are uploaded to the secure One Drive, they will be deleted from the device used to take them.

The students were allowed to withdraw at any point throughout the study. Before the students were administered the quantitative survey, a research team member informed them that if they choose to withdraw, they could stop filling out the survey and write “Withdraw” or “Kuvamo” on the front page of their survey. They were permitted to remain in the classroom or leave the class for the duration of the survey administration.

CHAPTER FOUR: RESULTS

4.1 Study participant characteristics

A total of 1,148 LSS2 and LSS3 girls were surveyed at 15 sample schools. The study excluded the survey results of 31 girls who self-reported they had not reached menarche at the time of the site visit, qualifying a total of 1,117 participants for inclusion in the study. Of the 1,117 study participants, 351 attended public school (31.4%), 543 attended a government aided school (48.6%), and 223 attended private school (20.0%) (Table 2). Ten of the participating schools were day schools (66.7%) and five were boarding schools (33.3%).

The mean age of study participants was 16.3 years old with self-reported ages ranging from 13-21 years old. Girls reported reaching menarche between the ages of 9-18, with the mean age of menarche occurring at 13.7 years old. Respondents self-identified as Christian (93.8%), Muslim (3.8%), and non-religious (0.8%) (Table 2). Among public, government aided, and private schools, there was a statistically significant difference in parental occupation and education level for both female and male guardians, with the parents of children at private schools having the highest level of education and income (p-value <0.001). The difference among Ubudehe categories was statistically significant (p-value <0.001), with the majority of respondents reporting they were in Ubudehe category 3 (57.2%) and category 2 (33.8%), and the remaining respondents falling into category 1 (8.1%) and category 4 (0.9%).

Students at public schools were more likely to come from lower income households, have less educated parents, and have parents who work in the agricultural sector (Table 2). Girls at government aided schools came from slightly wealthier homes, though their parents were less educated and more likely to be unemployed. Comparatively, girls at private schools came from households of higher socioeconomic status and had more educated parents who work for the government or owned their own businesses.

Table 2. Demographics of female Secondary School 2 and 3 study participants from fifteen schools in Rwanda, (N= 1117)[1] P-value calculated with Pearson's Chi Square test of homogeneity or Fisher's Exact test.

	Public (n= 351)	Government Aided (n= 543)	Private (n= 223)	Total (N=1117)	P-Value
	Count (%)				
Religion[2]					
Christian	336 (95.7)	504 (92.6)	209 (93.7)	1048 (93.8)	0.049*
Muslim	8 (2.3)	24 (4.4)	11 (4.9)	43 (3.8)	
None	2 (0.1)	5 (0.1)	2 (0.1)	9 (0.1)	
No response	4 (1.1)	10 (1.8)	1 (0.4)	15 (1.3)	
Ubudehe Category					
1	24 (6.8)	53 (9.8)	9 (4.0)	86 (8.1)	0.001*
2	145 (41.3)	170 (31.3)	45 (20.2)	360 (33.8)	
3	170 (48.4)	296 (54.5)	143 (64.1)	609 (57.2)	
4	2 (0.6)	4 (0.4)	6 (2.7)	10 (0.9)	
No response	10 (2.8)	22 (4.1)	20 (9.0)	52 (0.1)	
Father/Male guardian highest level of education					
No education	43 (12.3)	79 (14.5)	7 (3.1)	129 (11.5)	<0.001*
Primary	154 (43.9)	280 (51.6)	37 (16.5)	470 (42.1)	
Secondary	97 (27.6)	115 (21.2)	73 (32.7)	285 (25.5)	
University	26 (7.4)	29 (5.3)	85 (38.1)	140 (12.5)	
No response	29 (8.2)	40 (7.2)	21 (9.4)	90 (8.5)	
Mother/Female guardian highest level of education					
No education	40 (11.4)	90 (16.6)	19 (8.5)	149 (13.3)	<0.001*
Primary	179 (51)	283 (52.1)	38 (17)	500 (44.8)	
Secondary	88 (25.1)	124 (22.8)	84 (37.7)	296 (26.5)	
University	23 (6.6)	19 (3.5)	66 (29.5)	106 (9.5)	
No response	21 (5.7)	46 (8.6)	15 (6.7)	82 (7.3)	
Father/Male guardian's occupation					
Unemployed	44 (12.5)	116 (21.4)	30 (13.5)	190 (17.0)	<0.001*
Homemaker	20 (5.7)	17 (3.1)	5 (2.2)	42 (3.8)	
Farmer	161 (45.9)	220 (40.5)	17 (7.6)	398 (35.6)	
Government	32 (9.1)	20 (3.7)	45 (20.2)	97 (8.7)	
Teacher	6 (1.4)	10 (1.8)	5 (2.2)	20 (1.8)	
Self-employed	58 (16.5)	89(16.4)	93 (41.7)	240 (21.5)	
Deceased	12 (3.4)	35 (6.4)	2 (0.9)	49 (4.4)	
No response	12 (3.7)	19 (3.5)	11 (4.9)	43 (3.8)	
Mother/Female guardian's occupation[2]					

Unemployed	45 (12.8)	128 (23.6)	41 (18.4)	214 (19.2)	0.001*
Homemaker	19 (5.4)	55 (10.1)	7 (3.1)	81 (7.3)	
Farmer	199 (56.7)	248 (45.7)	19 (8.5)	466 (41.7)	
Government	8 (2.3)	6 (1.1)	16 (7.2)	30 (2.7)	
Teacher	9 (2.6)	10 (1.8)	11 (4.9)	30 (2.7)	
Self-employed	49 (14.0)	69 (12.7)	104 (46.6)	222 (19.9)	
Deceased	5 (1.4)	7 (1.3)	3 (1.3)	15 (1.3)	
No response	5 (1.4)	16 (2.9)	7 (3.1)	28 (2.5)	

[1] "No response" not included in Pearson's Chi Square and Fisher's Exact tests
[2] Fisher's Exact test conducted due to small cell counts
* Statistically significant p-value

4.2 Perceptions of menstruation and sexual reproductive health

Of the 1,117 study participants, 881 (79.1%) were taught about menstruation before reaching menarche (p-value= 0.159) and reported that they initially learned about menstruation from their mother or female guardian (55.9%), teacher (39.6%), or friend (22.8%) (Table 3). Girls at private schools more frequently sought MHM information from media (16.7%, p-value <0.001) as compared to girls at public and government aided schools, who more often turned to books for information (12.0%, 10.7%, p-value= 0.018).

Most girls knew menstruation is a normal process (93.6%, p-value= 0.665), though fewer could correctly identify the source of menstrual blood as the uterus (35.7%). Many girls cited the vagina (54.4%) as the source of menstrual blood. With statistical significance, more girls at government aided and private schools could correctly identify the source of menstrual blood than girls at public schools (p-value= 0.002). Respondents reported the length of a normal menstrual cycle is variable among women (48.9%), or lasts 1-3 days (19.1%), 4-6 days (13.0%), or 7 or more days (6.1%). With a statistically significant variation, at government aided and private schools, girls reported with a greater frequency that tampons could not take their virginity (>60%), as opposed to girls at public school (49%) (p-value< 0.001).

Table 3. Biological knowledge and social perceptions of school girls in Rwanda about menstrual hygiene and sexual reproductive health (N=1,1117)[1] P-value calculated with Pearson's Chi Square test of homogeneity or Fisher's Exact test.

	Public (n= 351)	Government Aided (n= 543)	Private (n= 223)	Total (N=1,117)	P-Value
	Count (%)				
Taught about menstruation before menarche					
Yes	270 (76.9)	425 (78.3)	188 (84.3)	883 (79.1)	0.159
No	72 (20.5)	106 (19.5)	34 (15.2)	212 (19.0)	
No response	9 (2.6)	12 (2.2)	1 (0.4)	22 (2.0)	
First source of information about menstruation[3]					
Health care provider	21 (6.0)	39 (7.2)	5 (2.2)	65 (5.8)	0.029*
Mother/ Female guardian	210 (59.8)	292 (53.8)	122 (54.5)	624 (55.9)	0.190
Father/Male guardian	30 (8.5)	26 (4.8)	10 (4.5)	66 (5.9)	0.040*
Teacher	159 (45.3)	196 (36.1)	87 (38.8)	442 (39.6)	0.023*
Friend	96 (27.4)	131 (24.1)	28 (12.5)	255 (22.8)	<0.001*
Books	33 (9.4)	68 (12.5)	18 (8.0)	119 (10.7)	0.127
Media (TV, social media)	23 (6.6)	118 (21.7)	16 (7.1)	157 (14.1)	<0.001*
No response	3 (0.9)	16 (2.9)	6 (2.7)	25 (2.2)	
Most frequently used source of information about menstruation[3]					
Health care provider	41 (11.7)	76 (14.0)	21 (9.4)	138 (12.4)	0.194
Mother/ Female guardian	204 (58.1)	324 (59.6)	142 (63.4)	670 (60.0)	0.407
Father/Male guardian	24 (6.8)	26 (4.8)	10 (4.5)	60 (5.4)	0.334
Teacher	68 (19.4)	112 (20.6)	33 (14.7)	213 (19.1)	0.173
Friend	131 (37.3)	182 (33.5)	62 (27.7)	375 (33.6)	0.063
Books	42 (12.0)	56 (10.3)	11 (4.9)	109 (9.8)	0.018*
Media (TV, social media)	36 (10.3)	91 (16.7)	16 (7.1)	143 (12.8)	<0.001*
No response	8 (2.3)	18 (3.3)	6 (2.7)	32 (2.9)	
Thinks menstruation is a normal process[4]					
Yes	329 (93.7)	509 (93.7)	208 (93.3)	1046 (93.6)	0.665
No	6 (1.7)	13 (2.4)	6 (2.7)	25 (2.2)	
Unsure[4]	15 (4.3)	17 (3.1)	6 (2.7)	38 (3.4)	
No response	1 (0.3)	4 (0.7)	3 (1.3)	8 (0.7)	
Origin of menstrual blood[2, 4]					

Abdomen	21 (6.0)	10 (1.8)	2 (0.9)	33 (3)	0.002*
Bladder	7 (2.0)	10 (1.8)	6 (2.7)	23 (2.1)	
Vagina	208 (59.3)	280 (51.6)	120 (53.8)	608 (54.4)	
Uterus/Womb	105 (29.9)	209 (38.5)	85 (38.1)	399 (35.7)	
I don't know	3 (0.9)	6 (1.1)	2 (0.9)	12 (1.1)	
No response	7 (2.0)	28 (5.2)	7 (3.1)	42 (3.8)	
Length of a normal menstrual cycle					
1-3 days	68 (19.4)	108 (19.9)	37 (16.6)	213 (19.1)	0.003*
4-6 days	57 (16.2)	66 (12.2)	22 (9.9)	145 (13.0)	
7+ days	19 (5.4)	38 (7.0)	11 (4.9)	68 (6.1)	
It varies among women	148 (42.2)	267 (49.2)	131 (58.7)	546 (48.9)	
I don't know[4]	43 (12.3)	45 (8.3)	20 (9.0)	108 (9.7)	
No response	16 (4.6)	19 (3.5)	2 (0.9)	37 (3.3)	
Thinks girl loses virginity when she uses a tampon[4]					
Yes	33 (9.4)	27 (5.0)	15 (6.7)	75 (6.7)	<0.001*
No	172 (49.0)	339 (62.4)	142 (63.7)	653 (58.5)	
I don't know	142 (40.5)	164 (30.2)	65 (29.1)	371 (33.2)	
No response	4 (1.1)	13 (2.4)	1 (0.4)	18 (1.6)	
Causes of menstrual pain[3, 4]					
Heavy blood flow	73 (20.8)	187 (34.5)	50 (22.3)	310 (27.8)	<0.001*
Passing blood clots	51 (14.5)	79 (14.6)	34 (15.2)	164 (14.7)	0.965
Uterine defects	32 (9.1)	36 (6.6)	27 (12.1)	95 (8.4)	0.042*
Virginity	15 (4.3)	22 (4.1)	7 (3.1)	44 (3.9)	0.779
Not giving birth	13 (3.7)	6 (1.1)	8 (3.6)	27 (2.4)	0.021*
Uncleanliness	17 (4.8)	8 (1.5)	10 (4.5)	35 (3.1)	0.008*
I don't know	194 (55.3)	262 (48.3)	114 (50.9)	570 (51.0)	0.122
No response	11 (3.1)	42 (7.7)	13 (5.8)	66 (5.9)	
Thinks women can get pregnant during menstruation[4]					
Yes	105 (29.9)	249 (45.9)	61 (27.4)	415 (37.2)	<0.001*
No	146 (41.6)	183 (33.7)	124 (55.6)	453 (40.6)	
Unsure	98 (27.9)	106 (19.5)	38 (17.0)	242 (21.7)	
No response	2 (0.6)	5 (0.9)	0 (0)	7 (0.6)	

[1] "No response" not included in Pearson's Chi Square and Fisher's Exact tests
[2] Fisher's Exact test conducted due to small cell count
[3] Respondents could select multiple answers
[4] "Unsure" and "I don't know" included in Pearson's Chi Square and Fisher's Exact tests
***** Statistically significant p-value

4.3 **Menstrual hygiene practices and preferences**

Girls most frequently used single-use sanitary pads to absorb their menstrual fluid (89.3%), followed by underwear (18.1%), and cloth or reusable pads (14.6%) (Table 4). The use of products did not vary significantly among school types, except for the use of reusable pads,

which were used most frequently by private school girls (20.1%). Girls also reported that toilet paper (6.9%), tampons (2.0%), and natural materials, such as animal skins or plant leaves (0.7%) were their most frequently used materials to absorb menstrual fluid. The primary reasons for choosing these products included cost (25.0%), safety (20.1%), and comfort (19.2%). At all school types, most girls preferred using single use pads (82.5%), with 79.6% of respondents reporting that they were very or somewhat satisfied with the product that they used most frequently. Girls were able to access their preferred product always (45.6%) or sometimes (48.0%). Students at government aided schools had the greatest trouble accessing the products of their choice and were the least satisfied with their MHM products as compared to girls at public and private schools.

