

Menstrual Hygiene Management (MHM)

Knowledge, attitude and practices of adolescents in rural primary schools in Malawi



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Picture cover page:

Girls presenting locally available soap

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Foreword

Menstruation, though a natural part of the reproductive cycle, it is often not talked about because of cultural taboos in many parts of Africa, and Malawi is not spared. How girls can manage menstruation safely and with dignity is an area that has not received a lot of attention by actors focusing on Water, Sanitation and Hygiene (WASH), reproductive health and education. Poor menstrual hygiene management affects the general health and wellbeing of girls including poor attendance and performance in class. Malawi Red Cross Society (MRCS) among its many strategic areas of focus aims at influencing duty bearers and decision makers to act at all times in the interest of vulnerable populations, thus helping the vulnerable populations realize their rights and be able to demand for access to the same. MRCS therefore puts Menstrual Hygiene Management (MHM) high on its agenda to ensure girls' right to MHM are realized and that there is a conducive environment for girls around issues to do with MHM. Thus, MRCS intends to ensure girls are well informed about how they can safely manage menstruation and that the environment surrounding them is in support of menstrual hygiene management. It is against this background that MRCS in collaboration with Swiss Red Cross supported the Knowledge, Attitude and Practices Survey which was conducted in Salima and Mzimba districts among primary school learners to ensure the findings inform the design of evidence-based Menstrual Hygiene Management in the study districts. I am therefore hopeful that the study findings and recommendation in this report will provide direction to MRCS and other relevant service providers on evidence-based and culturally acceptable Menstrual Hygiene Management interventions. Let us therefore join hand in promoting menstrual hygiene management and indeed in breaking the cultural taboo around the subject.



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List of Abbreviations

Avg.	Average
FGD	Focus group discussion
KAP	Knowledge, attitudes and practices (a study design aiming to investigate...)
KII	Key informant interview
MHM	Menstrual hygiene management
MRCs	Malawi Red Cross Society
ICBHP	Integrated Community Based Health Program
LMIC	Low and middle income countries
SRC	Swiss Red Cross
WASH	Water, Sanitation and Hygiene

1. Executive Summary

The monthly period still puts many girls in Sub-Saharan Africa in very challenging situations, which have potentially devastating ramifications for their health, wellbeing and empowerment. The development of adequate and evidence-based measures and programmes requires an in-depth understanding of the dynamics of this phenomenon, which, however, still lacks in many geographical and cultural contexts, and particularly in Malawi.

To address this gap, this research sought to explore knowledge, attitudes and practices (KAP) and associated influencing factors of Menstrual Hygiene Management (MHM) of pupils in primary school environments in rural Malawi. Unlike prior research, this study also involved boys. The project, which was commissioned by the Malawi Red Cross Society (MRCS) with funding from Swiss Red Cross (SRC), researched the situation of pupils from 17 primary schools in two districts (Mzimba and Salima) between February and April 2018. The mixed-method design combined a cross-sectional survey (n = 522), 29 focus group discussions (n ≈ 200) and key informant interviews (n = 13).

The findings suggest that girls had a significantly higher level of knowledge than boys, and knowledge in girls was associated with better MHM practices and with reduced absenteeism. Interestingly, increased MHM knowledge of boys was associated with negative effects for girls, such as teasing and absenteeism. The use of disposable pads was positively associated with school attendance during menses. In both districts girls in menses were seen as unclean and restricted from several activities. While the quality of actual MHM practices did not differ, girls missed more school days during menses and knew more in one district (Salima). Also, socio-cultural differences grounded in information sources were observed: grandmothers traditionally transferred information on MHM during initiation rites in Mzimba, whereas girls in Salima relayed more on mothers and female teachers.

To conclude, the key contribution of this research is to shed light on the interplay of boy's knowledge and MHM dynamics and on the potential value of the use of disposable pads. Practice implications on access to absorbents, adequate sanitation and timely information are discussed.

2. Introduction and Background

The first section of this chapter gives an overview of the actual debate on MHM in literature in the geographical context of Sub-Saharan Africa. Literature was reviewed selectively in August 2017. The country specific background and how MHM is embedded in the development of Malawi school environments is explained in the second section. A third section clarifies the integration of this study into the Integrated Community Based Health Program (ICBHP) of MRCS.

2.1. Literature review on MHM in Sub-Saharan Africa

2.1.1. Introduction

Puberty and especially the onset of menstruation as a natural aspect of a woman's life is a very critical point of a girls' transition into womanhood (McMahon et al., 2011). However, the lack of adequate guidance and social support, male-dominated decision making, on-going gender inequality and taboos around menstruation leave girls in numerous low and middle income countries (LMIC) experiencing shame, fear, confusion and discomfort when trying to cope with their monthly period.

While MHM is influenced by women's rights, their role in society, their guidance and knowledge and the water, sanitation and hygiene (WASH) infrastructure and materials, the achievement of good menstrual health has an impact on general health and wellbeing, education, socioeconomic outcomes, dignity and gender equality (Hennegan, Dolan, Wu, Scott, & Montgomery, 2016a; Sommer, 2010; Winkler & Roaf, n.d.). Assuring the accessibility and affordability of culturally acceptable menstrual health solutions and knowledge and enabling girls to adequately manage their monthly period and to feel comfortable about it, is a window of opportunity to influence the way girls see themselves in society and can empower them to reach their full potential (McMahon et al., 2011; Winkler & Roaf, n.d.).

Schools and education take a key role in girls' MHM practices. Firstly, they have the opportunity to educate and train girls regarding the proper and safe hygiene practices and, more broadly, help support and empower them onto their trajectory into womanhood and personal development. Secondly, a lack of infrastructure and support in schools can jeopardize this developmental process and make girls abandon education trajectories. Examples are poor quality and the inadequate supply of water, the lack of latrines and of sanitary infrastructure and of access to adequate sanitary hygiene products, which leave girls with limited options for MHM. (Sommer, 2010)

As this literature analysis shows, there are several reviews around girls' MHM practices. For example, Bill and Melinda Gates commissioned a holistic overview of the present situation regarding MHM in LMIC, including literature, programmes, stakeholders and actors views (Geertz, Iyer, Kasen, Mazzola, & Peterson, 2016). The goal of this review is to identify effective MHM measures of school-related interventions in rural sub-Saharan Africa that impact on girls' MHM practices. The underlying practical rationale is to develop recommendations regarding the design of future interventions in these contexts. For this purpose, a selective literature review has been carried out. The databases PubMed and Google Scholar have been searched using the key words Menstrual Hygiene Management, Menstrual Health, Menstruation, Menarche and Adolescence linked to School Absenteeism, School Attendance and Drop-out, from June to August 2017.

2.1.2. Outcomes of adequate MHM

Three general outcomes of adequate MHM were mainly investigated and discussed in literature: education-related and health-related outcomes have been of first interest to investors, while girls comfort, dignity and self-esteem have been valued from a gender and human rights perspective. This section gives a brief overview of the association between MHM and the three categories stated in literature.

a. Education-related outcomes

Puberty creates a significant gender gap in education. In sub-Saharan Africa, 57% of girls attend primary school while only 17% enrol at the secondary level (Sommer, 2010). The outcome of measuring the general impact of menstruation on school absenteeism was mixed, reaching from zero to at least three days of absence during monthly period in sub-Saharan Africa with higher rates in rural areas (Geertz et al., 2016; Sumpter & Torondel, 2013; Tegegne & Sisay, 2014). The impact of MHM interventions on education and psychosocial outcomes was reviewed in literature in 2016 (Hennegan & Montgomery, 2016). The distribution of sanitary pads alone did not show a significant effect on the reduction of school absenteeism, but combined with puberty education it caused more presence in school according to several studies conducted in sub-Saharan Africa (Hennegan et al., 2016a; Montgomery, Ryus, Dolan, Dopson, & Scott, 2012; Owen et al., 2016)

61,7% of rural living girls in a Ugandan study responded that girls are not able to go to school during menstruation. (Boosey, Prestwich, & Deave, 2014) 54.51% female students in a Northeast Ethiopian trial have been absent around two days during their last period (McMahon et al., 2011). Responding girls in Northeast Ethiopia who did not use sanitary napkins were 5.37 times more likely to miss school (McMahon et al., 2011). Changing absorbents three times a day or more was the aspect of MHM that was related to a higher attendance rate in a Ugandan trial (Hennegan et al., 2016a).

