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Menstruation, Menstrual Cups and School Attendance:

Evidence from a Randomized Trial in Uganda

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Abstract

Several organizations claim menstruation and lack of proper sanitary protection to be one reason for lower school attendance in developing countries. These claims are stated to cause lower progression rates to secondary school among girls, and further increase the gender gap in enrollment to higher education. This study aims to examine the effects of menstruation on school attendance and to evaluate further what impact provision of menstrual cups have on girls' schooling. The results are presented from a randomized trial that assigned menstrual cups to adolescent girls in rural Uganda. Girls are randomly assigned a menstrual cup for use during their menstruation to measure the effect on school attendance. The findings suggest that the effects are minimal and do not support that menstruation or lack of proper sanitary protection has a significant impact on education as has been claimed. The effect of menstruation on school attendance indicate that girls miss on average 0.009 days of school over 34 schooldays. Girls being allocated a menstrual cup are 0.028 days more likely to attend school during period days. I control for age, girls' years of education, parents' years of education and parents' monthly work for pay. The method used in the analysis is the difference-in-difference estimator. Quantitative and qualitative data were conducted with 58 participants.

Keywords: Menstruation, modern sanitary protection, menstrual cup, barriers to girls' schooling, school attendance

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1. Introduction

Positive effects of female education on economic development, health and empowerment have been highlighted by several organizations during the last decades (UNICEF, 2004). Girls schooling has become especially important and challenges to access education in developing countries have over the past years met progress (Global Partnership for Education, 2019a). However, despite gender parity in primary education, disparities remain in the rate of progression to secondary school (UNICEF, 2018). Lower progression to higher education among girls may be due to many factors, such as poverty, child marriage and early pregnancies (Subrahmanyam, 2016). Girls may also face additional obstacles when entering puberty during the later years of primary school when dropout rates are the highest for girls (World Bank, 2018a). In developing countries, less than two thirds of girls' complete primary education and only one third complete lower secondary school (World Bank, 2018a).

Several organizations claim menstruation and lack of proper sanitary protection to be one reason for lower school attendance among girls. For example, Femme International (2019) - a leading organization in the field of menstrual health education in East Africa - claim that menstruation is a primary reason for reduced school attendance. Challenges women in developing countries face during maintenance of their menstrual hygiene is related to menstrual taboos and social restrictions (Femme International, 2019). Lack of adequate facilities, mainly in public places such as schools and workplaces, along with limited access to water and lack of privacy, make girls and women struggle to maintain their menstrual hygiene (The World Bank, 2018b). The World Bank estimate menstruation to have a significant impact on girls schooling, claiming a 10-20 percent reduction rate in attendance if a girl misses four days of school every month due to her period (Oster & Thornton, 2009).

If menstruation causes lower school attendance rates as supported by policy claims, the provision of modern sanitary protection is suggested to increase schooling. Increased attendance would thus reduce the gender gap in progression to secondary school. This reasoning is important from an economic perspective, as research suggests that gender disparity in education causes long-term effects on economic growth by lowering the average level of human capital (Klasen, 2002). Focus on the interrelations of menstruation, lack of proper sanitary protection and lower attendance rates have been examined by several studies. The major findings summarize the effects of menstruation on attendance to be small. For example, one

randomized evaluation in Nepal reports no evidence that modern menstruation technology affects school attendance. However, results suggest menstruation to be a barrier for girls, but that provision of sanitary products may not be the solution to removing these barriers (Oster & Thornton, 2009). Similarly, a study in Kenya finds no significant effects on school attendance from the distribution of sanitary pads, though access to sanitary products may have health benefits in this context (Stopford, 2012). To further investigate the extent of menstruation as a barrier for girls schooling, I have chosen to perform quantitative research that I seek to describe with qualitative data.

This study aims to examine the effects of menstruation on school attendance and to evaluate further what impact provision of menstrual cups have on girls schooling. It is achieved by a randomized trial that provides menstrual cups to adolescent girls in Kamuli District, Uganda. In order to achieve this aim, the study will be guided by the following research questions:

- 1. What are the effects of menstruation on school attendance?*
- 2. Are there implications from the provision of a menstrual cup on school attendance?*

The answers to these questions are highly relevant as they may provide policymakers and organizations with the valuable insight required to assess the need for improved menstrual hygiene management.

The remainder of this thesis is presented as follows. Chapter two describes the theory of human capital and previous empirical research. Chapter three informs over the institutional context of Uganda. Chapter four describes the methodology and data. Chapter five presents the results and analysis. Chapter six concludes and discusses.

2. Theory and Previous Empirical Research

This chapter is divided into three main sections. The first section describes theoretical considerations of education's contribution to human capital. I hypothesize that menstruation has adverse effects on education and discusses the critical role that education play for future economic development. The second section presents previous empirical research that highlights the link between menstruation and school attendance, discussing quantitative and qualitative studies with a specific focus on menstruation and education. In the final section of this chapter, I also discuss some findings from the macro-oriented literature examining the relationship between gender inequality in education and economic growth.

2.1 Human Capital Theory

In order to understand the theoretical perspective linked to menstruation and school attendance, it is relevant to acknowledge how lower secondary completion rates may reduce the human capital in terms of lower educational attainment. Among girls in developing countries, lower attendance rates to higher education could be explained by the barriers girls face during menstruation. This statement is to be addressed for theoretical reasoning.

Human capital is an essential economic concept for economic growth and well-being (OECD, 2001). In the 1960s, economists began referring to "capital" as the role of education in prosperity and economic growth (OECD, 2001). Economically, the return from human capital can be perceived in terms of the individual's prosperity and the nation's economy (OECD, 2001). Furthermore, on an individual level, income tends to rise in the direction of a higher level of education and individuals thus invest in education to gain knowledge and skills that can provide long-term returns (OECD, 2001). Returns to investment in education, based on human capital theory, are higher in low-income countries and females continues to experience higher average rates of return to schooling (World Bank, 2018c). For this reason, girls' education remains a priority (World Bank, 2018c).

Returns to Investment in Education

The returns of schooling have been tested on several social issues, for example, gender discrimination (World Bank, 2018c). The effects of the returns to education results in efficiency and equity, yet social and private returns differ between levels and type of education (World Bank, 2018c). Returns are highest for primary and female education, however, private returns

to higher educations are increasing, and are largest for low-income and middle-income countries (World Bank, 2018c). The overall rate of return to schooling by low-income countries is 9,3 percent, and 9,2 percent by middle-income countries (World Bank, 2018c). As reported by Becker (2019), education, training and health are essential investments in human capital. Evidence from countries with different cultures and economic systems have all shown a positive relationship between education and earnings, where the gains from education generally are more substantial in less-developed countries (Becker, 2019). Becker (2019) states that countries that have achieved significant economic growth have experienced large increases in education and training, which has led to the possibility of advancing technological knowledge. Japan, Taiwan, and other Asian economies can, for example, illustrate the importance of human capital to growth; despite the lack of natural resources and discrimination against exports by the West, Asia's labor force makes use of modern technologies by being educated, well-trained and hardworking (Becker, 2019).

Heckman (1999) states that investments in early childhood development influence health, economic, and social outcomes for individuals and society. Heckman (1999) further state basic cognitive and non-cognitive skills to be essential components for the production of economic and social success. Abilities created in an early stage foster further learning, consequently leading abler people to acquire more skills, and more skilled people, therefore, to become abler (Heckman, 1999). Heckman's evidence shows investment in early learning to be effective and that learning begets learning. The rate of return to investment in human capital is explained to be highest for the young who have a longer horizon over gains of investments (Heckman, 1999). Schultz (1961) continues the analysis of economic productivity and economic growth to depend on people. Disparities in human investment may explain earning inequalities, consequently leading to differences in health (Schultz, 1961).

Measures have illustrated increases in education to affect social indicators and growth within 10-15 years (Baldacci, Clements, Gupta & Cui, 2008). This effect is different between country groups and is the highest for low-income countries. Despite the long term effects on human capital from investment in education, researchers indicate that growth is positively affected by the outcome of higher education by increased performance and basic skill development (Chu, Huang, Loyalka, Shi, Song, Wei, Yi, Zhang, Ren, Maani & Rozelle, 2014). Overall, spending on education is estimated as a good investment for increased future productivity and private returns.

2.2 Previous Empirical Research on Menstruation and School Attendance

In order to understand to what extent menstruation and school attendance are correlated, research that illuminates the relationship needs to be acknowledged. This relation, including alternative factors that may impede education, is observed by studies that have implemented interventions on menstruation and education.

Hennegan, Montgomery, Dolan, Wu and Scott (2016) performed a quantitative survey measuring existing menstrual hygiene management and its impact on schoolgirls in Kamuli District, Uganda. Eight primary schools were enrolled in a quasi-randomized survey, providing each school with the provision of one of the four conditions: i) Puberty education; ii) AFRipads (a reusable sanitary pad that can be used for 12+ months); iii) Puberty education and AFRipads, or iv) no intervention. The initial results from the survey display that there are more barriers to girls schooling than lack of sanitary protection alone. One of the four conditions; provision of the reusable AFRipads and puberty education, increased girls school attendance by 17 percent, translating into 3.4 days out of every 20 days (Hennegan et al. 2016). This result adds to the fact that other aspects of menstrual hygiene management need to be acknowledged for further explanations to the lower attendance rates during menstruation. Grant, Lloyd and Mensch (2013) consider this result and examine alternative individual and school-level factors associated with menstruation-related school absenteeism in rural Malawi. Estimations by the researchers indicate that data on factors for gender disparity in education only confirm menstruation to account for a small proportion of all female absenteeism. Causes stronger associated with school absence is time spent with family or doing homework (Grant, Lloyd & Mensch, 2013). On account of above, research approaching specific experiences of menstruation, that alter distinctive barriers to education, is presented in the following part.