In addition to products used to absorb their menstrual fluid, girls also purchased pain medication (30.3%), herbal medications (3.0%), and other products (5.4%) that were not included in the statistical analysis, including ice cream, soft drinks, black tea, and fruits. Girls obtained money for these products from their parents (86.8%), friends (8.8%), or other sources, such as teachers, personal income, or savings (5.3%).

Table 4. Menstrual hygiene practices and preferences of school girls in Rwanda (N=1,117)[1]
P-value calculated with Pearson's Chi Square test of homogeneity or Fisher's Exact test.

	Public (n= 351)	Government Aided (n= 543)	Private (n= 223)	Total (N= 1,117)	P-Value
	Count (%)				
Products ever used during menstruation[3]					
Sanitary Pads	316 (90.0)	502 (92.4)	199 (88.8)	1017 (91.0)	0.265
Tampons	4 (1.1)	16 (2.9)	8 (3.6)	28 (2.5)	0.124
Reusable cloth or pad	50 (14.2)	82 (15.1)	46 (20.5)	178 (15.9)	0.096
Underwear	51 (14.5)	114 (21.0)	46 (20.5)	211 (18.9)	0.041*
Toilet paper	43 (12.3)	44 (8.1)	21 (9.4)	108 (9.7)	0.121
Other	3 (0.9)	9 (1.6)	4 (1.7)	16 (1.4)	0.445
No response	11 (3.1)	2 (0.4)	0 (0)	13 (1.2)	
Most frequently used product during menstruation[3]					
Sanitary Pads	314 (89.5)	493 (90.8)	191 (85.3)	998 (89.3)	0.111
Tampons[2]	5 (1.4)	11 (2.0)	6 (2.7)	22 (2.0)	0.563
Reusable cloth or pad	38 (10.8)	80 (14.7)	45 (20.1)	163 (14.6)	0.008*
Underwear	55 (15.7)	104 (19.2)	43 (19.2)	202 (18.1)	0.365
Toilet paper	28 (8.0)	34 (6.3)	15 (6.7)	77 (6.9)	0.610
Natural materials	0 (0)	7 (1.3)	1 (0.4)	8 (0.7)	0.132
No response	8 (2.3)	3 (0.6)	1 (0.4)	12 (1.1)	
Preferred product during menstruation[2]					
Sanitary Pads	285 (81.2)	453 (83.4)	184 (82.5)	922 (82.5)	0.170
Tampons	42 (12.0)	40 (7.4)	19 (8.5)	101 (9.0)	
Reusable cloth or pad	7 (2.0)	9 (1.7)	3 (1.3)	19 (1.7)	
Underwear	5 (1.4)	21 (3.9)	7 (3.1)	33 (3.0)	
Toilet paper	3 (0.9)	8 (1.5)	5 (2.2)	16 (1.4)	
None	3 (0.9)	3 (0.6)	3 (1.3)	9 (0.8)	
No response	6 (1.7)	3 (0.6)	1 (0.4)	16 (1.4)	
Reasons for choosing most frequently used product [3]					

Comfort	70 (19.9)	89 (16.4)	55 (24.6)	214 (19.2)	0.027*
Safety	68 (19.3)	119 (21.9)	37 (16.5)	224 (20.1)	0.230
Cost	82 (23.3)	145 (26.7)	52 (23.2)	279 (25.0)	0.432
Availability	45 (12.8)	77 (14.2)	33 (14.7)	155 (13.9)	0.768
Ease of re-use	24 (6.8)	42 (7.7)	16 (7.1)	82 (7.3)	0.101
Ease of disposal	26 (7.4)	48 (8.8)	28 (12.5)	102 (9.1)	0.107
Mother's preference	32 (9.1)	58 (10.7)	22 (9.8)	112 (10.0)	0.746
Satisfaction with most used product					
Very satisfied	178 (50.7)	248 (45.7)	96 (43.0)	522 (46.7)	0.010*
Somewhat satisfied	112 (31.9)	168 (30.9)	87 (39.0)	367 (32.9)	
Not satisfied	29 (8.3)	93 (17.1)	29 (13.0)	151 (13.5)	
Prefer not to answer	16 (4.6)	19 (3.5)	4 (1.8)	39 (3.5)	
No response	15 (4.3)	14 (2.6)	7 (3.1)	36 (3.2)	
How often can you access the sanitary product of your preference?					
Always	189 (51.3)	167 (30.8)	162 (72.6)	509 (45.6)	<0.001*
Sometimes	149 (42.5)	330 (60.8)	57 (25.6)	536 (48)	
Never	13 (3.7)	39 (7.2)	2 (0.9)	54 (4.8)	
No response	9 (2.6)	5 (0.9)	2 (0.9)	16 (1.4)	
Where sanitary products are obtained while at school[3]					
Shop	167 (47.6)	214 (39.3)	135 (60.3)	516 (46.2)	<0.001*
Family member	50 (14.2)	66 (12.1)	41 (18.3)	157 (14.1)	<0.001*
Teacher/School	125 (35.6)	282 (51.8)	27 (12.1)	434 (38.9)	<0.001*
Other	10 (2.8)	28 (5.1)	11 (4.9)	49 (4.4)	0.234
No response	13 (3.7)	19 (3.5)	10 (4.5)	42 (3.8)	
Where sanitary products are obtained while at home[3]					
Shop	295 (84.0)	388 (71.5)	174 (77.7)	857 (76.7)	<0.001*
Family member	57 (16.2)	132 (24.3)	59 (26.3)	248 (22.2)	0.004*
Teacher/School[2]	7 (2.0)	15 (2.8)	2 (0.9)	24 (2.1)	0.263
Other	10 (2.8)	19 (3.5)	0 (0)	29 (2.6)	0.112
No response	19 (5.4)	31 (5.7)	9 (4.3)	59 (5.3)	
Availability of sanitary products in shops when needed					
Always	145 (41.3)	120 (22.1)	127 (57.0)	392 (35.1)	<0.001*
Sometimes	183 (52.1)	379 (69.8)	90 (40.4)	652 (58.4)	
Never	9 (2.6)	20 (3.7)	1 (0.4)	30 (2.7)	
No response	14 (4.0)	21 (3.9)	4 (1.8)	39 (3.5)	
Additional MHM products purchased during menstruation[3]					

Nothing	210 (59.8)	293 (53.9)	113 (50.4)	616 (55.1)	0.073*
Pain medications	94 (26.8)	173 (31.8)	72 (32.1)	339 (30.3)	0.213
Herbal medications	12 (3.4)	17 (3.1)	5 (2.2)	34 (3.0)	0.716
Other	21 (6.0)	16 (2.9)	23 (10.3)	60 (5.4)	<0.001*
No response	24 (6.8)	29 (5.3)	12 (5.4)	65 (5.8)	
Source of money for sanitary products[3]					
Parents/guardians	302 (86.0)	453 (83.3)	214 (95.5)	969 (86.8)	<0.001*
Friends	31 (8.8)	60 (11.0)	7 (0.3)	98 (8.8)	0.002*
Other	9 (2.6)	49 (9.0)	2 (0.1)	60 (5.3)	0.003*
No response	23 (6.6)	22 (4.0)	6 (0.3)	51 (4.6)	
Barriers that prevented girls from buying sanitary products[3]					
No money	201 (57.3)	418 (76.8)	66 (29.5)	685 (61.3)	<0.001*
Embarrassed to buy	48 (13.7)	45 (8.3)	50 (22.3)	143 (12.8)	<0.001*
Unavailable at the shop	40 (11.4)	23 (4.2)	25 (11.2)	88 (7.9)	<0.001*
No barriers[4]	33 (9.4)	24 (4.4)	52 (23.2)	109 (9.8)	0.001*
No response	51 (14.5)	45 (8.3)	38 (17.0)	134 (12.0)	

[1] "No response" not included in Pearson's Chi Square and Fisher's Exact tests
[2] Fisher's Exact test conducted due to small cell count
[3] Respondents could select multiple answers
[4] "No barriers" included in Pearson's Chi Square test
* Statistically significant p-value

4.4 Menstruation-related absenteeism

Respondents reported missing a median of two days due to menstruation annually (IQR: 2 days; p-value= 0.001) (Table 5). Of the responding students, 147 students from public schools (41.9%), 287 students from government aided schools (52.9%), and 111 students from private schools (50.0%) were absent at least one day in the past twelve months due to menstruation (Table 4). Girls attributed this absenteeism to pain and physical discomfort (43.2%), heavy menstrual days (12.7%), having stains from menstrual fluid on their school uniform (11.3%), fearing menstruation-related shame (3.6%), and not having a private place to wash or change at school (1.8%). The reasons for menstruation-related absenteeism did not vary with significance among school types (p-values > 0.05). In addition to missing school, some girls also missed spiritual activities (43.2%), sporting activities (36.3%), parties (20.3%), and days of work (1.4%). Among school types, these social activities were not missed with significance variance, except for spiritual activities, which were missed most frequently by girls at government aided schools (p-value< 0.001).

Table 5. Menstruation-related absenteeism of Rwandan school girls (N= 1117)[1] P-value calculated with Pearson's Chi Square test of homogeneity or Fisher's Exact test.