The main reasons for absenteeism were shame, fear of leakage, the lack of sanitary napkins or adequate underwear and a private place to change in school (McMahon et al., 2011; Tegegne & Sisay, 2014). Girls in different studies reported teasing by boys, younger children and even teachers and other girls (McMahon et al., 2011). The first reason mentioned for drop outs linked to menstruation was the embarrassment of being seen by other students in a blood stained dress usually as a result of having the first menses at school without previous preparation (Tegegne & Sisay, 2014).

Most previous studies focused on school attendance only, while the aspect of concentration, participation, performance and achievement during menstrual period has been undervalued (McMahon et al., 2011; Phillips-Howard et al., 2016). Less than 20% of school girls in a different trial in rural Uganda stated that menstruation caused them to miss school, although over half reported difficulties to concentrate during menstruation due to discomfort, fear of soiling or menstrual pain (Hennegan et al., 2016a). Discomfort, shame, anxiety and distraction leading to difficulties to concentrate and lower performance in class, were reported by most of responding students and teachers in studies conducted in Ethiopia, Uganda and Kenya (Boosey et al., 2014; Hennegan et al., 2016a; McMahon et al., 2011; Tegegne & Sisay, 2014).

Even if there are multiple reasons for girls to leave school and the exact impact of menstruation remains under investigated, the onset of menstruation remains an important facet of the education gap puberty creates. (Sommer, 2010)

b. Health-related outcomes of MHM

Sumpter and Trondel systematically reviewed the association of MHM and health outcomes. Reproductive track infections were directly associated with MHM while other, indirect outcomes were linked to education (Sumpter & Torondel, 2013). If girls spend more time in school and reach a higher level of education, health outcomes like reduced maternal death, increased contraceptive uptake and

decrease in fertility rate, improved child health, increased vaccination rates, decreased infection rates with HIV, and improved population health in general are reported consequences (UNICEF, 2004).

c. Girls comfort, dignity and self-esteem

While education- and health-related outcomes have earned much attention, girls' dignity and comfort is a very valid outcome of MHM interventions from a gender and human rights perspective (Sommer, 2010). To get the physical and emotional support they need to manage their monthly menstruation healthy, safely and with confidence, to take charge of their lives and to feel positive about themselves and their bodies, is invaluable for girls' development and well-being (McMahon et al., 2011; Winkler & Roaf, n.d.). Even if the direct link to education and health outcomes was difficult to measure, girls valued the adaptation of MHM products and infrastructure to their needs and stated to feel more comfortable (Oster & Thornton, 2010).

2.1.3. Effective MHM measures

Recognizing the need to improve the experience of MHM for girls in LMICs, researchers and practitioners outlined a global vision for MHM in schools by 2024 and identifying priorities for global, national and local action. Yet, a wide range of definitions of 'good' and 'bad' MHM have been used (Hennegan et al., 2016a; Phillips-Howard et al., 2016; Sumpter & Torondel, 2013). Addressing the lack of evidence for MHM criteria, a unified working definition of MHM was developed by the Joint Monitoring Programme of the WHO and UNICEF in 2012 and used as a measurement in several studies (Lawan, Yusuf, & Musa, 2010; Tegegne & Sisay, 2014): «Women and adolescent girls are using a clean menstrual management material to absorb or collect menstrual blood, that can be changed in privacy as often as necessary for the duration of a menstrual period, using soap and water for washing the body as required, and having access to facilities to dispose of used menstrual management materials.» But while the criteria focus on the availability of WASH hardware, important factors like knowledge would allow a more holistic evaluation of good menstrual health.

Four areas of MHM measures turned out to be most relevant according to the literature reviewed:

a) Access to clean and comfortable absorbents b) Access to adequate WASH c) Timely access to knowledge and support; and d) girls involvement in decision-making. Critical factors, importance and evidence of the four areas are reviewed below:

a. Access to clean and comfortable absorbents

Access and use of sanitary napkins was found to be very low in rural sub-Saharan African areas, especially among girls who live with relatives or families with lower income and education (Tegegne & Sisay, 2014). Where sanitary napkins are not affordable or available, girls use other materials like old cloth, leaves, mattress, paper and develop coping mechanisms like wearing dark cloths, avoiding to sit and leaving class as the last person (McMahon et al., 2011). Lack of knowledge on how to use pads, followed anxiety of being seen and teased by boys were other reasons for girls not to use sanitary pads during menstruation (Hennegan, Dolan, Wu, Scott, & Montgomery, 2016b; Tegegne & Sisay, 2014).

To measure prevalence of poor MHM, Hennegan considered absorbents to be clean if they were industrial reusable pads, new cloth or disposable sanitary pads. Toilet paper, mattress, sponge or underwear alone were considered inadequate, except if old cloth was washed appropriately. For reusable absorbents, MHM was considered adequate if washed with soap and hygienically dried outside or at least hung up. Never wearing absorbents damp was also required for adequate MHM (Hennegan et al., 2016a) 37.04% of girls in Northeast Ethiopia washed reusable absorbents with soap but 33.33% dried it at

the inside of the house where no sun came in (Tegegne & Sisay, 2014). Drying absorbents outside may provoke concerns that they will be seen: Needs to hide menstrual cloths were reported in Tanzania, Kenya, Ghana and Ethiopia (Sommer, Kjellén, & Pensulo, 2013). If conditions outside are unclean, drying outside may increase contamination and cause unintended harm (Hennegan et al., 2016a).

Poorly maintained, sanitary pads did not improve girls' menstrual hygiene and were associated with irritation, infection, concerns about odour and distraction in school. There was no significant difference in the level of hygiene between girls using AfriPads and those using existing methods (mainly cloth). The provision of reusable products had a negligible impact on MHM due to their dependency on proper washing, drying, storing and privacy facilities. But comparison between reusable pads and existing methods revealed a few differences in daily activities: Reusable pads were reported to be quicker to change, less of a problem to change at school, easier to wash and significantly more reliable than other absorbents (Hennegan et al., 2016b). Besides cleanliness, these factors of comfort using and maintaining absorbents should be included as second criteria.

Absorbents must be available in a quantity that allows adequate frequency of change. 79.12% of girls in Northeast Ethiopia reported that they changed their menstrual absorbents twice a day or more, while 85.49% avoided changing at school due to lack of convening infrastructure (to change, wash and dispose) or lack of new material (Tegegne & Sisay, 2014). Quantitative criteria, like changing absorbents three times a day, have been used but might be of limited validity (Hennegan et al., 2016a). Adequate frequency depends on the quality of used materials, on flow and perception of comfort and reliability, to avoid symptoms, which may cause distress and distraction in class, like irritation, concerns about odour, or anxiety of soiling. If girls spend the whole day at school, two sets of reusable material may be adequate so girls can wash the absorbents in the evening and let them dry over the next day.

Material for MHM does not only have to be accessible and affordable but also culturally acceptable. Inserted products including menstrual cups and tampons may not be culturally appropriate in every population, but may present another alternative to reusable pads for future studies (Hennegan et al., 2016a). Menstrual cup were very popular among girls in a study conducted in rural Kenya. It had a significant time saving component, reducing time spent doing laundry and drying. Take-up rates were high and girls in the sample reported liking the product and having (hypothetical) willingness to pay for the cup (Oster & Thornton, 2010).

b. Access to adequate WASH

The interaction between MHM and sanitation systems in LMIC was reviewed in literature in 2013. Lack of privacy and space for MHM as well as insufficient availability of water were outstanding problems (Sommer et al., 2013). The importance of programmes and sanitary infrastructures in schools to be adapted to girls needs is shown in several other reviews (Birdthistle, Dickson, & Freeman, 2010; Hennegan & Montgomery, 2016; Jasper, Le, & Bartram, 2012; Sommer et al., 2013).

Girls need to be able to change absorbents in adequate frequency, have access to water of good quality and soap to wash their body and maintain their menstruation material in a discreet and hygienic way. Where disposable absorbents are used, a disposal system needs to be part of the sanitary infrastructure at school. If girls are using reusable absorbents, means to store, wash and dry materials and to discreetly transport clean and soiled material home needs be added to the criteria of adequate disposal (Hennegan et al., 2016a).