One research report pain, lack of access to sanitary protection and inadequate facilities at school to be the primary reasons given for why menstruation keep girls away from school (Miuro, Rutakumwa, Nakiyingi-Miuro, Nakuya, Musoke, Namakula, Franciz, Torondel, Gibson, Ross & Weiss, 2018). These results are assembled from a qualitative and quantitative study on practices, barriers, and facilitators coherent to menstruation and school absenteeism in a peri-urban district of Uganda (Miuro et al. 2018). 19,7 percent of the participants reported at least one day of missing school during their period due to physical symptoms (Miuro et al. 2018). Furthermore, results from qualitative research in Delhi, India, add to these estimations and report pain, lack of privacy, and quality sanitary protection to be prior restrictions for education

during menstruation (Vashisht, Pathak, Agarwalla, Patavegar & Panda, 2018). However, evidence on to what extent lack of proper sanitary protection affects school attendance is still of necessity. Therefore, further quantitative evidence that aims to highlight statistical associations between the two variables is emphasized. Explicitly, experimental trials are desirable for this type of estimations, which explain and allow us to draw inferences around association and causality. The next part highlights two studies on this type of empirical research, focusing on interventions with treatment and control groups.

Oster and Thornton (2009) examine the effects of distributing menstrual cups to adolescent girls in four schools in Chitwan District, Nepal. The study method includes a randomized evaluation with one treatment group, given the menstrual cup, and one control group. All participants are given a time diary, including a menstrual calendar to note the start and end date of their period. Data on menstruation is collected from the girls' menstrual calendars and data of school attendance is collected daily through official school records. Oster and Thornton (2009) report two findings; girls only miss a total of 0.4 days in a 180-day school year due to their menstruation, and access to the menstrual cup shows no significant impact on school attendance. Comparing these results to the World Bank hypothesized estimation, to be between 18 and 36 schooldays missed in a 180-day school year, specify the concern of alternative experimental trials (Oster & Thornton, 2009).

Montgomery, Ryus, Dolan, Dopson and Scott (2012) perform an alternative experiment and focus on the impact of puberty-related interventions on school attendance by a non-randomized trial in Ghana. The trial has three levels of treatment: the first intervention is to provide puberty education and distribution of sanitary pads, the second intervention is to provide puberty education alone, and the third intervention is the control group with no provision of pads or education. The study reports both puberty-related interventions to result in increased school attendance compared to the control group with no interventions. Finally, the intervention providing puberty education alone resulted in higher attendance rates compared to the intervention that also distributed sanitary pads (Montgomery et al. 2012).

To conclude, high dropouts and lower progression rates to secondary school among adolescent girls may be due to many factors and not only because of lack of proper sanitary protection. Puberty education and provision of proper sanitary protection suggest having some effects. Even so, physical pain implies to be more related to school absenteeism.

2.3 Previous Empirical Research on Gender Inequality in Education and Economic Growth

Lower attendance rates and progression to secondary school among girls, due to menstruation, add to gender disparities in education. Secondary education has been stated as the minimum educational level to ensure productive employment, reduction in poverty rates and thus economic and social contribution to the society (Subrahmanyam, 2016). Girls' returns from investment in secondary education are stated to have more substantial effects than those for boys (Subrahmanyam, 2016). For this reason, it is relevant to discuss the macro-oriented literature that examines the relationship between gender inequality in education and economic growth.

Costs related to inequality education prevent global progress and affect a country's economy on a large scale (World Bank, 2018a). World Bank (2018a) report barriers to girls' education to cause the world trillions of dollars. Lost lifetime productivity and earnings reports to be the two main costs. Data from low-income countries shows that less than two thirds of girls' complete primary school and only one in three girls complete lower secondary school (World Bank, 2018a). 130 million girls between the ages of six and 17 are not in school (World Bank, 2019). Girls who continue education on secondary school-level says benefit both socially and economically, not only for the girls themselves but also their children and their communities (Subrahmanyam, 2016).

Gender inequality in education is stated to harm poverty (UNFPA, 2017). Chaudhry and Rahman (2009) investigate this claim performing a case study, a household survey questionnaire, in ten villages in rural Pakistan, Muzaffar Garh District. Gender inequality refers to inequality in conditions among women and men for realizing their full human rights (Chaudhry & Rahman, 2009). The researchers state that gender disparity in education exists due to cultural values concerning the life roles of women and men in Pakistan. Empirical evidence display a positive correlation between an increase in female education and human development outcome; child survival, health, and schooling (Chaudhry & Rahman, 2009). Chaudhry and Rahman (2009) find a positive relationship between increased education and reduced poverty. In addition to education, the size of households, physical assets and landholding assume to have an impact on the probability of being rural poor (Chaudhry & Rahman, 2009). Households with a lesser number of enrolled or educated females, low

educational qualifications of females, and low or no female participation in earning activity face a higher risk of poverty (Chaudhry & Rahman, 2009).

Klasen and Lamanna (2009) investigate to what extent gender inequality in education and employment reduce economic growth. The use of panel data during the period 1960-2000 finds a gender gap in education and employment to reduce economic growth in South Asia, the Middle East, and North Africa. Previous macro studies using microdata based on information up to 1990 present girls to have a higher marginal return to education (Klasen & Lamanna, 2009). Theoretical literature argues gender inequality to reduce the average amount of human capital in a society and thus harm economic performance by excluding highly qualified girls and including less qualified boys (Klasen & Lamanna, 2009). If there is declining marginal returns to education, restricting the education of girls to lower levels while taking the education of boys to higher levels, means that the marginal return to educating girls is higher than that of boys and thus would boost overall economic performance (Klasen & Lamanna, 2009). The results show the role women play in society to be linked to the challenge of an increase in economic growth. Costs of discrimination towards women in education and employment impose a cost for the entire society's economic growth and also on other development goals such as child survival, health, and schooling (Klasen & Lamanna, 2009).

Gender inequality in education infers to harm poverty and to be a cost for the entire society. An increase in female education is supposed to have a positive impact on development goals related to an increase in survival rates, income and health. However, the lack of evidence on the relationship between menstruation and girls schooling is still in need of additional research and cannot warranty to be the primary reason for gender disparity in education at higher levels.

3. Institutional Context

This chapter describes the education institutional structure of Uganda, followed by an area specific profile of the Kamuli District where the trial was executed in February and March 2019.

3.1 Education in Uganda

Education is considered a fundamental human right and the government of Uganda views education as part of the solution to reducing poverty (Global Partnership for Education, 2019b). The goal is to provide equitable access to quality and affordable education for everyone (Global Partnership for Education, 2019b). The education system has a structure of two years' pre-primary school, seven years' primary school, four years' lower secondary school, and two years' upper secondary school. The education sector faces many challenges, including a high level of teacher and student absenteeism, weak school-level management structures, inadequate availability of learning materials and large class sizes (Ministry of Education and Sports, 2016).

The Education Sector Strategic Plan (hereafter referred to as ESSP) 2004-2015 was in 2003 prepared to provide a framework for policy analysis and budgeting aimed at addressing critical concerns regarding primary schools, secondary schools, and universities and technical institutes (Global Partnership for Education, 2019b). Firstly, providing children in primary schools with literacy, numeracy, and basic life skills were not fulfilled. Secondly, students finishing secondary schools did not reach the requirements with skills and knowledge for the workforce or tertiary education. Thirdly, students from disadvantaged backgrounds did not have access to tertiary education by universities and technical institutes. To achieve universal primary and secondary education, and to enhance equitable access to tertiary education, ESSP works on specific objectives (Global Partnership for Education, 2019b). These objectives cover an increase and improvement in access to all levels of education and improvement in quality, effectiveness and efficiency of all education levels and education services. The approach to fulfill these policies is performed through strategies supporting disadvantaged children and adolescents, improving school facilities and strengthening the teaching force, leading to student achievement (Global Partnership for Education, 2019b).

3.1.1 The Ministry of Education and Sports

The Ministry of Education and Sports (MoES) is responsible for providing high-quality education at the lowest affordable costs and accessible by all. The ministry's mission is to, by, regulations, coordination and guidance, support and promote quality education, training and sports to everyone in Uganda (Ministry of Education and Sports, 2019). National integration and development are dependent on the mission. Implementation of free tuition at the primary school level has, according to ESSP, increased enrollment to primary education among poor households and therefore reduced the gap between children who get access to primary education and children who earlier not could afford education (Ministry of Education and Sports, 2019). Girls had higher enrollment, relative to boys, and primarily benefited from the implementation. Universal primary education in 1997 affected education rates, increasing student enrollment from two million pupils to the current almost eight million (Ministry of Education and Sports, 2019). Since also implementing free post-primary education, making Uganda the first country in Africa to provide free education at this level, enrollment proliferated (Ministry of Education and Sports, 2019).