	Public (n= 351)	Government Aided (543)	Private (223)	Total	P-Value
	Count (%)				
Missed school days due to menstruation in last 12 months					
Yes	161 (45.9)	320 (58.9)	121 (54.3)	602 (53.9)	0.001*
No	174 (49.6)	208 (38.3)	98 (43.9)	480 (43.0)	
No response	16 (4.6)	15 (2.8)	4 (1.8)	35 (3.1)	
Reason for missing school days due to menstruation[2]					
Pain/Physical Discomfort	133 (37.9)	248 (45.6)	102 (45.5)	483 (43.2)	0.051
Stains on school uniform	33 (9.4)	66 (12.1)	26 (12.1)	125 (11.3)	0.406
Heavy menstrual days	47 (13.4)	67 (12.3)	28 (12.5)	142 (12.7)	0.896
Other	25 (7.1)	43(7.9)	5 (1.7)	73 (6.9)	0.013*
No response	161 (45.9)	195 (35.8)	88 (39.3)	444 (39.7)	
Number of school days missed due to menstruation in last 12 months[3]					
0 days	25 (7.1)	52 (9.6)	23 (10.3)	219 (19.6)	0.013*
1-4 days	117 (33.3)	216 (40.0)	93 (41.7)	308 (27.6)	
5-7 days	18 (5.1)	41 (7.6)	12 (5.4)	70 (6.3)	
8+ days	13 (3.7)	24 (4.4)	5 (2.2)	48 (4.2)	
No response	179 (51.0)	204 (37.6)	89 (39.9)	472 (42.3)	
Number of work days missed due to menstruation in last 12 months[3]					
0 days	43 (12.3)	47 (8.7)	9 (4.0)	99 (0.9)	0.016*
1-3 days	12 (3.4)	11 (2.0)	9 (4.0)	32 (0.3)	
4+ days	5 (1.5)	11 (2.0)	2 (0.9)	18 (0.2)	
I do not work	242 (68.9)	401 (73.8)	169 (75.8)	812 (72.7)	
No response	49 (14.0)	73 (13.4)	34 (15.2)	156 (14.0)	
Social activities missed due to menstruation in last 12 months[2]					
Sports activities	129 (36.8)	188 (34.6)	88 (39.3)	405 (36.3)	0.437
Spiritual activities	144 (41.0)	264 (48.5)	75 (33.5)	483 (43.2)	<0.001*
Parties	69 (19.7)	116 (21.3)	42 (18.8)	227 (20.3)	0.683
None	34 (9.7)	51 (9.4)	27 (12.1)	112 (10.0)	0.507
No response	61 (17.4)	66 (12.1)	29 (12.9)	156 (14.0)	

[1] "No response" not included in Pearson's Chi Square and Fisher's Exact tests
[2] Respondents could select multiple answers
[3] Data initially reported as continuous variable, recoded into categorical variable
* Statistically significant p-value

4.5 Financial cost of menstrual hygiene management

The total median amount spent per menstrual cycle on MHM-related products and transportation varied significantly among schools (p-value= 0.036), with girls paying a median of 4,000 RWF (IQR: 9,400 RWF) at public schools, 4,300 RWF (IQR: 8,000 RWF) at government aided schools, and 3,100 (IQR: 7,550 RWF) at private schools (Table 6). Per menstrual cycle, the median typical amount spent on sanitary products was 1,800 RWF (IQR: 3,000 RWF), an amount that did not vary significantly among school types. The median of the least amount spent per cycle (2,000 RWF, IQR: 4,000) and the most amount spent per cycle (2,000 RWF, IQR: 4,000) on sanitary products were reported to be the same. Per cycle, girls spent 700 RWF on traveling to obtain MHM products from school (IQR: 1,000 RWF) and 800 RWF on traveling to obtain MHM products from home (IQR: 1,000 RWF). Girls at private schools spent a median of 0 RWF on transportation to acquire MHM products, contributing to their lower median cost of menstruation per cycle. Girls at public and government aided schools consistently spent more on additional products purchased during menstruation than girls at private schools (p-values < 0.008).

Table 6. Median costs of menstrual hygiene products and transportation to obtain MHM products for school girls in Rwanda in 2022. Costs reported in Rwandan francs (2022RWF).[1,4] P-value calculated with Pearson's Chi Square test of homogeneity or Fisher's Exact test.

	Public	Government Aided	Private	Total	P-Value
	Median (IQR)				
Travel cost to obtain sanitary products					
From school	700 (0-1000)	900 (0-1000)	0 (0-1000)	700 (0-1000)	0.008*
From home	800 (0-1000)	1000 (0-1000)	100 (0-1000)	800 (0-1000)	0.038*
Amount paid for sanitary products per menstrual cycle					
Lowest	1800 (1000-5000)	1700 (1000-5000)	2000 (800-3000)	2000 (1000-5000)	0.327
Typical	1200 (800-3000)	1625 (1000-5000)	2000 (925-3875)	1800 (1000-4000)	0.427
Highest	1500 (1000-6000)	1800 (1000-4950)	2000 (1000-4750)	2000 (1000-5000)	0.182
Amount paid for additional products per menstrual cycle					
Lowest	1000 (0-3000)	1000 (300-2500)	550 (0-2000)	1000 (0-2500)	0.002*
Typical	1000 (0-3500)	1000 (500-4000)	800 (0-2500)	1000 (0-3500)	0.001*
Highest	1000 (0-5000)	1200 (200-4000)	750 (0-3000)	1200 (0-5000)	0.008*
Median cost of menstruation per cycle[2]					
	4000 (1600-11,000)	4300 (2000-10,000)	3100 (1000- 8550)	4000 (1625-10,000)	0.036*
Annual cost of menstruation[3]					
	48,000	51,600	37,200	48,000	

[1] "No response" not included in calculations
[2] Variable is a summation of travel cost to obtain products from home, travel costs to obtain products from school, typical amount paid for sanitary products, and typical amount paid for additional products per menstrual cycle
[3] Variable is the median cost of menstruation per cycle multiplied by 12
[4] Sample sizes vary for each question due to no response
* Statistically significant p-value

4.6 WASH facilities and resources

Out of six observed criteria pertaining to WASH facilities and resources (sanitation facility separated by gender, menstrual hygiene room, available water, soap, toilet paper, and waste bin), government aided schools had the most resources available to students at the time of the site

visit, followed by private schools, and public (Table 8). All schools had sanitation facilities that were separated by gender, with the majority of facilities being pit latrines (n=13, 86.7%).

Figure 4. Sanitation facilities in lower secondary schools in Rwanda. A. Pit latrine with locking doors at a government aided school. B. Pit latrine with a non-locking, non-closing door, and no ventilation window at a public school. C. Flush toilet, sink with running water, soap, waste receptacle, and toilet paper in MHM room at a government aided school. D. Pit latrine with a non-locking door at a private school. Photo: Kirsten Dodroe, with permission.

Almost half of the schools (46.7%) did not have any water source present at the time of the site visit, while the remaining 53.3% of schools sourced water from a faucet (n=5), bucket (n=2), or tippy tap (n=1) (Figure 4). Five schools had waste bins present in or around the sanitary facilities. More than 80% of girls from public and government aided schools threw their sanitary products into the latrine, compared to just 41.2% of girls at private schools. In addition to throwing used sanitary products in the latrine, girls also threw them in the trash (9.6%), did not have a place for disposal (1.3%), or disposed of them in other ways, such as burning or throwing them into a receptacle in a menstrual hygiene room (6.5%). At home, over 62% of girls reported

always having access to clean sanitary products, soap, clean water, and a private changing area, a proportion that fell to 54% while they were at school. Girls at private schools had better access to clean sanitary products, soap, and clean water than other girls while at school. While at home, access to these products was more consistent among girls at all school types, with only private school girls having significantly better access to clean sanitary products.

Ten of the fifteen schools had MHM rooms (Lady's rooms, Girl's rooms) present on campus. These rooms varied in their provision of MHM supplies and WASH infrastructure, though consistently provided a private space for girls to manage their menstrual hygiene. At three locations, schools provided free disposable sanitary pads, toilet paper, underwear, soap, and pain medications to the girls (Figure 5). Girls were able to take these materials at their leisure and record what they took in a log book.

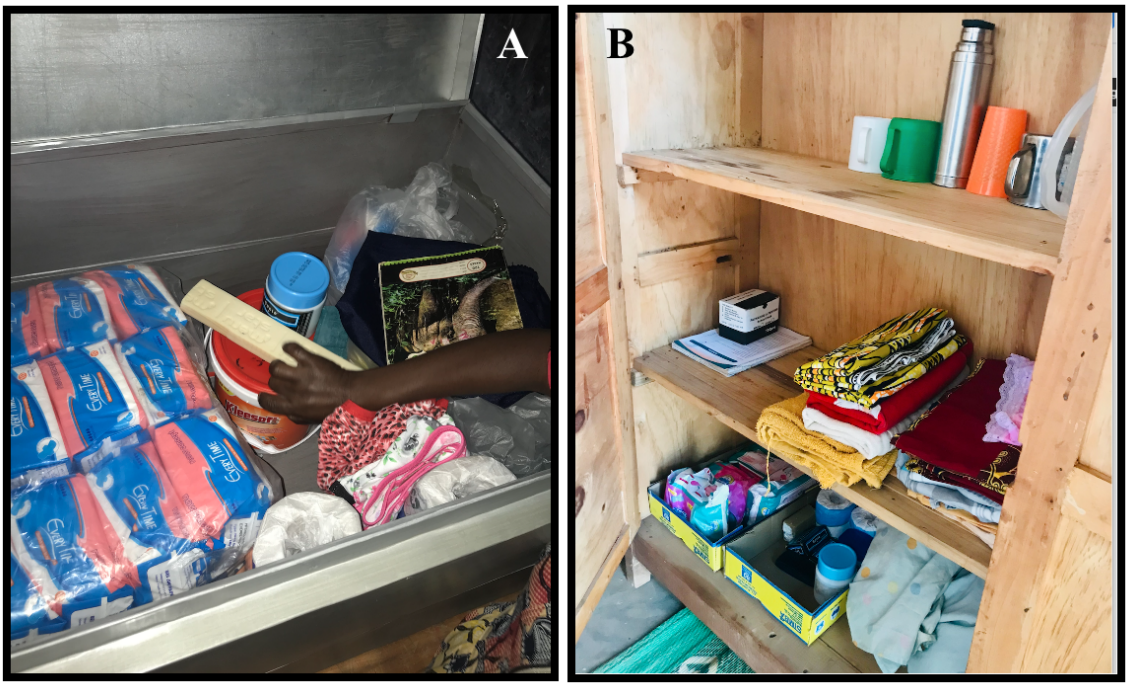


Figure 5. MHM supplies in MHM rooms at LSS in Rwanda. A. Box with sanitary pads, body and clothing soap, clean underwear, toilet paper, and log book in an MHM room at a government aided school. B. Cabinet with sanitary pads, clean underwear, clean skirts, soap, pain medications, towels, and cups for water at a private school in an MHM room. Photo: Kirsten Dodroes, with permission.

Seven schools had beds in the MHM room where girls could rest if they were feeling unwell (Figure 6).

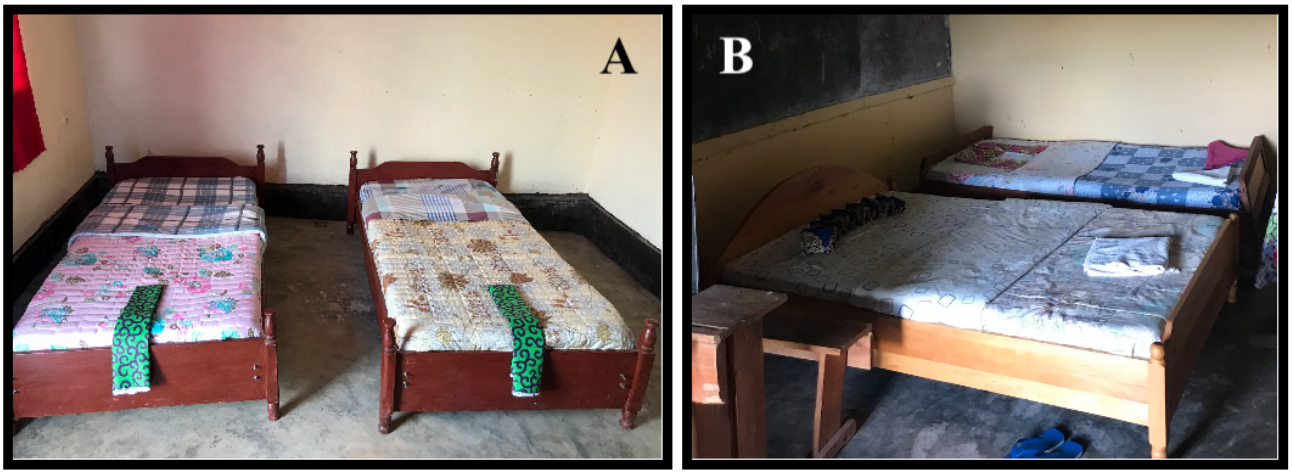


Figure 6. Beds with fresh linens and towels in MHM rooms at LSS in Rwanda. A. Government aided school. B. Public school. Photos: Kirsten Dodroe, with permission.

Four had private restrooms with water where girls could clean their bodies, change or wash their reusable pads, or clean stains from their uniform skirts (Figure 7).

Figure 7. WASH facilities in MHM rooms. A. WASH facilities in a public school. Jerry can and bucket contained water for washing, mop present to clean facilities. Smears of menstrual blood and fecal matter can be seen on the wall. B. WASH facilities in a government aided school. Water and soap were present in a bucket outside the shower stall. Mop and wash basin present for cleaning the facilities. Photos: Kirsten Dodroe, with permission.

Table 7. WASH practices and access of resources for Rwandan school girls during menstruation (N= 1,117) [1] P-value calculated with Pearson's Chi Square test of homogeneity or Fisher's Exact test.