Keeping menstruating status hidden from others remains a big challenge for girls in rural sub-Saharan African schools. (Sommer, 2010) Many girls reported going home to change absorbents due to lack of privacy, and all stated that they washed and dried reusable absorbents at home, rather than at school. (Hennegan et al., 2016a) Girls in Northeast Ethiopia reported to stop using the pads given in school when boys started to follow the activity and teased them (Tegegne & Sisay, 2014). Providing privacy

and water at schools had a significant influence on girls MHM and washing behaviour in Kenya (McMahon et al., 2011). Sanitary spaces far away from boys' areas, which include everything needed for the management of menstruation and allow privacy through lockable doors, were suggested by schoolgirls in Tanzania (Sommer, 2010).

c. Timely access to knowledge and support

Adolescent reproductive health education seems to be broadly neglected and a grey area for intervention in sub-Saharan Africa (Sommer, 2010) (Munthali, 2007). More than half of girls growing up in rural areas receive no information about menstruation and its management before they first experience it. Shock, shame, irritation, fear, disgust and a negative perception of menstruation are common consequences to the onset without prior knowledge (McMahon et al., 2011; Munthali, 2007; Sommer, 2010; Tegegne & Sisay, 2014). If adolescents are given advice on menarche and body changes it is usually posterior to the onset of menstruation. The subject is mostly not linked to reproductive health, the cause and origin of menstruation are not explained and boys receive even less information than girls (Munthali, 2007; Tegegne & Sisay, 2014). More positive perception and accepting attitude (including less teasing) towards menstruation could be achieved if girls were physically and emotionally prepared and both, girls and boys were guided and enabled to understand the changes that happen to their bodies (Munthali, 2007).

Schools are almost no source of information on menstrual health and menarche in sub-Saharan Africa and girls depend on female family members or close peers (House, Mahon, & Cavill, 2012). Only 18.12% of responding girls in a trial in Northeast Ethiopia discussed sexual and reproductive health with family members and menstruation and its management was only discussed by 5.39% (Tegegne & Sisay, 2014). Mothers were mentioned as a main source of information on MHM in some areas, while in other areas mothers were avoided and especially grandmothers took the role of advising girls (McMahon et al., 2011; Munthali, 2007; Tegegne & Sisay, 2014). Teachers and parents reported to feel uncomfortable or not entitled to discussing menstruation in different places (Chandra-Mouli & Patel, 2017; McMahon et al., 2011; Munthali, 2007; Sumpter & Torondel, 2013). Given information varied largely between areas and included subjects like MHM, advices on staying away from boys to avoid pregnancy, respect for parents and elder people and social rules including misconception and stigmatizing barriers linked to menstruation (McMahon et al., 2011; Munthali, 2007). Restriction of bathing during periods to avoid aggravating the bleeding is just one example that has been mentioned by 54.94% of responding girls in Northeast Ethiopia (Tegegne & Sisay, 2014).

2017 Chandra-Mouli and Patel reviewed the knowledge on menarche and MHM in adolescent girls in LMIC, concluding that countries need to recognize the lack of preparedness for menstruation and invest in the provision of knowledge and understanding in a whole-of-community approach. Reviewed studies showed a significant association between menstruation and school absenteeism as well as improvement of school attendance by puberty education and pad intervention. The review recommends multi level interventions at individual (education), family (support) and community (access to products and sanitary infrastructure) level and states that commitment needs to get greater by knowledgeable health workers and leaders who can change the perception (Chandra-Mouli & Patel, 2017). Two further literature reviews confirmed, that education interventions on MHM lead to more knowledge and better MHM practices (Hennegan & Montgomery, 2016; Sumpter & Torondel, 2013).

d. Girls' involvement in decision making

Girls' dignity and well-being must be put at the centre of research and interventions on MHM, which are usually focused on hygiene and education outcomes (Hennegan et al., 2016b). For this reason, girls should be included in the planning and decision making of MHM interventions and have a choice on products (Sommer et al., 2013). Their perception on comfort, acceptability, preferences and self-efficacy during menstruation, should be part of evaluations, even if there is no concurrence. Potential harms of interventions, like the reinforcement of stigma need to be avoided (Hennegan et al., 2016b).

MHM expert Marni Sommer stresses the importance of participatory methods to empower girls and to capture their experiences and recommendations to make schools more girl-friendly through girl-derived solutions (Sommer, Sutherland, & Chandra-Mouli, 2015). Girls in Tanzania suggest to create a school environment in which girls can concentrate more by giving access to pads, places to rest, materials to educate girls about their menses, build lockable toilets with water taps, tools for cleaning and places to burn pads far from the boys' areas. They recommended including the topic of girls growing up, menstruation, how to use pads and how to deal with cramps into curriculums. The girls suggest the subject should be thought to younger grade levels, previous to menarche and by external puberty trainers going from school to school (Sommer, 2010).

2.1.4. Conclusions based on Literature review

To improve girls' experience of menstruation in rural school environments in sub-Saharan Africa effectively and sustainably, MHM needs to be understood as a multi-faceted subject. Actors across sections like WASH, education, health, gender, human rights and politics need to cooperate to address effectively menstrual health in future programmes. Girls' dignity and well-being must be put at the centre of research and interventions on MHM and they should be included in the planning and evaluation of interventions, focusing on comfort, acceptability, preferences and self-efficacy during menstruation.

To avoid unpreparedness and shock as a first experience of becoming a woman, to give girls the physical and emotional support they need to manage their monthly menstruation healthy, safely and with confidence, to take charge of their lives and to feel positive about themselves and their bodies, systematic mechanisms to inform young girls what menstruation is, why it occurs, and how to deal with it prior to menarche, should be implemented (McMahon et al., 2011; Sommer et al., 2015). Reproductive health should be included into the curricula for boys and girls and teachers must receive training and learning materials to effectively address the subject.

Considering the significant regional differences in perception and attitudes concerning MHM, costumes, traditions, potential obstacles, treats and beneficiaries needs and perception should be investigated in the specific area, prior to interventions. Implemented programmes should also address potential influencers and come up with culturally acceptable solutions (Phillips-Howard et al., 2016; Sommer, 2010). To meet menstruating women's needs has to be part of the definition of sanitation and should be seen as an official duty by politicians, schools and communities (Sommer et al., 2013).

2.2. MHM in Malawi

Malawi is a landlocked country in South-East-Africa, divided into three main regions and 28 districts, with a total land surface of 118,484 km² and a dense population of 18.06 million people (2016). Ranked 170 out of 188 countries in the Human Development Index Report, Malawi is put in a very low human development category: Around 50% of the former British colony's population is living below the poverty line.¹ Such economic and developmental situation contributes to the country having one of the lowest WASH standards in the world.

According to the literature on MHM in Malawi the median age at menarche for girls was 15 years in 2017, while boys started experiencing pubertal body changes around 14 years. Girls in areas with better nutritional and health indicators started menstruating about one year earlier. Elderly woman were the first source of information on MHM in most of Malawi's regions. Many villages had a designated elderly woman acting as chief counsellor on reproductive health issues for young woman.

¹ Gapminder World. Wealth & Health of Nations: <http://data.worldbank.org/country/malawi>

43% of females and 33% of males in studies conducted in Malawi reported that they had participated in an initiation or puberty rite, usually after they experienced menstruation or body changes. Focus of initiation or puberty rites for girls and boys was put on advising them on the transition to a sexual world - reaching from encouragement to experience sex to advice on avoiding contact to the other sex to avoid pregnancy - including issues of respect and roles in society. Practice of female circumcision was not common in Malawi and only 2% were circumcised (Munthali, 2007). 82% of girls in Malawi were unaware of menses before menarche and 30% were scared by menarche. 30% of responding girls did not use the latrine when menstruating. 7% of girls missed school on heavy days and over a term, each girl misses 0.8 days. (House et al., 2012) According to a large study on school absenteeism in Malawi, menstruation-based absenteeism only accounted for a small proportion of female absenteeism and did not create a gender gap in absenteeism. The same study found no evidence for school-level variance in menstruation related absenteeism suggesting that absenteeism was not sensitive to school environments. Co-residence with a grandmother though reduced odds of missing school during period (Grant, Lloyd, & Mensch, 2015).

The Ministry of Education in Malawi conducted a WASH study in 2008 showing that only 23% of primary schools have sanitation of 'acceptable quality and quantity', with 81% lacking hand-washing facilities. The study covered 5,379 schools out of 5,460 schools (98.5%). In 2008, Malawi primary schools had a total of 15,473 improved latrines in use for female pupils. With a primary school enrolment of 1,773,369 girls, this represents a ratio of 1 improved latrine for every 115 girls (Bender et al., 2012).