3.1.2 Primary Education

Primary schools are divided into two categories: government aided schools and private primary schools (The Ministry of Education and Sports, 2016). Kamuli District is located in the Busoga sub-region, covering, 621 private primary schools and 1131 governmental schools (The Ministry of Education and Sports, 2016). Data on enrolment by grade, age and sex are collected and reported by the Annual School Census (The Ministry of Education and Sports, 2016). The minimum age of entry to grade one is six years and the maximum age to exit from grade seven is 12 years. Findings show a total of 83,7 percent to be between the ages of six and 12 years; the remaining 15,3 percent of the enrollment was over age while 1,0 percent was underage (The Ministry of Education and Sports, 2016).

3.2 Girls' and Women's Situation in Uganda

Women in Uganda are more marginalized than men in aspects of access to and control over education and health services, empowerment and political representation, agricultural production and economic status (UNFPA, 2017). Teenage pregnancy, child and forced marriage, and other socio-cultural norms and harmful traditional practices reinforce gender inequality (UNFPA, 2017). 22,7 percent of girls' school dropout is due to teenage pregnancies

(UNFPA, 2017). There is a negative impact of the slow pace in the reduction of maternal mortality rate and teenage pregnancies on the Gender Inequality Index (UNFPA, 2017).

3.3 Geographic Location and Area Specific Profile

Uganda is located in East Africa bordered by Kenya in the East; South Sudan in the North; Democratic Republic of Congo in the West; Tanzania in the South; and Rwanda in South West. The country is divided into 116 districts, which are subdivided into 200 Counties, 1 378 Sub-counties and 6 495 Parishes (Uganda Bureau of Statistics, 2017).

Kamuli District is located in the eastern region of Uganda, in the Busoga sub-region, with a population size of 486 319 (Uganda Bureau of Statistics, 2017). Females aged 6-12 attending primary school is 48 624, in contrast with 49 297 males. Females aged 13-18 attending secondary school is 13 336, and males in the same age attending secondary school are 13 662 (Uganda Bureau of Statistics, 2017). 69 749 females aged 15 and above are not in school and the highest level completed is below fourth class in secondary school, the same statistics for males are 56 777 (Uganda Bureau of Statistics, 2017). Females aged 10-19 who have ever been married is 8 330, and females who have given birth aged 12-19 are 8 042. Further, 7 597 youths (18-30 years) have neither been in school nor worked. Kamuli District is characterized by poor performance on education and health indicators; 89 685 households own at least one mosquito net and 3 453 households have piped water for drinking (Uganda Bureau of Statistics, 2017).

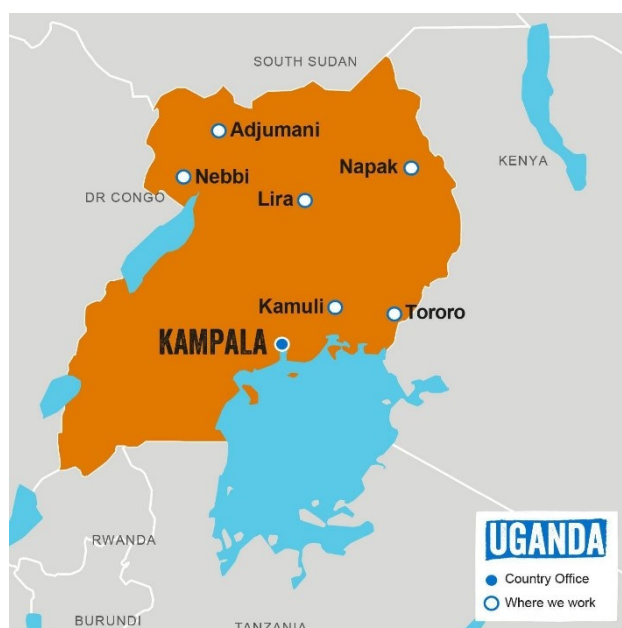


Figure 1: Geographic Location (Plan International Uganda, 2019)

Education in Kamuli

Statistics from 2016 report Kamuli municipality to have 19 governmental primary schools and 32 private primary schools, three governmental secondary schools and eleven private secondary schools. Mutekanga Primary School, where the study takes place, is one of the government primary schools. During 2016, a total of 515 students were enrolled in the school (288 boys and 227 girls) and 13 working teachers (four male teachers and nine female teachers). Today, Mutekanga Primary School has a total of 805 students (425 boys and 380 girls) and 12 working teachers. Daily class registers rate school attendance and has an average attendance rate of 50 students in a class of 67 students. Despite the government's policy on free education, school fees are dependent on the mobilization skills of the head teacher. Mutekanga Primary School collects school fees among the families who can pay. School fees are collected in church and differ between grades. It is illegal to send a child home for not paying school fees. In 85 percent of the cases, the government contributes USD 2,5 - equal to UGX 10 000 -, for each child per school year. This information is summarized from an interview with the municipal education officer.

4. Methodology

This chapter presents the design of the study and the approach used to collect the research data. It also describes the treatments used in the experiment.

4.1 Study Design

The study is performed in collaboration with Plan International Uganda, a development and humanitarian organization that advances children's rights and equality for girls. The research is conducted in one primary school in Kamuli District, rural Uganda, between February and March 2019. The study is performed in two stages: qualitative and quantitative. The qualitative research material is summarized from interviews and questionnaires. The quantitative research material is collected from calendars with time diary data. All documents and interviews are translated into the local language Lusoga by an interpreter.

4.1.1 Experimental Design

To analyze the effects of menstruation and the impact of the menstrual cup on school attendance, I run an experiment with one treatment and one control group. I invited girls enrolled in the school, along with the senior woman teacher, to a first study meeting. 58 girls attended the meeting and were all enrolled in the study. At this meeting, I carried out a randomization where 29 girls were assigned to the treatment group and control group, respectively. I gave each girl a number between 1-58 that was written down on all documents given to the girl. Girls who were assigned a number between 1-29 belonged to the treatment group and girls assigned a number between 30-58 belonged to the control group. After the randomization, all girls and the female teachers at school signed an ethical consent for the girls' participation. All signed agreements were collected before I conducted the baseline survey and questionnaires.

By the end of the meeting, girls were given a booklet of time diaries for each month. The time diary consists of two main sections. One column in which girls would mark what days they are in school and one column in which girls would mark what days they have their period. The calendar covers all days in February and March, and weekend days are marked in red. The calendar was translated into the local language Lusoga and girls were trained how to fill the diary. Lastly, the treatment group was given a menstrual cup and detailed instructions on how to use it with the help of a menstrual hygiene management worker from Plan International.

The control group was given a hand disinfection gel. All girls in the treatment group accepted the menstrual cup. Controls in the school were administered around once a week to control the use of the cup. I asked the girls if they used the cup and what main challenges they experienced with using the cup. All girls who had got their period by the time the controls took place had used the cup. I specifically asked them to describe how they managed the sterilization process to ensure the cup was correctly sterilized before and during use. During the controls, I also reviewed and corrected the calendars if there were any inconsistencies. The controls further encouraged the girls to ask questions.

By the end of the study, a last meeting was held to collect all calendars. Two girls from the control group had by this time transferred to another school and one girl in the treatment group did not fill in the calendar correctly. These three calendars are excluded from the data analysis and 55 calendars remain. At this last meeting, the girls in the control group were given the menstrual cup and the girls in the treatment group were given the hand disinfection gel.

4.1.2 The Menstrual Cup

The sanitary protection is a menstrual cup that is used internally to collect menstrual blood during menstruation. Participants are assigned a menstrual cup produced by the company Flowcup, shown in Figure 2. The cup is reusable for up to five years and made from 100 percent medical-grade silicone. The cup is sterilized by boiling the cup in water, alternatively by pouring boiling water on the cup for three to five times. Between uses, the cup is washed with water and stored in an organic cotton bag.

The primary protection participant's use during their period before access to the menstrual cup was reported to be cloths and pads (52 percent of girls in the sample report using cloths and pads, and 19 percent use only pads). Pads used are disposable pads and the reusable AFRIpad, which is washed and reused. The menstrual cup is suitable in developing countries for many reasons: the girls can use the cup for years, they do not dispose the cup and can more easily keep their period private, and they are not as likely to share the cup. The girls are given instructions not to share the cup, and only one cup is given per girl. The limited supply of sanitary protection reduces the chances for contamination in the experiment, and the treatment girls and control girls are less likely to share the product comparing to handling out a supply of sanitary pads. Participants report the menstrual cup to be preferable for various reasons. The

primary reasons are increased mobility and more extended use of the protection between changes.



Figure 2: Flowcup Photo (Flowcup, 2018)

4.2 Data

I use two primary elements of panel data: data on school attendance and data on menstruation days. Both data are available directly from the girls' calendars. I transfer all data from the calendars to excel and create a dummy for girls in the treatment group and a dummy for period. The dependent variable is school attendance and the main independent variables are menstruation and the treatment dummy. I control for age, years of education, parents' years of education, and parents' monthly work for pay.