	Public (n= 351)	Government Aided (n= 543)	Private (n= 223)	Total (N= 1,117)	P-Value
	Count (%)				
At school, do you always have access to these items?[2]					
Clean sanitary product	242 (68.9)	343 (63.1)	162 (72.3)	747 (66.9)	0.025*
Soap	190 (54.1)	277 (50.9)	136 (60.7)	603 (54.0)	0.042*
Clean water	187 (53.3)	308 (56.6)	140 (62.5)	635 (56.8)	0.081
Private changing area	219 (62.4)	357 (65.6)	139 (62.1)	715 (64.0)	0.501
No response	22 (6.3)	52 (9.6)	15 (6.7)	89 (8.0)	
At home, do you always have access to these items?[2]					
Clean sanitary product	228 (64.8)	341 (62.7)	173 (77.2)	742 (66.4)	<0.001*
Soap	211 (59.9)	354 (65.1)	149 (66.5)	714 (63.9)	0.318
Clean water	224 (63.6)	391 (71.9)	159 (71.0)	774 (69.3)	0.027*
Private changing area	225 (63.9)	368 (67.6)	153 (68.3)	746 (66.8)	0.425
No response	17 (4.8)	33 (6.1)	13 (5.8)	63 (5.6)	
At school, where do you dispose of used sanitary products?					
Latrine	300 (85.5)	482 (88.8)	92 (41.3)	874 (78.2)	<0.001*
Trash	27 (7.7)	23 (4.2)	57 (25.6)	107 (9.6)	
Other	9 (2.6)	14 (2.6)	64 (28.7)	87 (7.8)	
No response	15 (4.3)	20 (3.7)	10 (4.5)	45 (4)	
At home, where do you dispose of used sanitary products?					
Latrine	313 (89.2)	508 (93.6)	151 (67.7)	972 (87.0)	<0.001*
Trash	21 (6.0)	13 (2.4)	40 (17.9)	74 (6.6)	
Other	2 (0.6)	9 (1.7)	18 (8.0)	29 (2.7)	
No response	15 (4.3)	13 (2.4)	13 (5.8)	41 (3.7)	
Frequency of changing sanitary product during menstruation					
Less than once a day	15 (4.3)	18 (3.3)	2 (0.9)	35 (3.1)	0.001*
Once a day	57 (16.2)	106 (19.5)	18 (8.1)	181 (16.2)	
2-3 times a day	229 (65.2)	330 (60.8)	155 (69.5)	714 (63.9)	
4+ times a day	32 (9.1)	68 (12.5)	35 (15.7)	135 (12.1)	
Prefer not to say	2 (0.6)	6 (1.1)	4 (1.8)	12 (1.1)	
No response	14 (4.0)	15 (2.8)	6 (2.7)	35 (3.1)	

[1] "No response" not included in Pearson's Chi Square and Fisher's Exact tests

[2] Respondents could select multiple answers

* Statistically significant p-value

Table 8. Presence of WASH facilities at study schools in Rwandan on the day of site visit (N=15)

	Public (n=5)	Government Aided (n=5)	Private (n=5)	Total (N=15)
	Count (%)			
Sanitation facilities gender-specific	5 (100)	5 (100)	5 (100)	15 (100)
Menstrual hygiene room present	3 (60)	4 (80)	3 (60)	10 (66.7)
Water available during visit	3 (60)	3 (60)	2 (40)	8 (53.3)
Soap available during visit	1 (20)	2 (40)	2 (40)	5 (33.3)
Toilet paper available during visit	1 (20)	0 (0)	1 (20)	2 (13.3)
Waste bin present during visit	1 (20)	2 (40)	1 (20)	4 26.7)
Type of sanitation facilities present on site				
Pit latrine	4 (80)	5 (100)	4 (80)	13 (86.7)
Flush toilet	1 (20)	0 (0)	1 (20)	2 (13.3)
Functional water source on site				
Faucet	2 (40)	1 (20)	2 (40)	5 (33.3)
Tippy tap	0 (0)	1 (20)	0 (0)	1 (6.7)
Bucket	1 (20)	1 (20)	0 (0)	2 (13.3)
None	2 (40)	2 (40)	3 (60)	7 (46.7)

CHAPTER FIVE: DISCUSSION

5.1 Findings

As expressed in Rwanda's Vision 2050 and other national policies, Rwanda recognizes that gender parity is integral to the nation's goal of becoming a high income country by 2050 (MINECOFIN, 2019). This study found deficits between the actual and targeted outcomes for some of the nation's goals pertaining to gender equity, including MHM/SRH knowledge, access to WASH facilities and resources, and access to MHM products (MIGEPROF, 2021). However, our results indicated that some national targets, including the provision of MHM facilities and days of menstruation-related school absenteeism, are being met or exceeded. Rwanda also strives to reduce the environmental impact of all institutional practices (MINECOFIN, 2021). This is one of the first studies that contextualizes MHM specifically as an environmental and One Health topic through the characterization of WASH resources, waste disposal practices, and the consideration of their impact on animal health. Though there are not specific policy interventions pertaining to the environmental implications of MHM, this study provides an introduction into the MHM WASH practices that require political and economic support.

Even though girls from private schools spent the most on sanitary products, girls from government aided schools had the greatest per-cycle expenditure during menstruation. Girls from private schools spent 67% more than girls from public schools and 18% more than girls from government aided schools on just sanitary products. However, girls from government aided schools spent 39% more than girls from private schools and 8% more than girls from public schools on all MHM products and related transportation per cycle. To acquire the funds needed to purchase MHM products and transportation, most girls relied upon the financial support of their parents and families. For girls in Ubudehe categories one or two, this amounts to 6.5%-15% of their household's monthly income. As a cost analysis of MHM in six Sub-Saharan African countries found, the inequitable economic burden of MHM may make it challenging for families to afford basic necessities, including food, health care, and school fees (Rossouw & Ross, 2021). Furthermore, girls may engage in risky MHM practices to reduce their per-cycle MHM costs (Rossouw & Ross, 2021), exemplified by girls from public and government aided schools being twice as likely to change their sanitary pads only once per day as compared to girls from private schools. Despite this inequity, the annual cost of menstruation calculated from our research was only 22% of the 215,000 RWF cost calculated by Sustainable Health Enterprises in Rwanda (SHE, 2021). This difference may be attributed to SHE's inclusion of "lost income due to menstruation-related absenteeism" in their cost analysis, a factor our study did not measure.

The inconsistency in knowledge and perceptions regarding MHM observed among all school types supports the Ministry of Gender and Family Promotion's (MIGEPROF) call to strengthen the Comprehensive Sexual Education (CSE) curriculum and its strategy for implementation in schools. For questions pertaining to their biological and social understanding of menstruation, many surveyed participants did not know the correct answer. Some questions were answered

correctly in high proportions, though there was not a strong trend in the provision of correct answers differentiated by school type. This may be attributed to the variable roll-out of the CSE curriculum throughout secondary schools, as many girls reported initially learning about MHM from their teachers, but not receiving information from them frequently thereafter. In 2015, the Rwandan government mandated that CSE should be taught in secondary schools, though there was limited training given to teachers to support its integration into the standard curriculum (HDI, 2019); (MIGEPROF, 2021). Six years later, MIGEPROF published its Revised National Gender Policy in which the Ministry recognized that although CSE exists, the curriculum needed revision to be more responsive to the interests of youth and more widely taught throughout the country. Without this education, MIGEPROF is concerned that girls will lag behind academically and socially due to menstruation-related absenteeism, shame, and discomfort (MIGEPROF, 2021).

Despite the higher cost of disposable sanitary pads compared to reusable pads or natural materials, girls in our study were 1.1-9.7 times more likely to use disposable pads than school girls in other East African studies (Isano et al., 2022); (Hennegan et al., 2016); (Miiro et al., 2018); (Janoowalla et al., 2020). However, this pattern of product usage may change, as the price of disposable sanitary products has increased by nearly 10% since May of 2021 (Siritori-Cotina &Rockeman, 2022); (Telford, 2022); (Bekiempis, 2022). Disruptions in the global supply chain due to Russia's invasion of Ukraine and the COVID-19 pandemic have raised prices of the oil, cotton, and polymers that are integral to the production of disposable sanitary products (Siritori-Cotina &Rockeman, 2022); (Telford, 2022). Additionally, the intensification of droughts in cotton-growing regions as a result of climate change has reduced recent cotton yields, raising the price of the raw material globally (Siritori-Cotina &Rockeman, 2022). The climbing cost of MHM products makes it increasingly difficult for women in low income countries to afford their preferred MHM products and may worsen the financial burden of MHM for the majority of girls in this study who cited "no money" as a barrier to buying sanitary products (Siritori-Cotina &Rockeman, 2022). As these interdependent environmental, political, and economic issues unfold, it may be necessary to find less expensive, locally produced alternatives to traditional disposable sanitary products. Companies like SHE, a Rwandan organization that makes low-cost sanitary pads from banana fibers, serve as a leading example of the potential to adaptively innovate products that promote sustainable and equitable MHM (SHE, 2021).

Girls at public and government aided schools are more than twice as likely to throw their used MHM products into the latrine compared to girls from private schools. This practice fills pit latrines with plastic compounds and bleached cotton from disposable sanitary pads, materials that take decades to degrade naturally and disrupt the natural decomposition of organic waste (Olsson & Larson, 2014); (Elledge et al., 2018). Full of non-decomposing waste, pit latrines fill quickly, hazarding a sewage leak on the schools' campus that could introduce bacteria that are pathogenic to humans and animals into the environment (Scott et al., 2013); (Roxburgh et al.,

2020); (Olsson & Larson, 2014). At both school and home, girls at all school types reported burning their MHM waste or discarding it in open pits. Burning the plastic compounds used to make disposable sanitary products introduces toxic gasses into the air through the release of furans, dioxins, mercury, and polychlorinated biphenyls (Alabi et al., 2019); (Scott et al., 2013); (Roxburgh et al., 2020). Students did not specify if their pads were burned or incinerated, though incineration facilities were not observed at any of the visited schools.

Although the study team observed that most schools' WASH facilities were comparable among all school types, girls at public and government aided schools reported having poorer access to WASH facilities and resources than girls at private schools. Girls at private schools had greater access to sanitary products, soap, and toilet paper, possibly because the private school students had more financial resources to supply their own MHM WASH products. Despite these differences in access and use of MHM WASH products, studies of young women and school girls in Rwanda and India found that a girl's MHM WASH practices, not products, were more significantly associated with the contraction of laboratory-confirmed RTIs or UTIs (Das et al., 2015); (Janoowalla et al., 2020). Girls who used MHM products that are considered "unhygienic", such as natural materials, old clothes, or mattresses, were at a 1.41-3.68 increased odds of developing vulvovaginal discomfort and odorous discharge compared to girls who used disposable sanitary pads (Hennegan et al., 2016); (Janoowalla et al., 2020). However, these studies did not find a significant relationship between MHM product type and the presence of laboratory-confirmed RTIs/UTIs (Hennegan et al., 2016); (Janoowalla et al., 2020). Rather, girls whose MHM WASH practices were deemed as "poor" were at a 1.36-2.02 increased odds of developing RTIs/UTIs as compared to girls with WASH practices that were considered "good" (Das et al., 2015); (Janoowalla et al., 2020). Since girls at public and government aided schools had poorer access to WASH resources than girls at private schools, they may be at a higher risk of contracting RTIs/UTIs due to the financial limitations that restrict their MHM practices (Rossouw & Ross, 2021). These infections put a population of lower income girls, who may have more difficulty accessing medical or pharmacological care, at a two-six fold increased risk of developing long-term health complications such as pelvic inflammatory disease, infertility, or cervical cancer (USAID, 2011); (Ali et al., 2007); (Sumpter et al., 2013); (Sommer et al., 2015); (WHO, 2013).

The girls surveyed in this study reported missing approximately 75% fewer days of school due to menstruation compared to girls in other studies surveyed in the East African region (Isano et al., 2022); (Murekezi et al., 2018); (Miiro et al., 2018); (Sumpter et al., 2013). This variation may be because other studies asked students how many days were missed in the last menstrual cycle (Isano et al., 2022); (Murekezi et al., 2018), while the survey instrument used for this study asked how many days were missed in the last year. The longer time period may have introduced recall bias into the study results. Girls may have also misinterpreted the question, supposing that the study asked for the number of days missed per menstrual cycle, as opposed to per annum.