Although existence of latrines in itself is a main issue for hygiene and menstrual health, it was not the only factor affecting MHM. In 2011, WaterAid conducted a detailed study, which included a total of seven schools in and around Lilongwe. Three recurring themes emerged from the participatory sessions, questionnaires and semi-structured interviews (Pillitteri, 2012):

- Sanitation facilities, infrastructure and available resources: Facilities and infrastructure observed in the study were inadequate in every visited school. All of them except for one failed to meet the WHO suggested toilet / student ratio of 1:30.
- Cultural beliefs around menstruation: Parents do not talk to their children about menstruation – Menstruation is seen as 'strictly secret', girls are told to stop playing and talk / chat with boys.
- Knowledge and education: Ignorance about menstrual issues is prevalent not only amongst school-girls but also in communities.

A nationwide six-year programme named «Keeping Girls in School» was introduced in 2012 with the funding of the UK government through UK aid and in cooperation with several implementing partners like UNICEF, Save the Children etc. The programme supported by Malawi government was dedicated to tackling barriers to girls' education and to ensure more girls complete primary school and progress to secondary school in order to improve their life chances. WASH was one aspect under the programme.

However, poorly resourced schools sanitation facilities and the lack of privacy, along with a lack of knowledge on menstruation remained major challenge to girls managing their menses. Negative perceptions and attitudes towards menstruation and the lack of access to information and materials still left girls in rural Malawi with very limited options on handling their monthly period with dignity.

2.3. Malawi Red Cross Society addressing MHM

The Malawi Red Cross Society (MRCS), with the support of the Swiss Red Cross (SRC), has recognized the importance of MHM and incorporated it in its Integrated Community Based Health Program (ICBHP) in the districts of Mzimba and Salima.

Mzimba district and town lay a 4h drive north from the capital city Lilongwe, 1400m above sea level. It is a large and remote area, less populated ($20'000/10'430\text{km}^2 = 58,6 \text{ p/km}^2$ in 2006) compared to other districts in Malawi, where the main language spoken is Tumbuka. Salima district lies in the central region of Malawi, only a 1,5h car drive away from Lilongwe away, 510m above sea level with lake Malawi at the eastern side. The district with Salima city in its centre is densely populated ($32.000/2196 \text{ km}^2 = 113 \text{ p/km}^2$ in 2006). The national language Chichewa is the main language spoken.

During the first phase of this project (1 April 2014 – 31 Dec 2016, with no cost extension to 30 April 2017), latrines were constructed or improved in 21 schools. Girls' latrines included one menstrual room that was installed between two girl toilets. These rooms were equipped with a storage area, a water outflow and a door to provide a private space for changing and washing to girls in menses. The aim of these improved girl latrines was to avoid absenteeism in school due to girls' monthly period. Additionally, training in MHM support was provided to 180 mother group members (female parent committees) in most schools in Salima, whilst the schools in Mzimba did not benefit from MHM educational support so far.

In 2017, MRCS with the support of SRC started the second phase of the ICBHP in Mzimba and Salima districts for three years (1 May 2017 to 31 Dec 2019). Again, MHM was incorporated as a contributing measure to improve health and hygiene behaviour at schools. Even though the evaluation from the first phase of the project shed some light into some of the remaining gaps in MHM interventions - study data suggest that the constructed menstrual hygiene rooms at schools has not changed school attendance rate of girls -, it was clear that a more in-depth analysis was needed in order to gain a better understanding of the existing gaps and needs in resources, sanitation facilities, knowledge, attitudes and hygiene practices in schools. In September 2017, MRCS and SRC agreed to conduct the present study in collaboration with the Principle Investigator.

3. Objectives and research questions

With the aim to find sustainable, accessible, affordable and culturally acceptable menstrual health solutions to empower girls to reach their full potential, a KAP-study investigating current states of knowledge, attitudes and practices was conducted. The research should contribute valuable insights for the design of future Red Cross programming addressing the improvement of MHM in rural Malawi. Primary objectives, secondary objectives and research questions are described in the three sections of this chapter.

3.1. Primary Objectives

The primary objective of this study was to investigate and document the current state of knowledge and attitude towards menstruation among adolescent boys and girls in rural primary schools in Malawi, as well as MHM practices among girls and to establish associated influencers.

3.2. Secondary Objectives

Understanding the levels of knowledge, attitude and practice regarding MHM will enable the MRCS and SRC to design regionally and culturally adapted MHM project interventions at schools in Malawi and in similar contexts. The results of the KAP study will serve as a baseline that will allow MRCS and SRC tracking of changes in MHM knowledge, attitudes and practices over time.

3.3. Research question

Research questions were developed based on the selective literature review (see section 2.1.) on MHM in Sub Saharan Africa and in collaboration with SRC and MRCS, including an inspection visit to MRCS headquarters, the teams in the two impact areas of Salima and Mzimba and seven schools in October 2017.

The KAP study addressed the following Research Questions:

- Knowledge: How much and what do school girls in rural Malawi know about menstruation and its management, what are their sources of information, and what are the main barriers in accessing appropriate information?
- Attitudes: What perceptions of menstruation and its management do schoolgirls in rural Malawi have? How prepared are they to the onset of menstruation and what are their needs?
- Practices: How do schoolgirls in rural Malawi demonstrate their knowledge and attitudes concerning MHM through their actions and what is the current state of use of «sanitary products» ?
- Main influencing factors: Who and what influences Malawi primary school girls' knowledge, attitude and practice and in what ways do they influence MHM? What are the local threats and opportunities?

4. Methods

This chapter gives an overview of the study methodology looking at the total study population, the sample included, quantitative and qualitative data collection and analysis, as well as the ethical considerations linked to the conduction of the study in a section each.

4.1. Study population

The total study population included approximately 1200 standard 8 primary school pupils in the MRCS project areas in Salima and Mzimba. The two project areas, Salima with 14 primary schools and Mzimba with 23 primary schools, contained around 600 standard 8 pupils each (classes in Salima were bigger with 52 students at average). Around half of the students were girls and half boys (around 300 girls and 300 boys per project area).

Primary schools were chosen for the following reasons:

- To avoid raising false expectations, only schools covered by the MRCS project were included. MRCS collaborates with primary schools in both areas, what offered the chance to compare them.
- The study focused on the preparedness at the onset of menstruation. Many girls start menstruating in earlier grades.
- All included schools had sanitation infrastructure and a mothers group installed.

Standard 8 classes were preferred for the following reasons:

- All students are at least 12 years old and can be considered as adolescents. They are more articulate at expressing themselves compared to younger grades.
- The girls have more likely started menstruation and are able to share their experiences.
- The risk of asking the same or part of the same sample group again in a follow-up study is very small, as they will most likely have completed primary school.

4.2. Sample

Using the webpage <https://rechneronline.de/zufallszahlen/> for random sampling, 50% of these schools, with seven standard 8 classes in Salima, ten standard 8 classes in Mzimba and a total of around 600 students, were invited to participate in the study. Students who were either absent during the investigation visit or did not submit informed consent signed by their caregivers were excluded. 522 present students who submitted informed consent were included to the study. Figure 1 and Table 1 show the samples' composition by sex, district, menstruation status and school.

Figure 1: Overview of study sample by district, sex and menstruation status

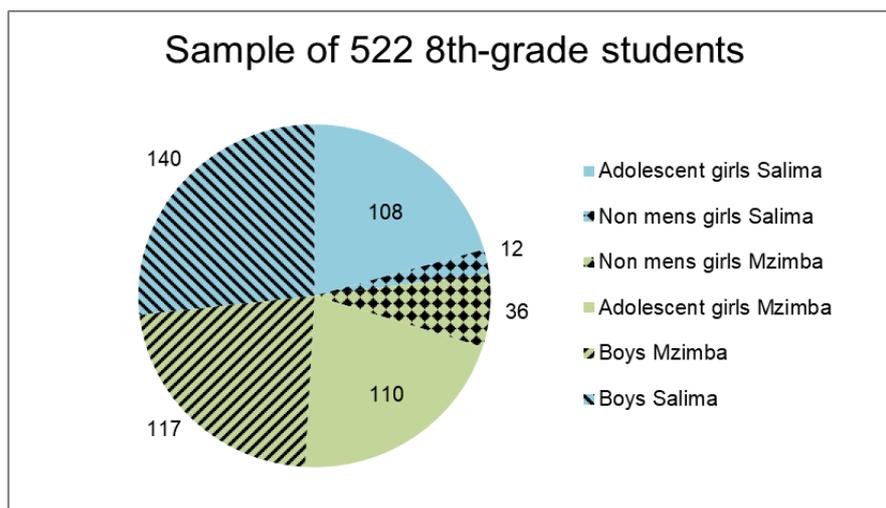


Table 1: Overview of study sample by sex and school

School	Girls	Boys	Total
Mzimba	146	117	263 (50.4%)
Chibale PS	8	5	13
Eswazini PS	11	19	30
Kamzomera PS	18	11	29
Kasangazi PS	15	8	23
Makali PS	15	18	33
Manyenyezi PS	5	11	16
Mathandani PS	39	18	57
Mbwiriwiza PS	19	14	33
Mongo PS	6	4	10
Ulida PS	10	9	19
Salima	120	139	259 (49.6%)
Chikombe PS	16	18	34
Chilanga PS	10	14	24
Kanjuwi PS	21	18	39
Matenje PS	25	39	64
Mchenga PS	23	19	42
Msambafum PS	16	13	29
Msanyanda PS	9	18	27
Total	266 (51%)	256 (49%)	522