A randomized controlled trial is a reliable method for testing the impact of an intervention. Randomization prevents unbiased estimates which avoid any treatment to appear more beneficial than it is. From the randomization, I can directly compare the differences between the two groups. Regressions are performed in Stata/IC 15.1. To estimate the impact of a girl's period on school attendance, I first limit my analysis to the girls in the control group since I am interested in estimating the impact of menstruation on girls with access to poor sanitary technology. Evaluation of the impact of the menstrual cup on school attendance is based on data from girls in both groups to compare the average outcome.

4.3 Empirical Approach

The method used to test for any differences in attendance between the treatment and control group is the difference-in-difference estimator. The method indicates the effect of an intervention, for a randomized evaluation, by comparing differences in the mean of an outcome variable between the treatment and control group. To do this, I estimate a panel data regression with individual fixed effects and a dummy for being in the treatment group. Fixed effects hold all control variables constant over a period of time and differences in control variables between observations do not indicate to affect the outcome of the study. Any change they cause to one observation is constant across individuals and the independent and dependent variable is the only two changing variables in the experiment. When I estimate the treatment effect, I test for control variables to see if any variable influences the outcome in attendance among the girls in the treatment group. Control variables are tested for girls' age, years of education, parents' years of education and parents' monthly work for pay.

5. Results and Analysis

The first section of this chapter presents descriptive statistics, empirical strategy and regression results. In the final section of this chapter, I also present the qualitative data and discuss my indications in correlation to the quantitative results. Interpretation and analysis of the results are carried out continuously.

5.1 Descriptive Statistics

A standard analysis for a randomized evaluation involves summary statistics on baseline characteristics. Descriptive statistics is data to provide summarized information and characteristics of observations, described with mean, standard deviation and the number of observations. Balancing tests is essential for randomized evaluation to ensure unbiased estimates and is observed by calculating the differences in mean on variables between the treatment and control group. The aim is that there should be no significant differences between the treatment and the control group.

Summary statistics and balancing tests are performed using data from the baseline survey. Panel A of Table 1 presents baseline demographics. The average age is 13, and girls are randomly divided between different grades and have an average of eight years of education. The average years of education are ten for mothers and seven years for the fathers. I collect information on income, which is a categorical variable. In my empirical analysis, I use a dummy for low income, which equals one if the monthly income ranges between UGX 0-11 999 (USD 0-3,19).

Panel B of Table 1 presents balancing tests between differences in the mean between the groups. To derive the p-value, I perform a two-sample t-test on each variable and test the hypothesis:

$$H_0 = \text{No differences in the mean between the treatment and control group}$$

Column five in Panel B of Table 1 shows the p-value from the t-tests. All variables indicate a statistically significant p-value at one percent, indicating that we reject the null hypothesis. This suggests that the groups are unbalanced and that the randomization of the experiment has failed. Rejecting the null hypothesis implies a difference between the groups. However, the differences between the groups are small. From column four in Panel B of Table 1, we see that girls in the treatment group only are seven weeks older ($0.138 * 52$ weeks) than the girls in the control

group. We also see that the girls in the control group have been in school ten more weeks ($0.302 * 36$ school weeks per year; that is, approximately one school year) compared to the treatment girls. Furthermore, it is noted that the mothers to the girls in the control group are more educated ($0.94 * 36$ school weeks) compared to the mothers to the girls in the treatment group. It is of importance to keep in mind of the failed randomization throughout the analysis.

Based on the above, it is also critical to acknowledge that the effectiveness of randomization depends on the sample size and that the likelihood of equivalence increase as sample size increases. A small sample size, therefore, undermines the reliability of the results of the study.

Table 1: Summary Statistics and Balancing Tests

<i>Panel A. Sample Summary Statistics</i>	<i>Mean</i>	<i>SD</i>	<i>Number of Observations</i>	
Age	13.8	0.97	55	
Years of Education	8.8	1.79	55	
Mother's Years of Education	10.27	3.89	55	
Father's Years of Education	7.84	5.42	55	
Mother's Low Income	0.64	0.48	55	
Father's Low Income	0.29	0.45	55	
Share of Days Attended	.98	.02	55	
<i>Panel B. Balancing Tests</i>	<i>Treatment (N=29)</i>	<i>Control (N=26)</i>	<i>Difference</i>	<i>p-value from t-test</i>
Age	13.828	13.690	0.138***	.0022
Student's Years of Education	8.621	8.923	-0.302***	.0003
Mother's Years of Education	9.83	10.77	-0.94***	.0000
Father's Years of Education	9.07	6.46	2.61***	.0000
Mother's Low Income	0.69	0.577	-0.113***	.0000
Father's Low Income	0.448	0.115	-0.339***	.0000

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: This table illustrates simple summary statistics on sample size and demographics. Income is a categorical variable and a dummy is created for low income, which equals one if the monthly income ranges between UGX 0-11 999 (USD 0-3,19).

Figure 3 presents descriptive statistics on attendance rates from the time diary data for girls on period and non-period days. Girls in the control group menstruate 12 percent of schooldays and girls in the treatment group menstruate 13 percent of schooldays. The two first columns illustrate girls in the control group who are not given the menstrual cup. The first column present attendance rates during non-period days and the second column illustrate attendance rates during period days. Attendance is slightly higher for girls in the control group during non-period days, with an average of 98,1 percent, compared to period days with an average of 97,2 percent. The third and fourth column illustrates the same statistics for girls in the treatment group who are given the menstrual cup. The third column present attendance rates during non-period days and the fourth column illustrate attendance rates during period days. Attendance during period is 100 percent, comparing to non-period days with an average attendance on 98,6 percent.

P-value difference in mean on attendance between non-period and period days is high and calculated to 0.5493 for girls in the control group and 0.1654 for girls in the treatment group. These results indicate weak evidence against the null hypothesis and show no statistically significant difference in attendance between non-period and period days.

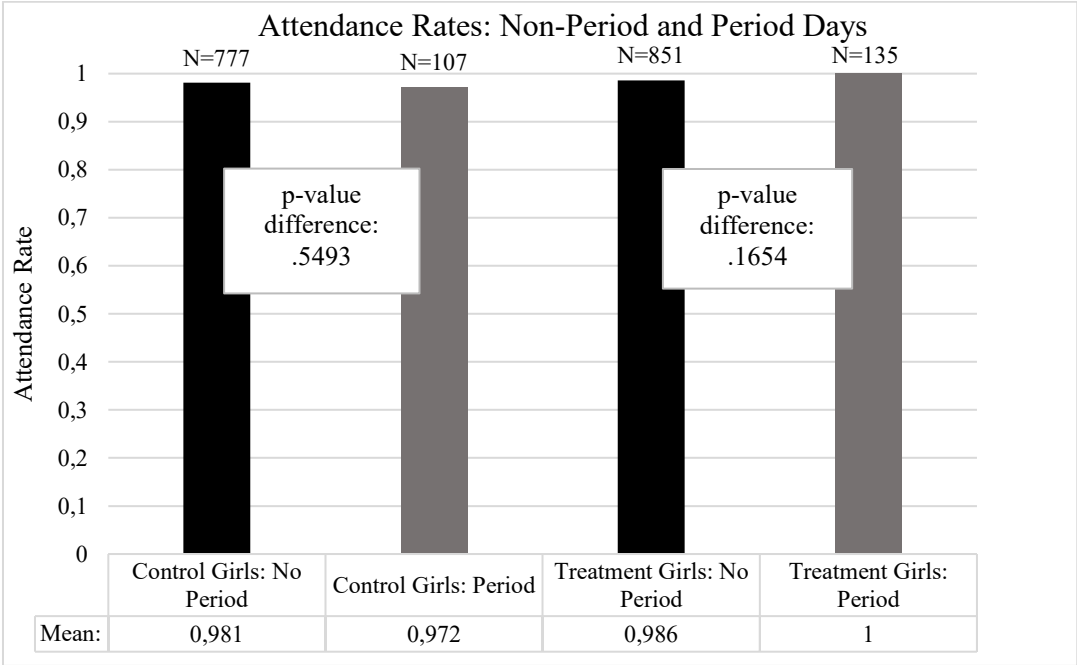


Figure 3: Attendance Rates: Non-Period and Period Days

Notes: This figure illustrates attendance rates (from time diary data) for girls on non-period and period days. The two first columns use control girls who do not have access to the menstrual cup. The two last columns use treatment girls who have access to the menstrual cup.

5.2 Regression Analysis

Next, I extend my analysis to more formally examine the impact of menstruation on school attendance, and the effect of the provision of the menstrual cup on attendance, respectively.

5.2.1 Impact of Menstruation on School Attendance

Estimations in Panel A of Table 2 is limited to girls in the control group to see the effect of menstruation on school attendance. Descriptive results were illustrated graphically in Figure 3, showing attendance rates from the control girls time diaries on non-period and period days. Panel A of Table 2 instead shows statistical estimates on the effect of menstruation on school attendance, testing for individual fixed effects. The coefficient is negative and indicates girls to be 0.009 days less likely to attend school during menstruation. The p-value is high, 0.549 (not shown in table), which indicates weak evidence against the null hypothesis and that the hypothesis test is statistically insignificant. In other words, the result cannot ensure any relationship between menstruation and school attendance. The estimation of the insignificant effect would indicate that missing 0.009 days on 34 schooldays, due to menstruation, would not have any significant impact on learning. This result corroborates the findings in Oster and Thornton's (2009) study on menstruation, sanitary products and school attendance in Nepal, which indicate girls to be 0.4 days less likely on 180-day school year to attend school on days they are menstruating. Both findings contradict policies claiming the effects of menstruation on girls schooling to be significant.