Another possible explanation for this relatively lower rate of menstruation-related absenteeism could be the presence of MHM rooms found in the surveyed schools. Of the fifteen surveyed schools, ten had MHM rooms on campus. In the Revised National Gender Policy, MIGEPROF suggested the building of MHM rooms at all secondary schools throughout the country, recognizing that they are associated with a 9-34% decreased rate of menstruation-related absenteeism and a 6-15% lower rate of dropout from school (Boosey et al., 2014); (Hennegan et al., 2016); (Chinyama et al., 2019); (Janoowala et. al.; 2019); (MIGEPROF, 2021). To enact this, the Rwandan government began partnering with NGOs (World Vision, World Food Project, UNFPA) in the mid-2010s to install MHM rooms in secondary schools (MIGEPROF, 2021). The creation of these rooms may have contributed to the comparatively lower rate of menstruation-related absenteeism found in this study, as other studies in the region either did not report the presence of MHM rooms or were conducted before they became a widespread phenomenon (Boosey et al., 2014); (Hennegan et al., 2016); (Chinyama et al., 2019); (Janoowala et al., 2019); (Isano et al., 2022).

Pain and physical discomfort were cited as the primary reasons for missing school days due to menstruation among all school types. However, few girls purchased pain medications during menstruation. This was consistent with studies among school girls in Rwanda and Uganda that similarly found that 68.9% and 76.0% of girls most frequently missed school due to menstrual pain (Isano et al., 2022); (Miiro et al., 2018). During data collection site visits, girls often asked the research team if over-the-counter pain medications were truly safe, noting that they had heard from their mothers that pain medications can make a girl infertile or cause drug addiction. Since the majority of girls get information about MHM/SRH from their mothers, these girls may have false perceptions about the utility and safety of pain management medications. If taken appropriately, these medications help alleviate the physical pain that cause girls to become academically and socially disengaged while they are menstruating (Sveinsdóttir, 2018); (Oruko et al., 2015); (Jewitt & Ryley, 2014); (Grant et al., 2013).

5.2 Challenges Encountered

When completing the survey, some girls did not know what certain menstrual products were or how they were used. We mitigated this by showing girls disposable sanitary pads, reusable cloth pads, and tampons so they were familiar with products before the survey was administered. In most of the physical settings in which the surveys were administered, there was not enough space for the girls to sit far apart, which allowed them to see each other's answers and discuss their responses. We tried to mitigate this by asking students to remain quiet during the study administration, respect each other’s privacy, and not look at each other’s answers. Another challenge encountered was the lack of response from the Heads of Schools when we attempted to call to schedule site visits. We addressed this challenge by texting or Whatsapp messaging them before we called so they could be familiarized with our phone numbers and more inclined to take our call. The Heads of Schools were also invited to communicate with the research team through

whatever method of communication was most convenient to maximize their likelihood of following up with us.

5.3 Limitations

This study had limitations that our research team worked to address transparently through our research methodology and data analysis strategy. This study was administered at LSS, so it excluded girls who dropped out of school or were absent on the day of the site visit. The study's results were not fully representative of the entire population of menstruating LSS-aged girls in Rwanda. However, given the brief window for data collection, by administering the surveys at schools, we were able to reach a larger sample size of adolescent Rwandan girls than if we had utilized other sampling techniques. This larger sample size gave the study a greater statistical power when reporting results about the female Rwandan LSS2 and LSS3 populations. All financial questions asked girls to report the cost of MHM products and the transportation cost associated with obtaining these products per one menstrual cycle. Since most girls have some irregularities in their menstrual cycle for an average of seven years after menarche, we relied upon the scientific literature to estimate that girls menstruate 12 times per year when we calculated the annual cost of menstruation (Hillard, 2014); (Dossus et al., 2012). When students reported the costs of MHM products and transportation in RWF, some girls provided answers that were highly unlikely (ex. 1,000,000 RWF, or approximately 1,000 USD). In these instances, it is likely that the girls miswrote the number of zeros in their answers, and may have meant 1,000 RWF rather than 1,000,000 RWF. Since the cost data was found to be non-parametric through a Kolmogorov Smirnov test, all costs were reported with medians, which provided a measure of central tendency that was not skewed by outliers.

CHAPTER SIX: CONCLUSION AND RECOMMENDATION

This study demonstrated the successes of efforts to ensure safe and private MHM for Rwandan school girls and characterized areas for growth to inform future policies and interventions to continue this work. The quantitative study design provided data to compare the present state of MHM in Rwanda with both past studies in the country and with present literature from the East African region. While girls missed fewer days of school due to menstruation and spent less money on MHM compared to other girls in the region, the socioeconomic inequities of MHM described in other studies were consistently reflected in this study's results. Girls from higher-income private schools had the greatest access to facilities and resources to manage their menstrual health safely. In some instances, these socioeconomic differences broke down, as there was a uniform need for more comprehensive MHM/SRH education and the better provision of WASH resources across all school types. However, the high prevalence of MHM rooms throughout the country serves as a testament to the potential for success when the government, NGOs, and schools collaborate to support safe MHM. Though continued work is necessary to achieve Rwanda's goal of reaching gender parity in all civil and professional sectors, this study reflects the benefits of systematically investing in MHM interventions to promote gender equity in academic, social, and economic life.

Recommendations

1. Integrate a clear plan to support safe and private MHM in schools into Rwanda's Vision 2050. This could include goals drawn from the Revised National Gender Plan (2021) and Rwanda's State of Gender Equality (2019) that prioritize sanitary product access, WASH resource provision, and MHM room construction.
2. Provide students with trash receptacles in all restroom facilities on campus. These receptacles should be regularly emptied and cleaned.
3. Divert some resources used to empty pit latrines to purchase sanitary pad incinerators. Since disposable sanitary pads fill pit latrines quickly, if they were incinerated, pit latrines would have to be emptied approximately 40% less frequently. The following companies make low-maintenance incinerators for low resource settings, including: Green Dispo, Vendingo Incinerators, PadCare, SARA Incinerators, or Inciner8. These incinerators could either be installed on a school's campus, or in a central and private location close to multiple schools.
4. Improve and enforce the teaching of a competent MHM/SRH curriculum. This revised curriculum could be disseminated to secondary school teachers during already-existing annual teacher training. The content of the curriculum can be strengthened to include some of the key information about MHM that our study found was widely misunderstood, including:
    a. Pain medication: educate students about the types of pain medication that are safe to use, provide guidelines about the safe dosages and the frequency of use, and address misconceptions about long term health consequences of pain medication

use.

b. WASH: inform students of the signs of RTIs and vaginal yeast infections, proper ways to dispose of MHM waste, and how to use different MHM products safely. Tailor this education to the WASH facilities and MHM resources that are available to students at school and at home.
c. Reproductive health: provide students with information about the biological process of menstruation and basic reproductive anatomy. It is important for students to know what is normal vs. abnormal when menstruating so that if they experience potentially dangerous symptoms during menstruation (such as extremely heavy blood flow or very long periods), they can seek help from a trusted adult or medical professional.

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APPENDICES

Appendix 1: English Consent Form

Project title: School Girl's Experiences and Financial Burden in Managing Menstrual Hygiene in Rwanda

Study population: Girls attending lower secondary school (LSS) two and three

Version date: March 30, 2021

Principal Investigator: Janna Schurer, PhD, UGHE

Dear participant,

You are invited to participate in this research project (Assessing Girls' Experiences and Financial Burden in Managing Menstrual Hygiene in Rwanda) because you can offer useful insight concerning the proposed research question.

This form contains important information to help you decide whether or not to participate in the research. Please take your time in choosing whether or not to participate and ask any questions about this research. If you agree to participate, you will sign this form and be given a copy for your records.

The project has been approved by the UGHE ethics committee and complies with international ethical standards for research to be carried out in Rwanda. Permissions have also been obtained from the concerned school administration

Participation is voluntary

Participation in this research is voluntary and one can change their mind and leave the study at any time. Refusal to participate or stopping their participation will involve no penalty or loss of benefits to which you are otherwise entitled.

What is the purpose of this project?

The purpose of this research is to assist in understanding the relationship between social or economic costs and education in Menstrual Hygiene Management. The findings of this study will be instrumental in informing the ongoing National Transformation Strategy, the Girls' Education Policy, Rwanda's Vision 2050 and the Country's Gender Policy; all of which consider girls' empowerment and gender equality as important pillars for the country.

How many people will take part in this research?

Approximately 384 girls will take part in this research. **What is the procedure for participation in this project?**

Participants will be invited to complete a written questionnaire that takes approximately 10 minutes to complete. Participants will also be invited to participate in a focus group discussion on menstrual hygiene and reproductive health.

What are the possible risks or discomforts related to taking part in this project?

Participants may experience some emotional distress due to the sensitive nature of the focus group discussion topics. For those who will have additional questions regarding their menstrual health we will guide them on where to find more credible information.

What are the possible benefits of taking part in this project?

Participants will receive menstrual hygiene information to clarify any myths or misinformation. Participants will also receive a sample menstrual hygiene management product (for example one pack of sanitary products).

What are my alternatives to participating in this study?

The alternative to participating in this research study is not to participate.

Will I be compensated for participating in this research?

Participants will not be compensated for participation in the study.

What will I have to pay for if I participate in this research?

Participants will not incur any financial cost to participate in this research.

What happens if I am injured as a result of participating in this research study?

Include this section heading and the wording below in all consent forms. This section will be deleted by the IRB if it is found to be not applicable.

- If physical injury resulting from participation in this research should occur, although UGHE's policy is not to provide compensation, medical treatment will be available including first aid, emergency treatment and follow-up care as needed, and your insurance carrier may be billed for the cost of such treatment. In making such medical treatment available, or providing it, the persons conducting this research project are not admitting that your injury was their fault.

Can my taking part in the research end early?

Participants can decide not to continue in the research at any time without it being held against them.

If I take part in this project, how will my privacy be protected? What happens to the information you collect?

All information will be de-identified and will be stored on a password-protected computer only accessible to the research team. Research results will not contain any names or personal identifiers.

Data collected, including your identifiable information, may be seen by the UGHE Institutional Review Board (IRB) that oversees the research. We may also share your information related to this study with other parties including translators, transcribers, thesis committee.

If I have any questions, concerns or complaints about this project, who can I talk to?

The researcher for this study is Dr Arlene Nishimwe who can be reached on email at anishimwe@ughe.org and phone call: +250 783 489 185

- If you have questions, concerns, or complaints;
- If you would like to talk to the project team;

- If you think the project has harmed you, or;
- If you wish to withdraw from the study."
- If you wish to withdraw from the study.

This research has been reviewed by the University of Global Health Equity Institutional Review Board. If you wish to speak with someone from the IRB, please contact the Office of Human Research Administration (OHRA) at Kigali Heights Building, 5th floor, Kacyiru, Kigali, P.O. Box 6955, Rwanda, for any of the following:

- If your questions, concerns, or complaints are not being answered by the research team;
- If you cannot reach the research team;
- If you want to talk to someone besides the research team;
- If you have questions about your rights as a research participant, or;
- If you want to get information or provide input about this research.

Statement of consent

Participant signature (or fingerprint) below indicates that:

- You have understood the content of this form
- You have had the opportunity to ask questions and received answers that were satisfactory;
- If needed, you took time to discuss this information with others to help you decide whether to participate;
- You will receive a dated and signed copy of the form;
- You agree to participate in this research project.

I have read the information in this consent form including risks and possible benefits. All my questions about the research have been answered to my satisfaction. I understand that I am free to withdraw at any time without penalty or loss of benefits to which I am otherwise entitled.
I consent to participate in the study.