4.3. Quantitative data collection

A questionnaire on knowledge, attitudes, practices and influencing factors was developed based on literature and pre-existing scales / measures and adapted during a field visit in October 2017 in collaboration with SRC and MRCS. The software Kobo Toolbox was used to digitalise the questionnaire in English, Tumbuka and Chichewa. Three female and one male interviewers were trained in each region to conduct structured interviews on MHM with students of the same sex in the local languages, filling in the digital forms according to the pupils answers. Quantitative data was collected and merged electronically through Kobo Toolbox.

Depending on sex, knowledge, status of menstruation and used materials, pupils were asked between 2 and 46 questions. Questionnaire guided interviews with boys focused on 8 questions concerning knowledge and attitudes. They took about 10 minutes time and were conducted by a male interviewer. Girls were additionally asked about sources of information, influencing factors and their practices in case they did already experience menstruation. An interview with a girl took about 20 minutes average. The questionnaire was tested in Tundwe primary school in Mzimba and adapted according to the enumerators' feedback.

In addition, a school survey based on a closed interview with an employee of each school and a sanitary infrastructure inspectional walk was carried out to investigate the school environment as an exposure.

4.4. Qualitative data collection

29 focus group discussions and 13 key informant interviews with a total of 120 girls, 42 boys, 7 mother groups, 14 teachers and 7 villagers were audio-recorded in local language (Tumbuka in Mzimba and Chichewa in Salima), transcribed and translated to English:

Focus group discussions with 5 to 12 girls: 8 in Mzimba / 5 in Salima
Focus group discussions with 4 to 8 boys: 4 in Mzimba / 3 in Salima
Focus group discussion with 2 to 8 members of mother groups: 4 in Mzimba / 3 in Salima
Focus group discussion with 2 teachers: 1 in Mzimba
Focus group discussion with 6 villagers: 1 in Salima
Key informant interviews with male head masters: 2 in Mzimba / 1 in Salima
Key informant interviews with female teachers: 4 in Mzimba
Key informant interviews with matron teachers: 3 in Mzimba / 2 in Salima
Key informant interview with male villager: 1 in Mzimba
Debriefing discussions with 5 to 6 team members: 1 in Mzimba / 1 in Salima
Interviews with organisations in the field of MHM: Peace Corps / AfriPads / Red Cross

4.5. Data analysis

Statistical analysis of quantitative data was conducted using the statistical software STATA. Associations between exposures and KAP outcomes were analysed comparing sub-groups of students and calculating correlation between independent variables like district, school (school settings), sex, age, menstruation status and years of experience, sources of information, knowledge and preparedness with knowledge, practices, absenteeism and reaction using Pearsons' r. Factors that showed a significant correlation with KAP outcomes were selectively examined through multivariate regressions.

The content of qualitative interviews was categorized and analysed through the software NVIVO. Findings were used for triangulation of quantitative outcomes and to gain further information on potential issues. Representative or illustrative statements were included to emphasize statistical outcomes.

4.6. Ethics

Ethical approval to conduct this study was obtained from the National Health Sciences Research Committee of Malawi. In addition, the District Education Managers and the District Commissioners of Salima and Mzimba, the targeted schools, SRC, MRCS and the University of Barcelona agreed to the execution of the study.

To avoid stigmatization based on the participation in the survey, entire standard 8 classes were included in the survey. All study participants were informed on the purpose, theme and procedure of the study during a first visit to selected schools. In addition to oral information, a written informed consent sheet was provided to the prospective participants. They were asked to take it back to their caregivers. Only students, who were willing to participate and provided the informed consent sheet with their caregiver's and their own signature, were included in the study. It was stressed in the written and oral communication that the participation was voluntary, and, that even upon initial agreement the participants could stop being in the study at any time without penalty or prejudice.

For the participants, there were no known risks and no costs associated with the participation in this study. Exception might be embarrassment to talk about menstruation or teasing of peers. Project costs were covered by the Swiss Red Cross study budget. The study participation was not rewarded with financial payments, but all students of involved classes, participating or not, received a tablet of soap in the end. In terms of general benefits, the research project leads to valuable insights for the design of future trainings and projects addressing the improvement of MHM. No conflicts of interest have been discovered.

Confidentiality was ensured in dealing with collected data and generated information: The data collected did not contain any names or identification codes. Nevertheless, every effort was made to keep the participants' personal information confidential. Only the principal investigator and the study staff were able to access the collected anonymized data. All data was stored on the principal investigator's password protected computer. Only completely anonymized parts of the set can be provided to other competent researchers for intercoder reliability testing and validation. No biological material and related health data was involved in the study. Literature review, field study results and recommendations are published as a study report within SRC and MRCS. If information from this study is published or presented at scientific meetings, the participants' names and other personal information will not be used.

5. Results

This chapter deals with the actual outcomes of data collection and analysis on MHM in primary school environments in Mzimba and Salima. Results are divided into four sections. The first section is based on a school survey and gives overview of the structural situation found in the 17 visited schools. The analysis and results of each aspect of the KAP study, knowledge, attitudes and practices, are explained in the following three sections.

5.1. School facilities and settings

Sanitary infrastructure and established systems linked to MHM were investigated by doing observation walks and closed interviews with a staff member in each of the 17 rural primary schools, which is every second primary school covered by the MRCS project in Mzimba and Salima. Table 2 shows the average characteristics of the 10 observed schools in Mzimba and 7 schools in Salima.

Table 2: School indicators

Indicators	Mzimba (10 schools)	Salima (7 schools)
Average school size	423 pupils	1027 pupils
Average percentage of girl students	54%	55%
Ratio students / toilet (Malawi standard = 60 students / toilet, WHO recommendation = 30 students / toilet)	41	117
Ratio girls / girl toilet	34	148
Ratio students / teacher	63	75
Ratio girls / female teacher	138	185
MHM or change room installed	5/10 schools	7/7 schools
Schools providing soap	1 yes	3 yes
	4 sometimes	1 sometimes
	5 no	3 no
Schools providing toilet paper	0/10	0/7
Trash bin within the sanitary infrastructure	3/10	1/7
Borehole close to school	8/10	7/7
Fluent water within the sanitary infrastructure	0/10	0/7
System to fetch water from the borehole within the sanitary infrastructure (bucket / bottle)	7/10	5/7
Water available during sampling inspection	2/10	3/7
Schools with at least one toilet with a door and a lock	7/10	7/7
	2/10	

5.1.1. Sanitary infrastructure and equipment

With an average school size of 423 students, the widely spread schools in Mzimba were small compared to the schools in the densely populated district of Salima with an average school size of 1027 students. Sanitary infrastructure capacity per school did not differ remarkably thus, what led to a quadruple student-toilet ratio in Salima. While an average of 34 girls shared the same infrastructure in Mzimba, Salima's average of 148 girls per toilet was more than four times higher and far from reaching the Malawi standard of 60 students per toilet. No school in Salima reached that standard, while every visited school in Mzimba did.

Inspectional walks showed that the basic sanitary infrastructure consisting of pit latrines and an MHM or change room in 12 of 17 schools was often in bad condition. 15 out of 17 schools had a borehole within or next to the school compound as their only source of water. None of the schools provided fluent water to the sanitary infrastructure. As a basic hand washing facility 12 out of 17 schools placed a plastic bucket to fetch water from the borehole next to the sanitary infrastructure or in the MHM room. Most buckets were empty though, some of them even broken. Only about a quarter of school provided soap or a trash bin for disposal and not a single school was fitting out pit latrines with toilet paper. Lack of resources to provide soap and buckets was mentioned as one of the main challenges by school staff in most qualitative interviews.