5.2.2 Impact of Menstrual Cup on School Attendance

Estimations in Panel B of Table 2 includes the whole sample to measure the effect on attendance from being allocated a menstrual cup. The second column in Panel B of Table 2 estimates the treatment effect without comparing outcome in attendance rates for girls in the control group. The coefficient is positive and the provision of the menstrual cup indicates an increase in attendance of 0.003 days during period days. The p-value is high, 0.689 (not shown in table), which indicates weak evidence against the null hypothesis and that the hypothesis test is statistically insignificant. From this, we cannot ensure that there are any differences in attendance during period and non-period days from the provision of the menstrual cup. When testing for control variables, the variable age shows a significant negative impact at the ten percent level, indicating that girls who are one year older tend to be less in school with 0.006 days during period days. Controlling for father's years of education presents a significant

negative impact at the five percent level, indicating that girls to fathers that have one more year of education tend to be less in school with 0.001 days during period days. These coefficients are very small and seem unlikely to have any impact on attendance.

The third column in Panel B of Table 2 estimates the treatment and control effect using the difference-in-difference approach. The column represents one regression after the intervention that compares girls in the treatment group and girls in the control group when they have and do not have their period. To estimate the difference-in-difference effect, I perform the following equation regression:

$$Y_{it} = \alpha + \beta_1 Treatment \times Period_{it} + \beta_2 Period_{it} + \gamma_i + \varepsilon_{it}$$

Y_{it} is the dependent variable, *attendance*, testing for all individuals during the 34 schooldays. β_1 is the coefficient we are interested in to see the effect of the menstrual cup. *Treatment* is an indicator of being in the treatment group and *Period* indicates if the girl had her period on a particular day.

Regression results indicate that girls who are not given a menstrual cup are 0.012 days less likely to attend school on days they are menstruating. The effect is not significantly different from zero and we can therefore not ensure any correlation between no access to the menstrual cup and lower attendance rates during period days. However, estimations of the insignificant effect can be that menstruation for girls in the control group lower attendance rates with 0.012 days, compared to if they would have been given a menstrual cup. Oster and Thornton (2009) estimate a significant effect and a decrease in attendance of 0.4 days in a 180-day school year during period days. The treatment effect indicates that girls who are given a menstrual cup are 0.028 days more likely to attend school on days they are menstruating. This effect is significantly different from zero and we can ensure, at a significant level of ten percent, that provision of menstrual cups increase attendance with 0.028 days during period days. Oster and Thornton (2009) find no significant effect from the provision of menstrual cups and indicate that provision of menstrual cups have an insignificant effect on 0.5 days increase in attendance in a 180-day school year.

5.2.3 Alternative Interventions

Estimates from descriptive and empirical evidence present minimal impact from the provision of menstrual cups on school attendance. Furthermore, the effect of menstruation on attendance is not as large as expected and stated from stakeholders. These results, therefore, illustrate that other randomized interventions may give more substantial gains to schooling. For example, interventions that include cost reduction of schooling, provision of incentives to attend school and improvement of students' health, shows to result in higher school attendance rates.

Miguel and Kremer (2014) findings on deworming children in Kenya illustrate an increase in attendance with seven percentage points. Bobonis, Miguel, and Sharma (2006) present similar increases in schooling among children in pre-primary schools, who randomly been given iron supplements and deworming medicine. Further, programs providing students with uniforms and textbooks find a decrease in dropout rates and higher attendance. Kremer (2003) find an increase of 15 percent years of schooling by the provision of incentives to attend. Given these points, the results of this study and the findings from Oster and Thornton (2009), indicates on other implications to increase school attendance to a more significant extent.

Table 2: Effect of Menstruation and Menstrual Cup on School Attendance

<i>Panel A: Impact of Menstruation on School Attendance: Girls in the Control Group</i>		
	Time Diary Data	
Period	-.009 (.015)	
Individual Fixed Effects	YES	
Number of Observations	884	
<i>Mean of Dependent Variable: Attendance</i>	0.98	
Estimated Period Impact, 34 schooldays	-0.009 Days	
<i>Panel B: Impact of Menstrual Cup on School Attendance</i>		
	Time Diary Data	
Treatment	.003 (.009)	
Treatment * Period		.028* (.017)
Period		-.012 (.013)
Controls	YES	NO
<i>Age</i>	-.006*	
<i>Years of Education</i>	-.000	
<i>Mother's Years of Education</i>	-.001	
<i>Mother's Low Income</i>	-.003	
<i>Father's Years of Education</i>	-.001**	
<i>Father's Low Income</i>	-.0014	
Individual Fixed Effects	NO	YES
<i>Mean of dependent variable: Attendance</i>	0.98	0.98
Number of Observations	1,870	1,870
Estimated Cup Impact, 34 schooldays		0.028 Days

Robust standard errors in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%
Note: This table illustrates the effect of menstruation and menstrual cup on attendance.

5.3 Qualitative Data

Next, I examine qualitative data that is observed from questionnaires on menstruation and education. The questionnaires were collected at the initial meeting in which all 58 girls attended. Qualitative data aims to provide detailed information that hopefully can complement the quantitative analysis. Responses on statements are divided into a four-point scale:

0: I do not agree at all

1: I do not agree

2: I agree

3: I completely agree

Table 3 presents qualitative measures on attitudes and activities during menstruation. Over 80 percent of all observations report not to agree with the statement of missing school due to lack of sanitary products, nor due to unhygienic sanitation in school. Only one girl agrees to be affected by the lack of sanitary products and two girls to be affected by unhygienic sanitation in school. More than half of all observations report not to agree with the statement on being unable to play with friends during menstruation. Carrying out daily activities due to menstrual pain is for over 80 percent of all observations not a problem, although 36 percent report to agree with the statement on remaining indoors during menstruation. Nearly 38 percent of the girls' report to avoid being around boys and men when menstruating.

Table 3: Attitudes and Activities during Menstruation

<i>Panel A. Sample summary statistics on attitudes and activities during menstruation</i>	<i>0: I do not agree at all</i>	<i>1: I do not agree</i>	<i>2: I agree</i>	<i>3: I completely agree</i>	<i>Number of Observations</i>
I miss school due to no access to sanitary products	6,897%	81,034%	10,345%	1,724%	55
I miss school due to no access to hygienic sanitation in school	1,754%	80,702%	14,035%	3,51%	57
I am unable to play with friends	7,018%	57,895%	24,561%	10,526%	57
I am unable to carry out daily activities due to menstrual pain	10,345%	81,034%	6,897%	1,724%	58
I avoid physical activities	0%	55,172%	31,034%	13,793%	58
I avoid being around boys or men	1,724%	36,21%	37,931%	24,138%	58
I remain indoors	1,724%	50%	36,21%	12,1%	58

Table 4 presents well-being measures during menstruation. Feeling ashamed and worried for leakage is present for over half of all observations. More than 20 percent report to completely agree on feeling ashamed and 33 percent report to agree on feeling insecure due to a non-accepted environment. Table 5 reports that 22 percent of the observations agree on the statement that they have been informed about what menstruation is, although almost half of all girls' report missing knowledge about why they menstruate and what happens in the body during menstruation. 58 percent report not to agree that they have been informed about available sanitary protection.

Table 4: Well-Being Measures

<i>Panel A. Sample summary statistics on well-being during menstruation</i>	<i>0: I do not agree at all</i>	<i>1: I do not agree</i>	<i>2: I agree</i>	<i>3: I completely agree</i>	<i>Number of Observations</i>
I feel ashamed	3,509%	19,298%	56,140%	21,053%	57
I feel worried about leakage	3,509%	29,825%	50,877%	15,789%	57
I feel isolated	12,069%	72,414%	15,517%	0%	58
I feel insecure for a non-accepted environment	7,018%	54,386%	33,333%	5,263%	57
I feel open to talk about period	3,445%	15,517%	56,897%	24,138%	58

Table 5: Information and Preparation

<i>Panel A. Sample summary Statistics on "I have been informed about..."</i>	<i>0: I do not agree at all</i>	<i>1: I do not agree</i>	<i>2: I agree</i>	<i>3: I Completely agree</i>	<i>Number of Observations</i>
What menstruation is	17,241%	50%	10,345%	22,414%	58
Why I have menstruation	17,241%	48,276%	13,793%	20,69%	58
What happens in the body during menstruation	5,172%	48,276%	43,103%	3,448%	58
Sanitary protection	12,1%	58,621%	24,138%	5,172%	58

Table 6 presents statements on attitudes toward education. Half of all observations report agreeing with better life chances with an education. Over 80 percent report support from parents on encouraging education, only one girl does not agree at all with the statement. 75 percent report to completely agree with the importance of having an education independently where you live. 72 percent report to completely agree that education contributes positively to health, no girls report not to agree at all with this statement.