_____

Name of participant

_____

Signature of participant

_____

Name of parent/guardian if the participant is below 18 years

Name of parent/guardian if the participant is below 18 years
Date

Witness
Date

Appendix 2: Kinyarwanda consent form

IBIKUBIYE MUNYANDIKO YO KWEMERA KWITABIRA UBUSHAKASHATSI

Izina ry'ubushakashatsi: Imibereho y'abakobwa, n'inzitizi z'amafaranga bahura nazo mu kwita kw'isuku mu gihe cy'imihango
Abarebwa n'ubushakashatsi: Abakobwa biga mucyiciro rusange cy'amashuri yisumbuye (tronc commun), umwaka wa 2 n'uwa 3.
Itariki bikoreweho: 30 Werurwe, 2021
Umushakashatsi w'ibanze: Dr Janna Schurer

Kuri mwe witabiriye,

Mutumiwe muri ubu bushakashatsi (Imibereho y'abakobwa, n'inzitizi z'amafaranga bahura nazo mu kwita kw'isuku mu gihe cy'imihango) kuko twizeyeko mwaduha amakuru yizewe yerekeranye n'iyi ngingo y'ubushakashatsi.
Iyi nyandiko ikubiyemo amakuru agufasha guhitamo kwitabira cyangwa kutitabira ubu bushakashatsi. Turagusabye ngo ufate akanya usome ibikubiye muri iyi nyandiko ubone gufata umwanzuro wo kwitabira cyangwa kutitabira kandi icyo utari busobanukirwe utubaze.
Nimwemera kwitabira ubu bushakashatsi murashyiraho umukono wanyu maze munahabwe kopi y'iyi nyandiko.
Ubu bushakashatsi bwemejwe na komite ya UGHE ishinzwe amabwiriza agenga ubushakashatsi kandi bunakurikije amabwiriza mpuzamahanga agenga ubushakashatsi bukorerwa mu Rwanda. Twahawe kandi uruhushya n'ubuyobozi bubishinzwe bw'ikigo.

Kwitabira ni ubushake

Kwitabira ubu bushakashatsi ni ubushake kandi mwemerewe kuba mwabuvamo igihe cyose mubishakiye. Nta gihano gitangwa, ndetse nta n'igihombo kirimo ku muntu uhitamo kutitabira, ndetse n'umuntu washaka guhagarika ubwitabire bwe muri ubu bushakashatsi mu gihe bwatangiye.

Intego y'uyu mushinga (Ubushakashatsi) ni iyihe?

Intego y'ubu bushakashatsi ni ugufasha mugusobanukirwa isano iri hagati y'imibereho cyangwa ubushobozi n'ubumenyi mukwita ku isuku mugihe cy'imihango (Kujya imugongo). Ibizava muri ubu bushakashatsi bizifashishwa mugufata ingamba zihamye, Gushyiraho ingamba zijyanye no kwigisha abakobwa, Gushyiraho ingamba zijyanye n'ubuzima bw'imyororokere mukerekezo 2050 u Rwanda rwihaye, byose bikazaba bigamije kongerera ubushobozi abakobwa no guteza imbere uburinganire nk'uko biri muntego z'ingenzi igihugu gifite.

Ni abantu bangahe bazitabira ubu bushakashatsi?

Abakobwa bagera muri 384 bazitabira ubu bushakashatsi.

Ni gute umuntu azitabira ubu bushakashatsi?

Abazitabira ubu bushakashatsi bazasabwa gusubiza ibibazo byanditse bizafata iminota igera ku 10 mu kubisubiza. Abazitabira bazanatumirwa mu matsinda aho bazaganira ku isuku yerekeye gihe cy'imihango ndetse n'ubuzima bw'imyororokere.

Ni izihe ngaruka ushobora guhura nazo mugihe witabiriye ubu bushakashatsi?

Abitabiriye bashobora kugira ibibazo by'amarangamutima bitewe n'imiterere y'ibibazo bizabazwa mugihe cy'ibiganiro. Abazaba bagifite ibibazo bijyanye n'ubuzima bw'imyororokere tuzabayobora aho bakura andi makuru yizewe.

Ni izihe nyungu ku muntu uzitabira ubu bushakashatsi?

Abazitabira ubu bushakashatsi bazahabwa amakuru yizewe ku birebana n'isuku mugihe cy'imihango.

Hari ikindi cyemezo nafata ureste kwitabira ubu bushakashatsi?

Ikindi cyemezo ushobora gufata ni kutitabira ubu bushakashatsi.

Hari insimbura mubyizi igenewe abazitabira ubu bushakashatsi?

Nta nsimbura mubyizi (amafaranga) iteganyijwe guhabwa abazitabira ubu bushakashatsi.

Ese hari ibyo ngomba kwishyura kugira ngo nitabire ubu bushakashatsi?

Abitabiriye ubu bushakashatsi nta cyo basabwa kwishyura

Ese nshobora kwikura mubushakashatsi butarangiye?

Abitabiriye ubu bushakashatsi bemerewe gufata icyemezo cyo kudakomeza ubushakashatsi igihe icyo ari cyo cyose babyifuza ntankomyi.

Ndamutse nitabiriye ubu bushakashatsi ni gute umutekano w'amakuru natanzee uzarindwa? Ese amakuru nzabaha muzayakoresha mute?

Amakuru yose, azakurwaho icyo ari cyo cyose cyagaragaza uwayatanze kandi abikwe muri mudasobwa ifite ijambo ry'ibanga (password) rizwi gusa n'itsinda rikora ubu bushakashatsi. Ibyo tuzakura muri ubu bushakashatsi nta mazina nta n'indi myirondoro iranga uwayaduhaye bizagaragazwa.

Amakuru yakusanyijwe, harimo n'amakuru ajyanye n'imyirondoro yawe azabonwa gusa n'urwego rwa UGHE rufite mu nshingano ibijyanye n'ubushakashatsi (IRB). Abandi bashobora kuzabona aya makuru ni abazadufasha kwandika, gusemura, ndetse n'itsinda rizandika igitabo kuri ubu bushakashatsi.

Ndamutse ngize ikibazo cyangwa impungenge kuri ubu bushakashatsi nabaza nde?

Uhagarariye ubu bushakashatsi yitwa Dr. Arlene NISHIMWE, mushobora kumwandikira kuri imeli (email) ye ariyo: **anishimwe@ughe.org** Cyangwa mukamuhamagara kuri nimero ya telefone ariyo: +**250783489185** mugihe cyose:

- Mugize ibibazo, impungenge cyangwa imbogamizi.
- Mushaka kuvugisha itsinda rigize ubu bushakashatsi.
- Mukeka ko hari ikibazo mwatewe n'ubu bushakashatsi
- Mushaka gukurwamuri ubu bushakashatsi

Ubu bushakashatsi bwasuzumwe n'ishami rya Kaminuza (UGHE) rishinzwe iby'ubushakashatsi. Uramutse wifuza kuvugana n'umwe mubagize iryo shami ry'igenzura (IRB), Wahamagara ibiro bishinzwe ubushakashatsi bwerekeye abantu (OHRA) rikorera mu nyubako ya Kigali Heights (Kigali Heights Building), Igorofa (Etage) ya 5, Kacyiru, Kigali, Agasanduku k'amabaruwa 6955 (P.O.Box 6955), mu gihe ufite impamvu imwe muri izi zikurikira:

- Mu gihe ikibazo cyawe, impungenge cyangwa imbogamizi zawe zitasubijwe n'abarimo bakora ubu bushakashatsi.
- Mu gihe udashobora kubonana n'abari gukora ubu bushakashatsi.
- Mu gihe wifuza kuvugana n'undi waba utandukanye n'abari gukora ubu bushakashatsi.
- Mu gihe uburenganzira bwawe butubahirijwe nk'umwe mu bitabiriye ubu bushakashatsi.
- Uramutse hari amakuru ukeneye cyangwa hari inyunganizi wifuza gutanga kuri ubu bushakashatsi.

Ibyerekeranye n'ubu bwumvikane:

Umukono cyangwa igikumwe cy'uwitabiriye ubu bushakashatsi ugaragaza ko:

- Wumvise ibikubiye muri iyi nyandiko.
- Wagize amahirwe yo kubaza ibibazo kandi wahawe ibisobanuro bikunyuze.
- Mugihe byari bikenewe, wagize umwanya wo kubiganiraho na bagenzi bawe kugirango bigufashe guhitamo kwitabira cyangwa kutitabira ubu bushakashatsi.
- Uzahabwa kopi y'iyi nyandiko kandi iriho umukono wawe.
- Wemeye kwitabira ubu bushakashatsi.
- Wemeye gufatwa amajwi mugihe cy'ibazwa (Interview).

Nasomye ibikubiye muri iyi nyandiko, harimo n'ingaruka, n'inyungu zishobora guturuka mukwitabira ubu bushakashatsi. Ibibazo byose nibazaga kuri ubu bushakashatsi byasubijwe kandi nanyuzwe n'ibisubizo byatanzwe. Nsobanukiwe ko mfite uburenganzira busesuye bwo guhagarika ubwitabire bwa njye muri ubu bushakashatsi igihe icyo ari cyo cyose kandi ntazindi nkurikizi cyangwa igihombo byanteza.

Nemeye kwitabira ubu bushakashatsi.

Umukono cyangwa igikumwe cy'uwitabiriye ubu bushakashatsi ugaragaza ko:

- Wumvise ibikubiye muri iyi nyandiko.
- Wagize amahirwe yo kubaza ibibazo kandi wahawe ibisobanuro bikunyuze.
- Mugihe byari bikenewe, wagize umwanya wo kubiganiraho na bagenzi bawe kugirango bigufashe guhitamo kwitabira cyangwa kutitabira ubu bushakashatsi.
- Uzahabwa kopi y'iyi nyandiko kandi iriho umukono.
- Wemeye kwitabira ubu bushakashatsi.

_____

Amazina y’uwitabiriye **Itariki**

_____

Umukono w’uwitabiriye

_____

_____

Amazina yombi y’umubyeyi cyangwa umwishingizi
Itariki (k’uri munsi y’imyaka 18 y’amavuko)

Umukono w'umubyeyi cyangwa umwishingizi
(k’uri munsi y’imyaka 18 y’amavuko)
Itariki

_____

Umukono w’uwakiriye iyi nyandiko

Appendix 3: Quantitative Survey Instrument

School Girl's Experiences and Financial Burden in Managing Menstrual Hygiene in Rwanda
Imibereho n'ibibazo birebana n'amafaranga abana b'abakobwa bahura nabyo mu Rwanda bijyanye no kwiyitaho mu gihe cy'imihango

Questionnaire identification Number: _____
Umubare uranga urutonde rw'ibibazo:

Date of interview: _____
Itariki ikiganiro gikoreweho:

Name of School: _____
Izina ry'ishuri:

Demographics/ Ibibazo bijyanye n'imibereho rusange	
1) What is your age? ***Ufite imyaka ingahe?***	_____ years *Imyaka* _____
2) Class level (Check one) ***Icyiciro cy'amashuri (Hitamo kimwe)***	□ Senior 2 *Icyiciro cya kabiri cy'amashuri yisumbuye* □ Senior 3 *Icyiciro cya gatatu cy'amashuri yisumbuye*
3) Religion (Check one) ***Idini (Hitamo kimwe)***	□ None *Nta dini ngira* □ Christian *Umukristu* □ Muslim *Umusilamu* □ Other, please specify: _____ *Irindi dini, ryandike hano:*
4) What is your ubudehe category? (Check one) ***Uri mu kihe cyiciro cy'ubudehe?***	□ 1 □ 2 □ 3 □ 4

5) What is your school district? ***Ikigo wigamo kiba mu kahe karere?***	_____
6) What is your home district? ***Utuye mu kahe karere?***	_____
7) What is your Father/male guardian's primary occupation? (Check one) ***Umubyeyi wawe w'umugabo akora akahe kazi? (Hitamo kimwe)***	□ Unemployed *Nta kazi agira* □ Homemaker *Akora imirimo yo mu rugo* □ Farmer *N'umuhinzi* □ Government employee *N'umukozi wa Leta* □ Healthcare worker *N'umukozi wo kwa muganga* □ Teacher *N'umwalimu* □ Self-employed *Arikorera* □ Deceased/ not present □ Yitabye Imana/ ntawe uhari □ Other (please specify): _____ *Akandi kazi, kandike hano:*

8) What is your Mother/female guardian's primary occupation? (Check one) ***Umubyeyi wawe w'umugore akora akahe kazi? (Hitamo kimwe)***	□ Unemployed *Nta kazi agira* □ Homemaker *Akora imirimo yo mu rugo* □ Farmer *N'umuhinzi* □ Government employee *N'umukozi wa Leta* □ Healthcare worker *N'umukozi wo kwa muganga* □ Teacher *N'umwalimu* □ Self-employed *Arikorera* □ Deceased/ not present □ Yitabye Imana/ ntawe uhari □ Other (please specify): _____ *Akandi kazi, kandike hano:*
9) What is the highest education level of your Father/Male guardian? (Check one) ***Umubyeyi wawe w'umugabo yize kugeza ku kihe cyiciro cy'amashuri? (Hitamo kimwe)***	□ No Education *Ntabwo yize* □ Primary *Amashuri abanza* □ Secondary *Amashuri yisumbuye* □ University *Kaminuza* □ Other (please specify): _____ *Ikindi cyiciro, cyandike hano:*
10) What is the highest education level of your Mother/Female guardian? (Check one) ***Umubyeyi wawe w'umugore yize kugeza ku kihe cyiciro cy'amashuri? (Hitamo kimwe)***	□ No Education *Ntabwo yize* □ Primary *Amashuri abanza* □ Secondary *Amashuri yisumbuye* □ University *Kaminuza* □ Other (please specify): _____