- We lack soap and hand washing facilities. We are not funded to have such facilities. Without provision of soap and buckets it will go a long way in assisting these girls. And instead of maybe going to their teacher to be assisted, since we lack the materials, they will rather go back home.
(KII, Head teacher, Msambafum, Salima, 07.03.2018)
- We don't have standard bathrooms. And on utensils like buckets and basins, they are not enough. Cause we have to take into consideration the issue of infection prevention. Imagine one basin used by all the girls here puts them at risk of contracting diseases.
(FGD, Mother Group, Kamsomera, Mzimba, 20.02.2018)
- We don't have enough pills (soap) so that we can use it to wash our hands. When the learners come back from the toilet they go straight to class, without washing their hands. We have a borehole there, but it is too far for them to go there.
(KII, Matron teacher, Kasangazi, Mzimba, 22.02.2018)

Menstrual hygiene management rooms were installed in 5 out of the 10 visited schools in Mzimba and in all schools (7/7) in Salima. Most of them were constructed by MRCS during the first project phase: a separate room with a storage area and a water outflow was placed in-between two girls' toilets to provide private space to girls in menses, where they could change and wash. Only 2 out of 12 MHM rooms were equipped with water and absorbent materials during observation visits. Some of the rooms didn't seem to be in use (see also 5.4.4. Practices, Use of sanitary infrastructure).

5.1.2. Class rooms

Some schools were not equipped with desks. Many children had to sit on the floor during class. According to a head master in Mzimba the main challenge for the girls during their period was to sit on the ground and to stand up to answer questions, due to the lack of desks.

- It is about the pride of girls. (...) The way the classrooms are, they are having a challenge on the lack of desks. (...) When a girl is approaching that period it becomes difficult for her to sit down (on the floor), and when the teacher asks her to answer a question she has to stand up. That period is very difficult. So we even allow the girls to answer the questions sitting down, and again it's too challenging to them, cause sometimes they cannot move when they have started their menstruation. So in the end it's an embarrassing factor.
(FGD, Teachers, Eswazini, Mzimba, 23.02.2018)

5.2. Knowledge on menstruation

The first subsection on knowledge describes how much and what students in Mzimba and Salima knew about menstruation, based on their answers to knowledge questions asked during the quantitative interviews. The second subsection deals with the timely development of students' knowledge, while subsection three and four describe the sources information provided at school level and students self-reported knowledge sources.

5.2.1. Students' knowledge on menstruation

The students' knowledge on menstruation was scored adopting a system that has been used in previous studies on MHM, assigning knowledge scores to poor, fair and good knowledge (Lawan, Yusuf, & Musa, 2010; Tegegne & Sisay, 2014). 522 students (266 girls and 256 boys) were asked knowledge questions on menstruation and received a point for every right answer. The first question was to select if further questions should be asked: if pupils stated that they had never heard about the existence of menstruation, even by probing with other names, they received a knowledge score of «0» and were not asked any further questions.

Base score: All pupils who knew about the existence of menstruation were asked 8 questions on the origin of menstrual blood, people affected, reason, meaning, time of onset, occurrence, restrictions and symptoms, receiving a base score between 0 and 8 points. Average base scores of four sub-groups, girls and boys in Mzimba and Salima, were compared. Means of 0 to 33,33... % of the maximal score stood for poor knowledge, 33,33... to 66,66...% for fair knowledge and 66,66... to 100% for good knowledge on menstruation within the according sub-group. Table 3 gives an overview of the 8 questions used to calculate the base score and how many pupils, divided by sex and district, answered right. The full questions and possible answers are visible in the questionnaire attached.

Table 3: Right answers to questions on MHM by sex and district

Knowledge questions on menses	Girls Mzimba (146)		Girls Salima (120)		Boys Mzimba (117)		Boys Salima (139)		Total (522)	
	n	n/146	n	n/120		n/117	n	n/139	n	n/522
0. Menses known	133	0.91	114	0.95	95	0.80	113	0.81	455	0.87
Who had not heard about menstruation received a score of «0» without further questioning.										
1. Origin of blood	107	0.73	66	0.55	0	0.00	0	0.00	173	0.33
2. Affected people	13	0.09	92	0.77	2	0.02	80	0.58	187	0.36
3. Reason	96	0.66	101	0.84	63	0.54	104	0.75	364	0.70
4. Meaning	98	0.67	98	0.82	45	0.39	101	0.73	342	0.66
5. Time of onset	121	0.83	105	0.88	65	0.56	100	0.72	391	0.75
6. Occurrence	117	0.80	109	0.91	71	0.61	94	0.68	391	0.75
7. Restrictions	2	0.01	1	0.01	0	0.00	5	0.04	7	0.01
8. Symptoms	1	0.01	1	0.01	1	0.01	0	0.00	3	0.01
Avg. base score (0-8)	4.06/8		5.31/8		2.13/8		3.53/8		3.77/8	
Avg. base score % of max. score (8)	50.8%		66.4%		26.6%		44.1%		47.1%	

Comparing students' knowledge levels by sex and district, significant differences were observed: girls in both districts reached higher scores than boys and students in Mzimba gained less knowledge on menstruation than in Salima. With 66.4% the girls in Salima reached the highest score, between fair and good knowledge. Girls in Mzimba with 50.8% and boys in Salima with 44, 06% were situated in the middle with fair knowledge, while in Mzimba boys' knowledge was rather poor with 26.6%.

Girls' score: Girls were asked two additional knowledge questions on the absorbents they knew and on the menstrual cycle. Points received for all 10 questions built an additional girls' score between 0 and 10 points. Results of additional questions and mean girls' scores are presented in Table 4.

Table 4: Additional answers on MHM for girl score

Knowledge questions on menses	Girls Mzimba (146)		Girls Salima (120)		Boys Mzimba (117)		Boys Salima (139)		Total (522)	
	n	n/146	n	n/120					n	n/522
9. Absorbents known	123	0.84	94	0.78					217	0.42
10. Menstrual cycle	68	0.47	64	0.53					132	0.25
Avg. girls score(Question 0 to 10)	4.90/10		6.1/10						5.44/10	
Avg. girls' score % of max. girls' score (10)	49%		61%						54.4%	

Girls reached an average girl score of 54.4% with a remaining difference between Mzimba and Salima (49% and 61%).

The correlation between knowledge scores and related variables - sex, district, age, onset of menstruation, main informants and confidants as well as school related variables like the inclusion of MHM to the curriculum (based on teacher's statement), if the school introduced an MHM-room and the ratio between girls and female teachers - was calculated using Pearson's r correlation coefficient and is presented in Table 5. The girl score was used to calculate correlation with girl specific variables only while the base score was used for variables relevant for both sexes. Average knowledge levels per school were used to measure the correlation with school level variables.

Table 5: Correlation between Knowledge scores and related Variables (STATA pwcorr)