Table 6: Attitudes toward Education

<i>Panel A. Sample summary statistics on attitudes toward education</i>	<i>0: I do not agree at all</i>	<i>1: I do not agree</i>	<i>2: I agree</i>	<i>3: I Completely agree</i>	<i>Number of Observations</i>
I have a better chance in life with an education	3,448%	36,207%	50%	10,345%	58
My parents encourage me to go to school	1,754%	7,018%	8,772%	82,456%	57
No matter where you live, it is crucial with education	3,448%	13,793%	6,897%	75,862%	58
Education contributes positively to my health	0%	8,621%	18,966%	72,414%	58

Evidence of Correlation between Results of Quantitative and Qualitative Research

Testing the significance of the correlation between menstruation and school attendance in a regression analysis does not imply on any statistically significant effects. However, one of the more significant findings to emerge from this study is the qualitative research that indicates the relevance of addressing menstruation in terms of the girls' psychosocial well-being.

In a context where girls are assumed to miss school due to poor sanitary technology, qualitative findings from my data corroborate with previous empirical research that promotes puberty educational interventions, rather than the distribution of sanitary protections, to increase schooling. Over 80 percent of all girls that participated in the study do not agree with the statement that they miss school due to lack of sanitary protection, nor due to physical pain. Feelings of shame and insecurity are more likely factors to why 36 percent of all participants' report remaining indoors during menstruation. Furthermore, nearly 38 percent report to avoid being around boys or men during period days. Oster and Thornton (2009) report cramps as the main reason why girls did not attend school during menstruation and that impact of providing menstrual cups seem to have a limited impact on girls' school attendance.

Poor menstrual hygiene management includes more aspects than lack of sanitary protection and inadequate facilities. Findings indicate that feelings of shame, anxiety and embarrassment may be more correlated to absenteeism and poor performance. Despite the small coefficients on treatment and control, girls in my sample put precise estimations on the fact that menstruation may affect schooling to some extent. This would be in terms of lower well-being measures and non-accepted attitudes towards menstruation, which is the reason why some girls choose to remain inside and avoid being around boys and men. In summary, gains for girls overall well-being should not be underestimated. Girls in the treatment group report the menstrual cup to be more convenient comparing to the use of disposable pads. One girl report using the cup for seven hours compared to the disposable pad she only uses for three hours. Another girl report using the cup for four hours and that she needs to change her pad every hour. In the context of where this study takes place, the lack of adequate facilities in school is common. For example, one girl report fear of infections from the washroom. The menstrual cup may, therefore, be suitable and help ease the burden during menstruation.

6. Concluding discussion

Lower attendance rates during period days have stated to be a consequence of menstruation and lack of proper sanitary protection in developing countries. This study focus on the relationship between menstruation and school attendance among adolescent girls in rural Uganda. The study aims to examine the effects of menstruation on school attendance and to evaluate further what impact provision of menstrual cups have on girls schooling. To achieve this aim, I perform a randomized trial. The sample includes 58 schoolgirls during a period of 34 schooldays.

In terms of the effect of menstruation on schooling, I find that girls are less likely to be in school on days they are menstruating. The effect of menstruation on school attendance is small and the results indicate that girls miss on average 0.009 days of school over 34 schooldays due to their period. The analysis is limited to the girls in the control group to measure the effect of menstruation for girls who not have access to the menstrual cup. The p-value for the coefficient is high and the null hypothesis cannot be rejected. In other words, there is no statistical evidence to infer that menstruation and school attendance are correlated. This finding contradicts policies claiming the effects of menstruation on girls schooling to be significant. Provision of the menstrual cup results in a 0.028 days increase in the possibility of attendance when girls have their period. Measures of effect on period using the difference-in-difference method indicate that girls in the control group are 0.012 days less likely to attend school during period days. The difference-in-difference method generates significant evidence on treatment and increased attendance from the provision of modern sanitary protection. The significant effect of the treatment coefficient remains when including individual fixed effects. However, in spite of the statistically significant effect on treatment, the treatment effect is small and economically insignificant. In other words, the size of the effect from being provided a menstrual cup does not have a significant impact on school attendance.

This research is limited by the small sample size and to a short period of study time. Implications of the failed randomization limit the analysis of the results and indicate that there are differences between the treatment and control group. Even though these differences are small, it undermines the reliability of the results of the study. More historical data is, therefore, desirable to clarify the relationship with greater security. A more extensive dataset would contribute to this, partly thanks to more observations and for increased variation in the primary explanatory variable. The research can be expanded by analyzing the effects of various control

variables. One aspect would be to extend the study over several schools within the district and outside the municipality. An increased spread of observations could highlight differences in the effects of the menstrual cup on attendance. The focus may also be on to what extent the schools' sanitation, and location, affects girls' schooling.

Despite the limitations of the quantitative analysis, evidence from the qualitative research implicate on additional studies. The effects of menstruation and lack of proper sanitary protection on school attendance are small. Nevertheless, qualitative findings indicate other implications that may cause lower attendance rates during menstruation. The qualitative estimations suggest other interventions to be more beneficial in the likelihood of increased attendance. Recommended actions for improving future interventions, based on these findings, is to more concrete examine the differences in effects from the provision of sanitary protection and the provision of puberty education on attendance, respectively. For example, Hennegan et al. (2016) performed a quasi-randomized survey in Kamuli District and indicates that provision of sanitary protection, together with puberty education, increase school attendance by around three days out of every 20 days. Additionally, one study in Ghana indicates that provision of puberty education has more significant effects on school attendance compared to the provision of sanitary protection (Montgomery et al. 2012).

A randomized controlled trial would be a recommended method for future evaluations. This allows the researchers to directly be able to compare the treatment effects of the different interventions. However, if randomization is not performed correctly, there is a risk of selection bias, which makes it difficult to estimate the treatment effect. The chances to ensure unbiased estimates increase with large sample size.

In conclusion, by analyzing the effects of menstruation on school attendance and to evaluate further what impact provision of menstrual cups have on girls schooling, this research has shown that increasing girls' progression to secondary school goes beyond access to education. Marginalized girls and women in rural areas are uninformed and unprepared for menarche. Qualitative measurements of girls overall well-being during menstruation has shown how feelings of shame and worry for leakage can, directly and indirectly, affect school absenteeism by remaining indoors or avoid being around boys and men during menstruation. The menstrual cup should not be underestimated in its effect of ensuring girls to feel safe and help ease the burden of puberty.

References

Baldacci, E., Clements, B., Gupta, S. & Cui, Q. (2008). Social Spending, Human Capital, and Growth in Developing Countries, *World Development*, vol. 36, no. 8, pp. 1317-1341, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 21 May 2019]

Becker, G. S. (2019). Human Capital, *The Library of Economics and Liberty*, Available Online: <https://www.econlib.org/library/Enc/HumanCapital.html> [Accessed 18 April 2019]

Bobonis, G. J., Miguel E., & Puri-Sharma, C. (2006). Anemia and School Participation, *The Journal of Human Resources*, Available Online: http://emiguel.econ.berkeley.edu/assets/miguel_research/36/Paper_Anemia_and_School_Participation.pdf [Accessed 10 May 2019]

Chaudhry, I. & Rahman, S. (2009). The Impact of Gender Inequality in Education on Rural Poverty in Pakistan: an empirical analysis, *European Journal of Economics, Finance and Administrative Sciences*, no. 15, Available Online: [http://www.eif.gov.cy/mlsi/dl/genderequality.nsf/all/12d2a22fac60da74c22579a6002d950a/\\$file/pakistan.pdf](http://www.eif.gov.cy/mlsi/dl/genderequality.nsf/all/12d2a22fac60da74c22579a6002d950a/$file/pakistan.pdf) [Accessed 16 April 2019]

Chu, J., Huang, X., Loyalka, P., Shi, Y., Song, Y., Wei, J., Yi, H., Zhang, L., Ren, B., Maani, M. and Rozelle, S. (2014). The Impact of Vocational Schooling on Human Capital Development in Developing Countries: Evidence from China, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 21 May 2019]

Femme International. (2019). The Issue, *Femme International*, Available Online: <https://www.femmeinternational.org/our-work/the-issue/> [Accessed 17 May 2019]

Flowcup. (2018). Available Online: <https://www.flowcup.se/> [Accessed 17 December 2018]

Global Partnership for Education. (2019a). Education, *Global Partnership for Education*, Available Online: <https://www.globalpartnership.org/education> [Accessed 17 May 2019]

Global Partnership for Education. (2019b). Uganda, *Global Partnership for Education*, Available Online: <https://www.globalpartnership.org/country/uganda> [Accessed 22 April 2019]

Grant, M., Lloyd, C. & Mensch, B. (2013). Menstruation and School Absenteeism: Evidence from rural Malawi, *Comparative Education Review*, vol. 57, no. 2, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 10 April 2019]

Heckman, J. J. (1999). Policies to Foster Human Capital, *The National Bureau of Economic Research*, no. 7288, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 18 April 2019]

Hennegan, J., Montgomery, P., Dolan, C., Wu, M. & Scott, L. (2016). Measuring the Prevalence and Impact of Poor Menstrual Hygiene Management: A quantitative survey of schoolgirls in rural Uganda, *BMJ Open*, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 15 April 2019]