	Ikindi cyiciro, cyandike hano:
11) At what age did you have your first menstrual period? ***Watangiye kujya mu mihango ufite imyaka ingahe?***	_____ years *Imyaka* _____ □ I have never menstruated *Ntabwo ndajya mu mihango*
We would now like to ask you some questions about your <u>Menstrual Knowledge.</u>/ Twifuzaga kukubaza ibibazo byerekeranye <u>n'ubumenyi ufite ku bijyanye n'imihango</u>	
12) Were you taught about menstruation before your first period? (Check one) ***Wigeze wiga ibijyanye n'imihango mbere y'imihango yawe yambere? (Hitamo kimwe)***	□ Yes *Yego* □ No *Oya*
14) Where did you first learn about menstruation? (Check all that apply) ***Nihe wize bwa mbere ibijyanye n'imihango? (Hitamo ibishoboka byose)***	□ Health care provider *Umukozi wo kwa muganga* □ Mother/Guardian *Umubyeyi w'umugore/*Abarezi □ Father/Guardian *Umubyeyi w'umugabo/*Abarezi □ Teacher *Umwalimu* □ Friend *Inshuti* □ Books *Mu bitabo* □ Media (TV, Radio, Social Media) *Mu itangazamakuru (Televiziyo, Radiyo, Imbuga nkoranyambaga)* □ Other (Specify): _____ *Ahandi, handike hano:*

15) When you have a question about menstruation, where do you get information? (Check all that apply) ***Iyo ufite ikibazo kijyanye n'imihango, nihe ukura amakuru? (Hitamo ibishoboka byose)***	□ Health care provider *Umukozi wo kwa muganga* □ Mother/Guardian *Umubyeyi w'umugore/*Abarezi □ Father/Guardian *Umubyeyi w'umugabo/*Abarezi □ Teacher *Umwalimu* □ Friend *Inshuti* □ Books *Mu bitabo* □ Media (TV, Radio, Social Media) *Mu itangazamakuru (Televiziyo, Radiyo, Imbuga nkoranyambaga)* □ Other (Specify): _____ *Ahandi, handike hano:*
16) Is menstruation a normal healthy process in girls and women? (Check one) ***Ese kujya mu mihango ni ibintu bisanzwe ku bakobwa no ku bagore? (Hitamo kimwe)***	□ Yes *Yego* □ No *Oya* □ I don't know *Simbizi*
17) Menstrual blood comes from which body part? (Check one) ***Ese imihango ituruka mu kahe gace k'umubiri? (Hitamo kimwe)***	□ Abdomen *Mu nda* □ Bladder *Mu ruhago* □ Vagina *Mu gitsina* □ Womb (Uterus) *Inda ibyara (Nyababyeyi)* □ Other (Specify):_____ *Ahandi, handike hano:*

18) What is the length of a normal menstrual cycle? (Check one) ***Ese imihango isanzwe imara iminsi ingahe? (Hitamo kimwe)***	Day(s):_____ *Iminsi* □ It varies from woman to woman *Birahinduka bitewe n'umukobwa cyangwa se umugore* □ I don't know *Simbizi*
19) Does a girl lose her virginity when she uses a tampon? (Check one) ***Ese umukobwa atakaza ubusugi bwe iyo akoresha ibikoresho by'isuku bashyira mu gitsina (tampons)? (Hitamo kimwe)***	□ Yes *Yego* □ No *Oya* □ I don't know *Simbizi*
20) What are the causes of menstrual pain? (Check all that apply) ***Ni izihe mpamvu zitera kuribwa mu gihe cy' imihango? (Hitamo ibishoboka byose)***	□ Heavy blood flow *Kuva amaraso menshi* □ Passing blood clots *Kuva amaraso avuze* □ Uterine defects *Indwara za nyababyeyi* □ Virginity *Ubusugi* □ Not having delivered a child *Kuba utarabyara umwana n'umwe* □ Uncleanliness *Kugira umwanda* □ I don't know *Simbizi* □ Other (Specify): _____ *Izindi mpamvu, zandike hano:*
21) Is a woman able to get pregnant if she has sexual intercourse during menstruation? (Check one) ***Ese umugore ashobora gusama (gutwita) mu gihe akoze imibonano mpuzabitsina ari mu mihango? (Hitamo kimwe)***	□ Yes *Yego* □ No *Oya* □ I don't know *Simbizi*

We would now like to ask you some questions about ***<u>sanitary products/</u> Twifuzaga kukubaza ibibazo byerekeranye <u>n'ibikoresho by'isuku bikoreshwa mu mihango</u>***	
22) Which of the following absorbent materials have you **ever** used during menstruation? (Check all that apply) ***Muri ibi bikoresho ni ibihe wigeze ukoresha uri mu mihango? (Hitamo ibishoboka byose)***	□ None *Ntacyo* □ Sanitary Pads *Ibikoresho by'isuku barambika ku mwenda w'imbere (Cotex)* □ Tampons *Ibikoresho by'isuku bashyira mu gitsina (tampons)* □ Reusable piece of cloth or pad *Ibitambaro bikoreshwa inshuro zirenze imwe* □ Underwear *Imyenda yambarirwaho (ikariso)* □ Toilet paper *Ibikoresho by'isuku bikoreshwa umuntu yihanagura mu bwiherero* □ Paper (newspapers, pages from books) *Ibipapuro (ibinyamakuru, ibice by'ibitabo)* □ Animal skins *Impu z'inyamaswa* □ Plant leaves *Amababi y'ibiti* □ Other (Specify): _____ *Ibindi bikoresho, byandike hano*

23) What absorbent materials do you **most often** use during menstruation? (Check all that apply) ***Muri ibi bikoresho ni ibihe umaze gukoresha inshuro nyinshi mu gihe uri mu mihango? (Hitamo ibishoboka byose)***	□ None *Ntacyo* □ Sanitary Pads *Ibikoresho by'isuku barambika ku mwenda w'imbere (Cotex)* □ Tampons *Ibikoresho by'isuku bashyira mu gitsina (tampons)* □ Reusable piece of cloth or pad *Ibitambaro bikoreshwa inshuro zirenze imwe* □ Underwear *Imyenda yambarirwaho (ikariso)* □ Toilet paper *Ibikoresho by'isuku bikoreshwa umuntu yihanagura mu bwiherero* □ Paper (newspapers, pages from books) *Ibipapuro (ibinyamakuru, ibice by'ibitabo)* □ Animal skins *Impu z'inyamaswa* □ Plant leaves *Amababi y'ibiti* □ Other (Specify): _____ *Ibindi bikoresho (byandike hano)*
24) How satisfied are you with the menstrual products that you most often use? (Check one) ***Ibikoresho by'isuku ukunze gukoresha uri mu mihango ubyishimiye ku ruhe rugero? (Hitamo kimwe)***	□ Very satisfied *Ndabyishimiye cyane* □ Someone satisfied *Ndabyishimiye* □ Not satisfied *Ntabwo mbyishimiye* □ Prefer not to answer *Sinshaka gusubiza iki kibazo*

25) What is the **top reason** for using the product you most often use? (Check one) ***Ni iyihe mpamvu yambere ituma ukoresha ibikoresho umaze gukoresha inshuro nyinshi? (Hitamo imwe)***	□ Comfort *Ubwisanzure* □ Safety *Umutekano* □ Cost *Igiciro* □ Availability *Ukuboneka* □ Ease of re-use *Gukoreshwa inshuro zirenze imwe* □ Ease of disposal *Kujugunya byoroshye* □ Mother/female guardian's product of choice *Nicyo gikoresho umubyeyi w'umugore akunze gukoresha* □ Other (specify): _____ *Indi mpamvu (yandike hano)*

26) What product do you prefer to use? (Check one) ***Muri ibi bikoresho ni ibihe wakwifuza gukoresha? (Hitamo kimwe)***	□ None *Ntacyo* □ Sanitary Pads *Ibikoresho by'isuku barambika ku mwenda w'imbere (Cotex)* □ Tampons *Ibikoresho by'isuku bashyira mu gitsina (tampons)* □ Reusable piece of cloth or pad *Ibitambaro bikoreshwa inshuro zirenze imwe* □ Underwear *Imyenda yambarirwaho (ikariso)* □ Toilet paper *Ibikoresho by'isuku bikoreshwa umuntu yihanagura mu bwiherero* □ Paper (newspapers, pages from books) *Ibipapuro (ibinyamakuru, ibice by'ibitabo)* □ Animal skins *Impu z'inyamaswa* □ Plant leaves *Amababi y'ibiti* □ Other (Specify): _____ *Ibindi bikoresho, byandike hano*
27) How often can you access the sanitary product of your preference? (Check one) ***Ni inshuro zingahe ubasha kubona ibikoresho by'isuku wifuza? (Hitamo kimwe)***	□ Never *Ntanarimwe* □ Sometimes *Rimwe na rimwe* □ Always *Buri gihe*
28) What prevents you from using your preferred sanitary product? ***Ni igiki kikubuza gukoresha ibikoresho by'isuku wifuza gukoresha?***	_____

29) During menstruation, how frequently do you change your sanitary product per day? (Check one) ***Mu gihe uri mu mihango, uhindura ibikoresho by'isuku inshuro zingahe ku munsi? (Hitamo kimwe)***	□ 4+/day *Inshuro 4 ku munsi cyangwa zirenga* □ 2-3/day *Inshuro 2 cyangwa 3 ku munsi* □ 1x/day *Inshuro imwe ku munsi* □ Less than 1x/day *Inshuro iri munsi y'imwe ku munsi* □ Other: _____ *Ibindi* □ I prefer not to say *Sinshaka gusubiza iki kibazo*
30) At school, do you **always** have access to these items? (Check all that apply) ***Ese iyo uri ku ishuri ibi bikurikira ubibona buri gihe? (Hitamo ibishoboka byose)***	□ Clean sanitary product *Ibikoresho by'isuku bikoreshwa mu mihango bisa neza* □ Soap *Isabune* □ Clean water *Amazi meza* □ Private changing area *Aho kwihindurira hihishe*
31) At home, do you **always** have access to these items? (Check all that apply) ***Ese iyo uri mu rugo ibi bikurikira ubibona buri gihe? (Hitamo ibishoboka byose)***	□ Clean sanitary product *Ibikoresho by'isuku bikoreshwa mu mihango bisa neza* □ Soap *Isabune* □ Clean water *Amazi meza* □ Private changing area *Aho kwihindurira hihishe*
32) At school, where do you dispose of used sanitary products? (Check one) ***Iyo uri ku ishuri ibikoresho by'isuku bikoreshwa mu mihango ubijugunya he? (Hitamo kimwe)***	□ Latrine *Mu bwiherero bw'umwobo* □ Trash *Mu bishingwe* □ There is no place for disposal *Ntaho kubijugunya hahari* □ Other: _____

	Ahandi
33) At home, where do you dispose of used sanitary products? (Check one) ***Iyo uri mu rugo ibikoresho by'isuku bikoreshwa mu mihango ubijugunya he? (Hitamo kimwe)***	□ Latrine *Mu bwiherero bw'umwobo* □ Trash *Mu bishingwe* □ There is no place for disposal *Ntaho kubijugunya hahari* □ Other: _____ *Ahandi*
We would now like to ask you some questions about ***barriers to access/ Twifuzaga kukubaza ibibazo byerekeranye n'ibibazo uhura nabyo mu kubona ibikoresho by'isuku bikoreshwa mu mihango***	
34) a) At school, where do you obtain your sanitary products? (Check all that apply) ***Ese iyo uri ku ishuri ibikoresho by'isuku ukoresha mu mihango ubikura he? (Hitamo ibishoboka byose)***	□ Shop *Mu iduka* □ Family member *Ku muvandimwe* □ Teacher *Ku mwalimu* □ Other: _____ *Ahandi*
(b) If from a shop, what is the roundtrip travel cost? ***Niba ubigura mu iduka, ukoresha amafaranga angahe ku rugendo iyo ugiye kuzigura?***	□ Rwf: _____ □ There is no transportation cost *Nta mafaranga yo kugerayo no kugaruka nkoresha*
(c) If from a shop, how far do you travel (roundtrip)? (Check one) ***Niba ubigura mu iduka, bigusaba ibirometero bingahe kugenda no kugaruka? (Hitamo kimwe)***	□ <1 KM *Munsi y'ikirometero kimwe* □ 1 -2 KM *Hagati y'ikirometero kimwe na bibiri* □ 3-4 KM