Independent Variable	N	Scale	% or μ of N	Correlation to Y (Pearson's r; p-value)
Sex (female / male)	521	f/m	51%	r = 0.43 ; p = 0.000***
District (Mzimba / Salima)	521	M/S	50%	r = - 0.28 ; p=0.000***
Age	521	12 - 20	$\mu=15.3$	r = 0.19 ; p = 0.000***
Mens started (girl score)	266	yes/no	82%	r = 0.62 ; p = 0.000***
Informant (girl score)	226			
Peer (f)	226	yes/no	65%	r = 0.19 ; p = 0.005**
Grandmother	226	yes/no	55%	r = 0.08 ; p = 0.212†
Class	226	yes/no	39%	r = 0.26 ; p = 0.000***
Mother	226	yes/no	37%	r = 0.20 ; p = 0.003**
Other female family	226	yes/no	35%	r = 0.15 ; p = 0.029*
Mother group	226	yes/no	35%	r = 0.36 ; p = 0.000***
Teacher (f)	226	yes/no	30%	r = 0.29 ; p = 0.000***
Sister	226	yes/no	20%	r = 0.30 ; p = 0.000***
Readings	226	yes/no	14%	r = 0.28 ; p = 0.000***
Red Cross	226	yes/no	08%	r = 0.28 ; p = 0.000***
Health worker	226	yes/no	05%	r = 0.27 ; p = 0.000***
Confidant (girl score)	226			
Peer (f)	226	yes/no	62%	r = 0.07 ; p = 0.285†
Grandmother	226	yes/no	57%	r = 0.01 ; p = 0.826†
Mother	226	yes/no	28%	r = 0.16 ; p = 0.014*
Other family member (f)	226	yes/no	29%	r = - 0.01 ; p = 0.839†
Mother group	226	yes/no	27%	r = 0.17 ; p = 0.011*
Teacher (f)	226	yes/no	33%	r = 0.15 ; p = 0.025*
Sister	226	yes/no	18%	r = 0.13 ; p = 0.050*
No one	226	yes/no	01%	r = - 0.17 ; p = 0.011*
School level correlations (aggregated knowledge score)				
Curriculum includes MHM	17	yes/no	47%	r = 0.32 ; p = 0.217†
MHM-room installed	17	yes/no	59%	r = 0.45 ; p = 0.067
Student per teacher	13	15 - 126	$\mu=69$	r = - 0.11 ; p = 0.729†
Girls per female teacher	13	43 - 499	$\mu=160$	r = 0.13 ; p = 0.693
District (Mzimba / Salima)	17	M/S	59%	r = - 0.76 ; p = 0.000***

Please note: †p > 0.1 (no significant correlation); *p < 0.05; ** p < .01; *** p < 0.001

The positive correlation between students' female sex and knowledge was quite strong and highly significant ($r = 0.43$; $p = 0.000$) while a quite strong and highly significant negative correlation between district and knowledge was confirmed for Mzimba (individual level: $r = -0.28$; $p = 0.000$ / school level: $r = -0.76$; $p = 0.000$). Age showed a weak but significant correlation to students' level of information on menses ($r = 0.19$; $p = 0.000$), while the onset of menstruation showed the strongest correlation of all variables ($r = 0.62$; $p = 0.000$). Most sources of information mentioned, like class, mothers, teachers, readings, Red Cross and health workers, correlated positively with girls' knowledge. Especially notable is the strong and very significant positive correlation between their knowledge and having the mother group ($r = 0.36$; $p = 0.000$) or a sister ($r = 0.30$; $p = 0.000$) as a source of information. Having a mother, the mother group, a teacher or a sister as confidant people had a weak positive correlation with girls' knowledge, while having no confidant people correlated negatively. Having an MHM room installed at school showed a weak positive correlation with students' average knowledge, what might be due to the fact that menstruation became a subject during construction. Other school level variables didn't show any correlation with students' knowledge levels.

Calculation of intra-class correlation (ICC) showed that compared to individual differences, variances between schools counted for 11.29% only: $(\text{dis } 0.0052776 / (0.0052776 + 0.0414665)) * 100 \Rightarrow 0.113$. This result suggests that only 11% of student's knowledge can be influenced by adapting factors on school level.

5.2.2. Time of knowledge development

The age of all 522 interviewed standard 8 pupils ranged from 12 to 20 years with a mean of 15.3 years. The reason for this wide age-range within just one grade is found in the schooling system: to get to the next standard or to complete school, pupils have to pass the final exams. As long as they do not reach the required level, they stay in the same class and repeat regardless of their age.

The older standard 8 students were, the more they knew about menstruation; their level of knowledge developed around 6% per year (coef. = 0.06; $p = 0.032$). Taking a closer look though showed, that knowledge levels develop very differently in boys and girls. While boys gained more knowledge on menstruation with every year of age, a regression presented in Table 6 showed, that age and years of experiencing menstruation were not the variables that correlated with girls' knowledge (coef. = -0.00; $p = 0.914$) but were confounded by the onset of menstruation (coef. = 0.59; $p = 0.000$). Girls jumped from a low to a quite high level of information at the time of menstruation onset, while their knowledge did not rise notably before, or with additional years of experiencing menstruation thereafter.

Table 6: Regression model explaining knowledge (girl score, STATA xtmixed)

Independent Variable	Scale	Coefficient	(p-value)
Age (years)	12 - 20	- 0.00	0.914
Menstruation started	yes/no	0.13	0.000***
Experienced years of mens.	0 – 5+	0.01	0.347
Intercept		0.46	0.000***
R2		0.34	
N		245	

Please note: $t_p > 0.1$ (no significant correlation); * $p < 0.05$; ** $p < .01$; *** $p < 0.001$

5. Results

218 out of 266 interviewed standard 8 girls (82%) did already experience the onset of menstruation. At average they were 13,77 years old when they had their first menstrual period (13,6 years in Mzimba/ 13,86 years in Salima).

197 girls answered to the question on how much information they had received before the event of menstruation onset. 52% (44% in Mzimba /63% in Salima) reported that they had not received any information previous to the onset, while 38% (44%/30%) had little or medium information and only 10% (12%/7%) felt well informed. A few schools only tried to reach and inform girls previous to the onset of menstruation in order to prepare them.

- As mother group members we also prepare those girls who have not yet started menses. We tell them that they will all experience the menses. Their time will come (...) so they shouldn't be surprised. (FGD, Mother group, Machenga, 08.03.2018)
- I tell the older learners: «Your friends are coming closer to you. So don't hide something to them. Give them the chance to know something about menstruation.» (KII, Matron teacher, Kamzomera, Mzimba, 20.02.2018)

5.2.3. Sources of information provided at school level

Schools in Mzimba and Salima provided different channels of information on menses and MHM: while some information was included into the curriculum to reach boys and girls, female parent committees called «mother groups» and matron teachers responsible to counsel girls on request were established as additional sources of information and support to girls in school. Table 7 gives an overview of how many schools offered these three sources of information. Some schools supported voluntary boy and girl clubs in addition.

Table 7: Sources of information provided at school level

Source of information	Mzimba (10 schools)	Salima (7 schools)
Mother group	10/10	7/7
Matron teacher	7/10	6/7
Curriculum includes «Life skills»	10/10	7/7
• Adolescence is content	9/10	7/7
• Body changes are content	9/10	7/7
• MHM is content	3/10	5/7

a. Curriculum

The curricula of all 17 schools included the subject of «Science and life skills» in standard 5 to 8. Adolescence and body changes were part of the subject and usually treated in all schools. MHM was discussed within the scope of this subject in 2/10 schools in Mzimba and 5/7 schools in Salima according to the head masters' or their representatives' statements.

- We teach them in class (...) and we do touch those aspects of reproductive age. We call it adolescence in boys, adolescence in girls. Now we always hit the significance of every step a human being takes. There is no need to laugh; there is no need to tease. Cause once you tease, that means you are forsaking where you are coming from. (...) We are advocating for child friendly environment in class as well as outside. (FGD, Teachers, Eswazini, Mzimba, 23.02.2018)

Qualitative interviews showed, that what was taught in «Life skills» depended to a great extent on how comfortable teachers felt to talk about the subject.

- Menstruation of course we tackle it partially, but we don't go much into detail. But in life skills of course there is a topic of growing up and changing whereby we do highlight such things to learners; but not very much.
(KII, Head teacher, Msambafum, Salima, 07.03.2018)
- We have life skills (as a subject in school). Especially in standard 5, 6, 7 as we go this way we teach much about HIV / AIDS, stages of human development etc. For instance last week I was teaching standard 5 about the stages of human development and we talked much about the adolescence stage, that we consider the most dangerous. Because if not properly handled, you can get impregnated, you see? (...) Depending on the class (we talk about menstrual hygiene). So standard five we don't talk about that, but maybe six, seven... (...) We have our teacher's guides. Everything we teach is from the guide. However, due to cultural matters we don't feel comfortable. So yes, it is like you run away from the truth sometimes, stay just on the surface instead of going deep. (...) They are trying to say that the government should re-change some of the books that talk about these subjects. Especially life skills: They talk about things that are against our culture. Like talking of puberty, issues of sexuality, this is against our culture. We don't feel comfortable talking about that.
(KII, Male teacher, Mathandani, Mzimba, 16.02.2018)

b. Mother groups

Within the scope of the governmental initiative to keep girls in school, mother groups consisting of up to 10 female parents have been installed on voluntary basis in all 17 visited schools. Mother groups in Mzimba have not been trained in general, but in isolated cases they received training by Peace Corps volunteers. In schools that have been included in an early stage of the MRCS programme in Salima, the mother groups have received an initial training. A member of the District Education Office and a community nurse from the district hospital, financed by Red Cross, conducted it. Recently included schools have not received training for mother groups.