Klasen, S. (2002). Low Schooling for Girls, Slower Growth for All? Cross-Country Evidence on the Effect of Gender Inequality in Education on Economic Development, *The World Bank Economic Review*, vol. 16, no. 3, pp. 345-373, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 17 May 2019]

Klasen, S. & Lamanna, F. (2009). The Impact of Gender Inequality in Education and Employment on Economic Growth: new evidence for a panel of countries, *Feminist Economics*, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 18 April 2019]

Kremer, M. (2003). Randomized Evaluations of Educational Programs in Developing Countries: Some lessons, *The American Economic Review*, vol. 93, no. 2, pp. 102-106, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 18 April 2019]

Miguel, E. & Kremer, M. (2004). Worms: identifying impacts on education and health in the presence of treatment externalities, *Econometrica*, vol. 72, no. 1, pp. 159-217, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 10 May 2019]

Ministry of Education and Sports. (2016). Education Abstract 2016, *Ministry of Education and Sports*, [pdf] Available Online: <http://www.education.go.ug/files/downloads/The%20Education%20Statistical%20Abstract%202016.pdf> [Accessed 25 April 2019]

Ministry of Education and Sports. (2019). About the Ministry, *Ministry of Education and Sports*, Available Online: <http://www.education.go.ug/data/smenu/47/About%20the%20Ministry%20.html> [Accessed 25 April 2019]

Miiró, G., Rutakumwa, R., Nakiyingi-Miiró, J., Nakuya, K., Musoke, S., Namakula, J., Francis, S., Torondel, B., Gibson, L. J., Ross, D. A. & Weiss, H. A. (2018). Menstrual health and school absenteeism among adolescent girls in Uganda (MENISCUS): a feasibility study, *BMC Women's Health*, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 10 April 2019]

Montgomery, P., Ryus, C. R., Dolan, C. S., Dopson, S. & Scott, L. M. (2012). Sanitary Pad Interventions for Girls' Education in Ghana: a pilot study, *Plos One*, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 10 April 2019]

The National Population and Housing Census 2014 – Area Specific Profile Series, Kamuli District, Uganda. (2017). *Uganda Bureau of Statistics 2017*, [pdf] Available Online: <https://www.ubos.org/wp-content/uploads/publications/2014CensusProfiles/KAMULI.pdf> [Accessed 19 May 2019]

OECD. (2001). The Well-being of Nations, *Organisation for Economic Co-Operation and Development*, [pdf] Available online: <http://www.oecd.org/site/worldforum/33703702.pdf> [Accessed 27 May 2019]

Oster, E. & Thornton, R. (2009). Menstruation and Education in Nepal, *The National Bureau of Economic Research*, no. 14853, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 4 April 2019]

Plan International. (2019). Available Online: <https://plan-international.org/uganda> [Accessed 23 January 2019]

Schultz, T. W. (1961). Investment in Human Capital, *The American Economic Review*, vol. 51, no. 1, pp. 1-17, [pdf] Available Online: <http://la.utexas.edu/users/hcleaver/330T/350kPEESchultzInvestmentHumanCapital.pdf> [Accessed 21 May 2019]

Stopford, A. (2012). Why Adolescent Girls Miss School in Rural Kenya, *Duke Global Health Institute*, Available Online: <https://globalhealth.duke.edu/media/news/why-adolescent-girls-miss-school-rural-kenya> [Accessed 8 April 2019]

Subrahmanyam, G. (2016). Gender Perspectives on Causes and Effects of School Dropouts, *Swedish International Development Cooperation Agency (Sida)*, [pdf] Available Online: <https://www.sida.se/contentassets/4334380a5b754ef9924a6e25a4ca6e8a/babf2dad-1010-4035-8bfd-ce7d7f9108d7.pdf> [Accessed 25 May 2019]

The World Bank. (2018a). Missed Opportunities: The High Cost of not Educating Girls, *The World Bank*, Available Online: <https://www.worldbank.org/en/topic/education/publication/missed-opportunities-the-high-cost-of-not-educating-girls> [Accessed 15 April 2019]

The World Bank. (2018b). Menstrual Hygiene Management Enables Women and Girls to Reach Their Full Potential, *The World Bank*, Available Online: <https://www.worldbank.org/en/news/feature/2018/05/25/menstrual-hygiene-management> [Accessed 26 May 2019]

The World Bank. (2018c). Returns to Investment in Education, *The World Bank*, [pdf]
Available Online:
<http://documents.worldbank.org/curated/en/442521523465644318/pdf/WPS8402.pdf>
[Accessed 28 May 2019]

The World Bank. (2019). Girls' Education, *The World Bank*, Available Online:
<https://www.worldbank.org/en/topic/girlseducation> [Accessed 17 May 2019]

UNFPA. (2017). Worlds apart in Uganda: inequalities in women's health, education and economic empowerment, *Population Matters United Nations Population Fund*, no. 5, [pdf]
Available Online: https://uganda.unfpa.org/sites/default/files/pub-pdf/Issue%20Brief%205%20-%20special%20edition.%20inequalities.final_.pdf [Accessed 19 May 2019]

UNICEF. (2004). The State of the World's Children 2004, *United Nations Children's Fund*,
Available Online: https://www.unicef.org/sowc04/sowc04_girls_positive_force.html
[Accessed 25 May 2019]

UNICEF. (2018). Gender and education, *United Nations Children's Fund*, Available Online:
<https://data.unicef.org/topic/gender/gender-disparities-in-education/> [Accessed 17 May 2019]

Vashisht, A., Pathak, R., Agarwalla, R., Patavegar B. N. & Panda, M. (2018). School absenteeism during menstruation amongst adolescent girls in Delhi, India, *Journal of Family & Community Medicine*, vol. 25, no. 3, pp. 163-168, Available through: LUSEM Library website <http://www.lusem.lu.se/library> [Accessed 17 May 2019]

Appendices

Appendix 1: Time Diary Calendar

KALENDA YA 2019 CALENDAR 2019



flowcup

Ogamba ki muwala!

Mu mukono gw' okutte kalenda erimu emyezi ebiri omwezi ogwo kubiri no mwezi ogw'o kusatu. Osabibwa okujuzamu ennaku zo beera ku somero ne zo beera wekonye akagere. Wano we wali okunyonyorwa okwangu okusobozesa okutegera engeri yo kozesa mu Kalenda!

Okununyolwa:

Ennaku zonna eziri mu mwezi gwa Februari ne mu gwo'Marchi

Ennaku eziri mukala emyufu: Zezo nga tuli ewaka okugeza olwomukaga ne Sande

Tekako akasitale kwezo zokka zobadde kusomero: Wano olina okuteka akasitale kunnaku zonna zobadde kusomero buli mwezi

Tekako akasitale munaku zobadde nga wekonnye akagere: Wano olina okuteka akasitale ku nnaku zonna zobadde nga wekonye akagere buli mwezi

Kikkulu nnyo!

- Osabibwa okujuzamu mu kalenda yo buli lunaku okusobola okujukira nnaku zo beera kusomero n'ennaku nga wekonye akagere
- Ekyangu kwe kujuzamu kalenda eno mubwangu ddala nga omaze okusoma oba okugyijuzamu olweggulo
- Bwoba tobadde kusomero akabokisi okaleka kerere tokajuzamu
- Bwoba tewokona kagere oba tewangenda munsoga za bakazi era akabokisi tokajuzamu kaleke kerele
- Jjukira okukuma Kalenda yo mu kifo ekyekusifu nebirala ebikozesebwa mu somero
- Jjukira okubeera no busobozi ku kalenda yo buli lunaku
- Kulunaku olusembayo mu mwezi ogwo kusatu nja okukunganya Kalenda yo

Hey Girl!

In your hand you hold a calendar consisting of two months: February and March. You are asked to fill in what days you are in school and what days you have your period. Here are some explanations to make it easier for you to understand how to use the calendar!

Explanations:

Date: All days in February and March, respectively.

Dates marked in red: Weekend days

Mark the date/day you have been in school: Here you should mark all days you have been in school during each month.

Mark the date/day you have had your period: Here you should mark all days you have had your period during each month.

Important!

- You are asked to fill in the calendar day by day so you remember what days you have been in school and what days you have had your period.
- Easiest is to fill in the calendar directly when you have finished school OR in the afternoon/evening.
- If you haven't been in school you leave the box empty.
- If you haven't had your period you leave the box empty.
- Remember to save the calendar in a safe place with your other school material.
- Remember to have access to the calendar every day.
- At the end of March I will collect your calendar.