	Hagati y'ibirometero bitatu na bine □ >4 KM (Specify): _____ *Ibirometero birenga bine (byandike hano)*
35) At home, where do you obtain your sanitary products? (Check all that apply) ***Ese iyo uri mu rugo ibikoresho by'isuku ukoresha mu mihango ubikura he? (Hitamo ibishoboka byose)***	□ Shop *Mu iduka* □ Family member *Ku muvandimwe* □ Teacher *Ku mwalimu* □ Other: _____ *Ahandi*
b) If from a shop, what is the roundtrip travel cost? ***Niba ubigura mu iduka, ukoresha amafaranga angahe ku rugendo iyo ugiye kuzigura?***	□ Rwf: _____ □ There is no transportation cost *Nta mafaranga yo kugerayo no kugaruka nkoresha*
(c) If from a shop, how far do you travel (roundtrip)? (Check one) ***Niba ubigura mu iduka, bigusaba ibirometero bingahe kugenda no kugaruka? (Hitamo kimwe)***	□ <1 KM *Munsi y'ikirometero kimwe* □ 1 -2 KM *Hagati y'ikirometero kimwe na bibiri* □ 3-4 KM *Hagati y'ibirometero bitatu na bine* □ >4 KM (Specify): _____ *Ibirometero birenga bine (byandike hano)*

36) Are sanitary products available in the shop when you need them? (Check one) ***Ese ibikoresho by'isuku ukoresha mu mihango biba bihari mu gihe ubikeneye? (Hitamo kimwe)***	□ Never *Ntanarimwe* □ Sometimes *Rimwe na rimwe* □ Always *Buri gihe* □ Other (Specify): _____ *Ibindi bisobanuro*
37) In the last year, what is the **least** amount you paid for sanitary products during one menstrual cycle? ***Mu mwaka ushize, amafaranga make ashoboka wakoresheje mu kwezi kumwe ugura ibikoresho by'isuku n'angahe?***	□ Rwf: _____ □ I didn't spend anything *Nta mafaranga nakoresheje*
38) In the last year, what is the **average** amount you paid for sanitary products during one menstrual cycle? ***Mu mwaka ushize, ugereranyije waba warakoresheje amafaranga angahe mu kwezi kumwe ugura ibikoresho by'isuku?***	□ Rwf: _____ □ I didn't spend anything *Nta mafaranga nakoresheje*
39) In the last year, what is the **highest** amount you paid for sanitary products during one menstrual cycle? ***Mu mwaka ushize, amafaranga menshi ashoboka wakoresheje mu kwezi kumwe ugura ibikoresho by'isuku n'angahe?***	□ Rwf: _____ □ I didn't spend anything *Nta mafaranga nakoresheje*
40) If you answered no cost to purchasing sanitary products, why? (Check one) ***Niba wasubije ko nta mafaranga wakoresheje ugura ibikoresho by'isuku bikoreshwa mu mihango, ni iyihe mpamvu? (Hitamo kimwe)***	□ School provides them for free *Ikigo nigamo kibiduha ku buntu* □ Parents pay for products *Ni ababyeyi babigura* □ I don't menstruate *Ntabwo ndajya mu mihango* □ Other (Specify): _____ *Indi mpamvu (yandike hano)*

41) Other than sanitary products, do you buy anything else during menstruation? (Check all that apply) ***Uretse ibikoresho by'isuku ukoresha mu mihango, hari ikindi kintu ugura iyo uyirimo? (Hitamo ibishoboka byose)***	□ Nothing *Ntacyo* □ Pain medications I*miti y'ububabare* □ Herbal medications *Imiti ya Kinyarwanda* □ Other (Specify): _____ *Ikindi (cyandike hano)*
42) In the last year, what was the **least** amount you paid per menstrual cycle on the above items? ***Mu mwaka ushize, amafaranga make ashoboka wakoresheje mu kwezi kumwe ugura ibyo bintu uvuze haruguru n'angahe?***	□ Rwf: _____ □ I didn't spend anything *Nta mafaranga nakoresheje*
43) In the last year, what was the **average** amount you paid per menstrual cycle on the above items? ***Mu mwaka ushize, ugereranyije waba warakoresheje amafaranga angahe mu kwezi kumwe ugura ibyo bintu uvuze haruguru?***	□ Rwf: _____ □ I didn't spend anything *Nta mafaranga nakoresheje*
44) In the last year, what was the **highest** amount you paid per menstrual cycle on the above items? ***Mu mwaka ushize, amafaranga menshi ashoboka wakoresheje mu kwezi kumwe ugura ibyo bintu uvuze haruguru?***	□ Rwf: _____ □ I didn't spend anything *Nta mafaranga nakoresheje*
45) Where do you obtain money to pay for sanitary products? (Check all that apply) ***Ese ukura he amafranga yo kugura ibikoresho by'isuku ukoresha mu mihango? (Hitamo ibishoboka byose)***	□ Parents/Guardians *Ku babyeyi* □ Teacher *Ku mwalimu* □ Friends *Ku nshuti* □ Income *Mu mafaranga mpembwa* □ Other (Specify): _____

	Ahandi (handike hano)
46) Have any of the following ever prevented you from buying sanitary products? (Check all that apply) ***Ese muri ibi bikurikira hari ikintu cyigeze kikubuza kugura ibikoresho by'isuku bikoreshwa mu mihango? (Hitamo ibishoboka byose)***	□ No money *Kubura amafaranga* □ Embarrassed to buy sanitary products *Kugira isoni zo kugura ibikoresho by'isuku* □ They were unavailable at the shop *Ntabwo byari bihari mu iduka* □ Family or cultural beliefs *Umuryango cyangwa imyemerere* □ Other (Specify)_____ *Ikindi (cyandike hano)*
47) a) In the last 12 months, did you miss school due to menstruation? (Check one) ***Mu mezi 12 ashize, wigeze usiba ishuri kubera imihango? (Hitamo kimwe)***	□ Yes *Yego* □ No *Oya*
b) If yes, why? (Check all that apply) ***Niba wasubije Yego, ni kubera iyihe mpamvu? (Hitamo ibishoboka byose)***	□ Pain or physical discomfort *Kuribwa cyangwa kumva utameze neza mu mubiri* □ The school uniform was stained *Umwambaro w'ishuri wari wanduye* □ Heavy menstrual days *Kuva amaraso menshi* □ Fear of shame *Gutinya ikimwaro* □ No private place to change/wash at school *Ku ishuri ntaho kwihindurira cyangwa gukarabira hihishe hahari* □ Other (Specify): _____ *Indi mpamvu (yandike hano)*
c) If yes, how many school days did you miss due to menstruation in the last 12 months?	□ # Days: _____ *Iminsi*

Niba wasubije Yego, ni iminsi ingahe wasibye ishuri kubera imihango?	
48) In the last 12 months, how many workdays did you miss due to menstruation? (Check one) ***Mu mezi 12 ashize, wigeze usiba akazi kubera imihango? (Hitamo kimwe)***	□ # Days: _____ *Iminsi* □ I did not miss any work days *Ntabwo nigeze nsiba akazi* □ I do not work *Nta kazi mfite*
49) In the last 12 months, did you miss any of these social activities due to menstruation? (Check all that apply) ***Mu mezi 12 ashize, wigeze usiba muri ibi bikurikira kubera imihango? (Hitamo ibishoboka byose)***	□ Sports activities *Mu mikino* □ Spiritual or Church/Mosque activities *Gusenga* □ Parties *Mu birori* □ Other (Specify): _____ *Ibindi (byandike hano)*

Appendix 4: WASH Checklist

Toilet Facilities
☐ Are sanitation facilities separated by gender? ☐ Yes☐ No ☐ Type of facility ☐ Pit latrine ☐ Flush toilet ☐ Other ☐ None ☐ Is there a menstrual hygiene room? ☐ Yes☐ No ☐ Other
WASH Supplies in Bathroom
☐ Was water available during the visit? ☐ Yes☐ No ☐ Water source ☐ Faucet ☐ Tippy tap ☐ Bucket ☐ Other ☐ None ☐ Was soap available during the visit? ☐ Yes☐ No ☐ Was toilet paper available during the visit? ☐ Yes☐ No ☐ Was a waste bin present during the visit? ☐ Yes☐ No

Appendix 5. IRB Approval Letter

University of Global Health Equity Institutional Review Board
Academic Ethics Review

Notification of Approval

Ref: UGHE-IRB/2021/042

July 20, 2021

Protocol Title:	Girls' Experiences and Financial Burden in Managing Menstrual Hygiene in Rwanda
Principal Investigator(s):	Dr. Janna Schurer, Joseph Kalibbala, Arlene Nishimwe, Sandra Isano, Zahirah McNatt
Protocol #:	141
Funding Source:	UGHE
Initial IRB Review Date:	May 18, 2021
Initial Review Type:	Full review
Additional Review Dates:	July 15, 2021
IRB Review Action:	**Approved**
Effective Date:	July 15, 2021
Expiration Date:	July 14, 2022

Dear Dr. Janna Schurer,

On July 15, 2021, the University of Global Health Equity Institutional Review Board (UGHE IRB) approved this resubmission with modifications review. **Please note that the approval for this protocol will lapse after one (1) year and must be renewed according to the procedures of the UGHE IRB.**

The IRB reminds you that you are responsible for fulfilling the following requirements:

- Changes, amendments, and addenda to the protocol or consent form (if applicable) must be submitted to the committee for review and approval, prior to activation of the changes.
- Only approved consent forms are to be used for the enrollment of participants.
- All consent forms signed by subjects must be retained on file, and are submitted to inspection, along with other project materials, during routine onsite visits or audits.
- Failure to submit an application for continuing review will result in the suspension or termination of the study.
- The UGHE IRB must be notified at the closure of the study.

Please contact the UGHE IRB via email at irb@ughe.org with any questions.

Sincerely,

Daniel Seifu, IRB Chair

Grading Rubric:

Section	Criteria	Max	Score
Introduction (8 points)	Brief overview	2	
	Problem statement is clear, focused, and summarizes the research being undertaken (included in Lit review, per recommendation)	3	
	Objectives are SMART (included in Lit review, per recommendation)	3	
Literature review (12 points)	Clearly organized according to relevant topics (from general to specific)	2	
	Includes key definitions and establishes the significance of problem	2	
	Relevant literature identified and summarized	3	
	Previous interventions, success/challenges/limitations, any conflicting information from different literatures	3	
	Gap in literature to justify the project/study	2	
Methodology (20 points)	Setting: concise and relevant information about the site/location/community where the study will be conducted	1	
	Design: state the type of study design (cohort, pre-post-intervention, phenomenological, narrative etc.)	2	
	Sample: data source, inclusion/exclusion criteria defined	2	
	Sample size: justified	2	
	Tool: development of data collection tool described, including pre-test, translation, etc	2	
	Tool content: is described, including content, organization, etc. (included in appendix)	2	
	Data collection method: logistics of sampling, data collection detailed, organized by phase/part of data collection	2	
	Measures: list the key variables you are measuring for this project	2	

	Data management: how will the info be processed	2	
	Data analysis: the method of analysis for each measure is described clearly and appropriately	2	
	Ethical consideration- Adequately and appropriately addressing ethical concerns about vulnerable population, risks, actions, consent	1	
Results (25 points)	The extent to which the expected outcome/output of the study and its possible usage or application are clearly documented	25	
Discussion (25 points)	Interpretation of the results, link to literature, challenges encountered and steps taken to overcome them; limitations stated and justified	25	
Conclusion (5 points)	Clear interpretation of study findings; recommendations for preceptor organization as well as future studies	5	
One Health (10 marks)	One Health component and approach for solving this problem is clearly explained in the background, methods, results, discussion, and recommendations	10	
Adherence to the Guidelines for Writing Capstone Project (5 points)	The extent to which the guidelines provided are strictly followed in preparing the document including examining and grading the: structure, format and the lay-out of the document; text development and coherence; language and style; use of sources and citation style; and the quality and relevance of the references.	5	
	Total	110	