FEBRUARI

Ennaku zo badde kusomero		Okwekona akagere oba kugenda mu nsonga za bakazi	
Enaku zo mwezi	Naku ki zobadde ku somero mu mwezi gwa Februari	Enaku zo mwezi	Nnaku ki nzege munsonga za bakyala mumwezi ogwokubiri
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	
13		13	
14		14	
15		15	
16		16	
17		17	
18		18	
19		19	
20		20	
21		21	
22		22	
23		23	
24		24	
25		25	
26		26	
27		27	
28		28	

MARCHI

Ennaku zo badde kusomero		Okwekona akagere oba kugenda mu nsonga za bakazi	
Enaku zo mwezi	Naku ki zobadde kusomero mu mwezi gwa marchi	Enaku zo mwezi	Nnaku ki nzegeze mu nsonga za bakyala oba nekonye akagere muwezi gwo kusattu
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	
13		13	
14		14	
15		15	
16		16	
17		17	
18		18	
19		19	
20		20	
21		21	
22		22	
23		23	
24		24	
25		25	
26		26	
27		27	
28		28	
29		29	
30		30	
31		31	

Appendix 2: Ethical Consent

Edangano yo kukirizinganya nga ngedda okola omulimu mu mwaka gwe byesoma 2018/2019

Amaina gange nze Sofia nga ndimuyizi asoma diguli okuva mu yunivasite ekulu okuva mu Sweden. Ngenda kola okunonyereza ku bikwatagana n'ebyo bulamu ne soma mu disitrikiti ye Kamuli okuva mu mwezi gwa kubiri okutuka mumwezi gwo'kusatu 2019. Omulimu guno gugenda kolebwa wamu nekitongole kya Plan ekikola omulimu ogwa nekyewa mubyekulakulana.

No'Iwensonga eyo kusaba nobuwobfu okirize muwala wo yetabe mukunonyereza kuno kwe ndiko. Okunonyereza kuno tekulimu byakugezesbwako byonna era kugenda kolebwa nobwendereza kwabo bonna abanetaba mu.

Nze owuwo,
Sofia Eklöf

Field Study - Cooperation Agreement: Academic Year 2018/2019

My name is Sofia and I am a bachelor student from Sweden. I am going to perform a study on health and education in Kamuli District between February and March 2019. The project is a collaboration with Plan International Uganda, a development and humanitarian organization.

With this document I am hereby asking for your approval to let your daughter be part of my study. The study does not involve any physical examination and will be conducted with respect and fairness to all involved.

Yours sincerely,
Sofia Eklöf

***Omuyizi era natekako omukono gwe
(Student, Signature)***

***Omukono gwo'muzadde
(Parent, Signature)***

Appendix 3: Baseline Survey

Okunonyereza Baseline Survey

Omuntu ekinomu (The Individual)

- *Emyaka gyo (Age)*
 - 10 – 12
 - 12 – 14
 - 14 – 16
 - 16 <
- *Emyaka gyomaze nga osoma (Years of Education)*
 - 0 – 3
 - 3 – 10
 - 10 – 14
 - 14 – 16
 - 16 <
- *Bwe nekona akagere oba bwengedda mu nsonga za bakazi kozesa...*
(When I menstruate I use...)
 - Ebikola (Leaves)
 - Obuwero wero (Pieces of cloths)
 - Ebisimula (Rags)
 - Paddi (Pads)
 - Ebintu ebirala (Other material)

Amaka (Family)

- *Emyaka maama wo gveyamala nga asoma (Mother's Years of Education)*

Nasare (Pre-Primary School)

Pulayimale Sukuulu (Primary School)

Siniya esooka (Lower Secondary School)

Siniya eya wangulu (Upper Secondary School)

- *Omulumu maama gwakola gumusasula buli mwezi*

(Mother's Work for Pay per Month (Shilling per Month))

0 – 5,999

6000 – 11,999

12000 – 17,999

18,000 – 23,999

24,000 <

- *Emyaka taata wo gveyamala nga asoma (Father's Years of Education)*

Nasare (Pre-Primary School)

Pulayimale Sukuulu (Primary School)

Siniya esooka (Lower Secondary School)

Siniya eya wangulu (Upper Secondary School)

- *Omulumu taata wo gwa kola gumusasula buli mwezi*

(Father's Work for Pay per Month (Shilling per Month))

0 – 5,999

6000 – 11,999

12000 – 17,999

18,000 – 23,999

24,000 <

Ebikwatagana awaka (Household)

- *Sobola okukozesa kabuyonjo (I have access to a toilet)*
Gyebela (Where I live)
Mbeera awo kumpi mu mailo nga (0.621) kuva we beera
(Within one kilometer (0.621 miles) *from* where I live)
We beera wala ko okusinga ne mailo(0.621) okuva ne webeera
(Within more than one kilometer (0.621 miles) *from* where I live)
- *Sobola okufuna amazzi amayonjo (I have access to clean water)*
Gyebela (Where I live)
Mbeera awo kumpi mu mailo nga (0.621) kuva we beera
(Within one kilometer (0.621 miles) *from* where I live)
We beera wala ko okusinga ne mailo(0.621) okuva ne webeera
(Within more than one kilometer (0.621 miles) *from* where I live)
- *Nfuna obujajambi (I get medical care)*
Bweba ndi mu bwetavu bwe ddagala/ oba obulabirizi bwe dwaliro
(Always when I am in need of medicine/hospital care)
Okujjako musawa kazingizigi
(Only in case of emergency)

Appendix 4: Questionnaire 1

Ekibuuzo ekisooka Questionnaire 1

Okigerageranya otya 0-3
(Scale 0-3)

Tuwe ngeri gykigerageranya
(Explanation of scale)

- 0: Sikiriza nganya nakyo yedde nakamu (I do not agree at all)
 - 1: Sikirizanganya nakyo (I do not agree)
 - 2: Nzikiriza (I agree)
 - 3: Nzikiriza mu bujunvu (I completely agree)
-

Okugenda munsonga za bakyala: Engeri gy'okirabamu ne mirimu egyikolebwa (Menstruation: Attitudes and Activities)

Okugenda munsoga za bakyala kikukosa kitya...
(Does menstruation ever cause you to...)

Sigenda kusomero kubanga sirina paddi zakukozeza
(Miss school due to no access to sanitary products)

0 1 2 3

Sigenda kusomero kubanga ne toyi nzetukozesa kyafu
(Miss school due to non-hygiene toilets in school.)

0 1 2 3

Sisobola nakunza na mikwano gyange
(Be unable to play with your friends)

0 1 2 3

Newara ebyemizanyo byonna
(Avoid physical activities)

0 1 2 3

Sigala mukibiina ne sizanya
(Remain indoors)

0 1 2 3

Newalira ddala okubera na basajja na balenzi
(Avoid being around boys or men)

0 1 2 3

Sisobola nakola emirimu gya buli lunaku kuba beera numizibwa
(Be unable to carry out daily activities due to pain)

0 1 2 3

**Engeri gye bikutemu oba empenda ezo kweyimirizawo
(Well-being Measures)**

Mpulira okuswala nga ndi munsonga za bakyala.
(I feel ashamed during my period)

0 1 2 3

Nerarikirila nga ndi munsonga za bakyala kubanga musayi guyinza okumpitamu kubanga sirina
bukumi bumala
(I am worried that I may leak due to that I do not have any safe protection)

0 1 2 3

Mpulira nga asosolebwa nga ndi munsonga za bakyala
(I feel isolated from others during my period)

0 1 2 3

Mpulira nga njagala kwongera ko n'omuntu omulala nga ndi mu nsonga za bakyala
(I feel that I can talk with others about my period)

0 1 2 3

Mpulira okwetya nga nekonye a kagere olw'embera enetolodde
(I feel insecure during my period due to a non-accepted environment)

0 1 2 3

**Obubaka no kwetegekera ensonga za bakyala
(Menstruation: Information and Preparations)**

Amaka, Abasomesa na bantu abalala byebangambye ku...
(Family/Teachers/Others have informed me about...)

Okugenda munsonga za bakyala oba okwekona akagere kitegeza ki
(What menstruation is)

0 1 2 3

Lwaki ngenda munsonga za bakyala oba lwaki nekona akagere
(Why I have menstruation)

0 1 2 3

Kiki ekibawo ku mubiri gwange nga nekonye a kagere
(What happens in the body when I menstruate)

0 1 2 3

Ebiriwo ebikozesebwa ebyo kwekumisa ng'oli munsonga za bakyala
(Available sanitary products for protection)

0 1 2 3

Appendix 5: Questionnaire 2

Ekibuuzo ekyokubiri Questionnaire 2

Okigerageranya otya 0-3 (Scale 0-3)

Tuwe ngeri gykigerageranya

(Explanation of scale)

0: Sikiriza nganya nakyo yedde nakamu (I do not agree at all)

1: Sikirizanganya nakyo (I do not agree)

2: Nzikiriza (I agree)

3: Nzikiriza mu bujunvu (I completely agree)

Engeri gyotunulira mu ebyenjigiriza (Attitudes toward Education)

Nina omukisa ogwe njawulo mu bulamu bwange mu byenjigiriza
(I have a better chance in life with an education)

0 1 2 3

Bazadde bange banjagaziza
(My parents encourage me to go in school)

0 1 2 3

Newakubadde omuntu yenna gyabera kya mugaso nnyo okufuna okusomesebwa
(No matter where you live, it is important to have an education)

0 1 2 3

Mpulira obuwigizi okuva mu bazadde bange
(I feel support from my parents)

0 1 2 3

Mpulira obuwigizi okuva mu basomesa bange
(I feel support from my teachers)

0 1 2 3

Ebyegyigiriza bireeta enjawulo mu bulamu bwange
(Education contributes positively to my health)

0 1 2 3