The mother groups' purpose was to build a source of information and support to girls in school, to advocate for girl friendly environments to avoid absenteeism and to bridge between schools and villages. They usually meet at school on a regular basis to offer girls counselling. In some schools they are responsible for the maintenance of the menstrual hygiene rooms and raising funds for soap and water buckets. Depending on their resources, they provide materials like handmade pads to girls in need or do even teach them how to sew pads.

- As a mother group we encourage these girls to still come to school because we have taught them how they can take care of themselves right from home to school and back. And also we make sure in school there is always water available in the change rooms so they wash if they need to. Because we spend more time here at school, sometimes we notice girls who have started menses while at school, we make sure we give them a piece of cloth [Chitenje] to cover their stained dress, so that others should not notice. (...) No one has ever trained us. But we have heard from other areas.
(FGD; Mother group, Machenga, Salima, 08.03.2018)
- The mother group has planned to go to the villages to teach the villagers and the chiefs on how they should handle these learners. So that they should know what is happening. And they should not use more taboos in our days.
(FGD, Teachers, Eswazini, Mzimba, 23.02.2018)

Almost all mother groups mentioned to lack resources to support girls in menses with appropriate materials and were asking for training. Their roles, organisation as well as their levels of knowledge,

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motivation and capacity differed considerably. While girls in 5 schools explicitly mentioned that the mother groups were guiding and supportive, the groups seem to struggle finding their role and adequate information in other schools.

- Once a week they call girls who have started menstruating and we meet in standard 8 classrooms. (...) But when boys see us going there to meet the mother group, they laugh, so we don't go there. (FGD, Girls, Masanyanda, Salima, 02.03.2018)

c. Matron teacher

Most of Malawi teachers are men. To lower the threshold for girls to ask specific questions on subjects like menstruation, most schools in both areas have assigned a female teacher called matron teacher who is responsible for the information and support of all girls at one school.

- Most of the times they ask me about menstruation, periods. (...) So they ask me: «If this happens at school, what can I do?» (KII, Matron teacher, Kamzomera, Mzimba, 20.02.2018)
- Her (the matron teachers') main task is to make sure, that the girls are advised properly on proper dressing, she also has to make sure that the menstrual room has water and soap so the girls can change and clean themselves whenever they are like... soil themselves. (KII, Matron teacher, Chikombe, Salima, 07.03.2018)

d. Girl and boy clubs

Some schools installed voluntary «Girl Peer Clubs / Girl Skill Clubs» and a «Boy Champion Clubs» for pupils to meet regularly to discuss adolescence and its challenges, guided by a teacher of the same gender, in addition to «Life skills» but out of class.

- There was a Peace Corps girl from America. She tried to come in with the sewing and taught some of the madams how to sew the pads. And she also introduced a skills girls club. (...) A skills girls' teacher still meets the girls. Now she is emphasising on bringing in boys as well. So they should know their bodies, how they work. So it is about empowering them, knowing the challenges, how to go about that. So that club is also coming in to solve problems. (FGD, Teacher, Eswazini, Mzimba, 23.02.2018)
- We do give information to girls who started menstruation through Girls Peers Club on issues concerning menstrual hygiene and how a girl child should dress. (...) We give materials like disposable pads, home-made sanitary pads and soap. (KII, Matron teacher, Ulida, 15.02.2018)

5.2.4. Self-reported sources of information and confidante

Girls' sources of information and the people they were keen to ask on menstruation were established during qualitative interviews, while boys and teachers or mother groups were asked on where they gathered information during qualitative discussions and interviews. Self-reported sources of information are described in the following subsections.

a. Girls sources of information

To establish influencers on girls' decision-making, 222 girls who have reached menarche were asked where they gained information from and whom they could talk to or ask for advice on menstruation and MHM. Multiple answers were possible and are presented in Figure 2 and 3. Each mentioned source of information is described below.

Figure 2: Overview of self-reported sources of information

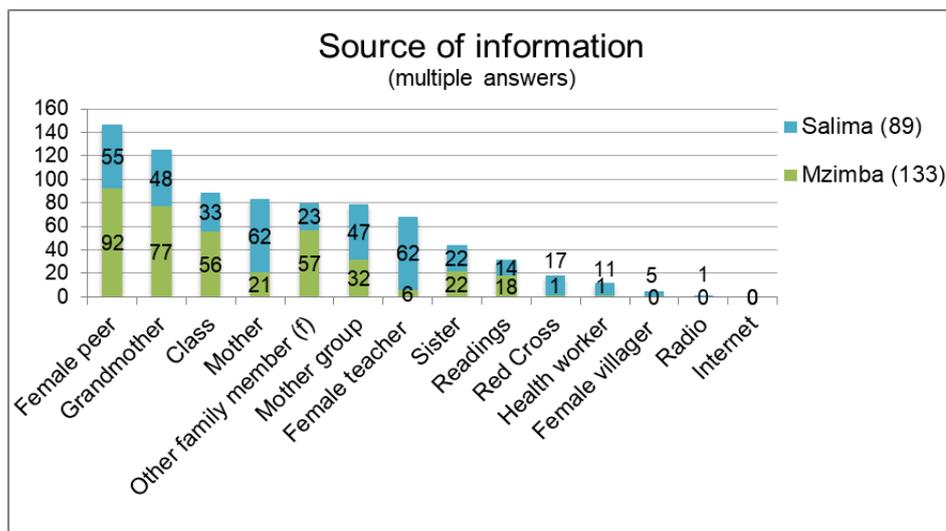
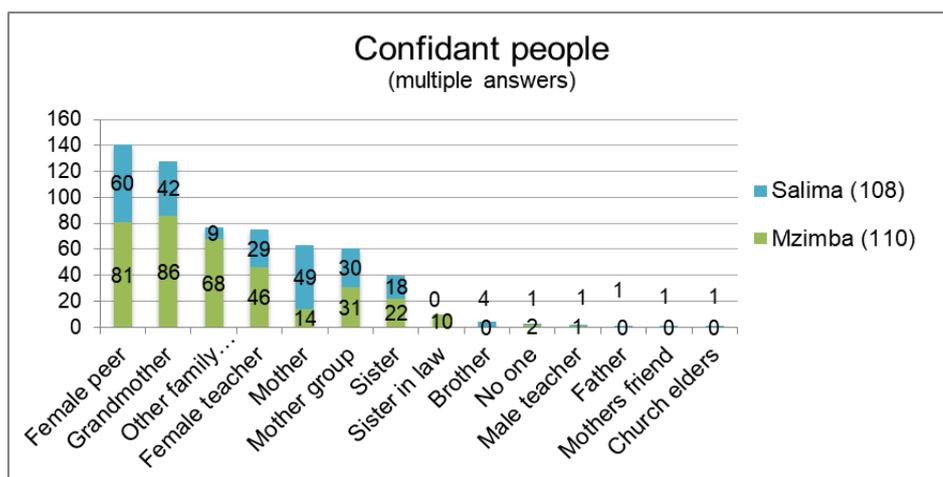


Figure 3: Overview of self-reported confidant people



Female peers: On the subject of menstruation, female peers were the first source of information and the second confidant in Mzimba, as well as the second source of information and the first confidant people to girls in Salima. Qualitative sources confirmed this trend.

- Most of the girls they do already know about menstruation before they start. They get the information from their peers. (...) The older ones advise the younger ones. (FGD, Mother group, Matenje, 06.03.2018)
- (If a girl has a blood stain) we appear like we are explaining something to her and then escort her outside. When she is aware, we give her a wrapper to go the toilet or home to prepare. Those people we didn't talk to, now we start talking to them after the first menses. They speak to us freely; very different from the way we talked before starting menstruation. (FGD, Girls, Chilanga, Salima, 06.03.2018)

Grandmothers: Grandmothers were mentioned in the second place as source of information and as main confidant people in Mzimba and in the third place in Salima (Figure 2 and 3). Also, according to

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several focus group discussions with boys and girls, grand mothers were known to be a main source of information and responsible for counselling girls on issues of menstruation.

- Grandmothers advice girls on how to take care of oneself when one has started experiencing monthly period for the first time, on how to manage it, on respecting elders and things to do and not to do: Health and hygiene when having monthly period, not cooking when having your monthly period because you make the food unclean, not having sexual intercourse to avoid getting pregnant and the boys may get sick, using a separate bathroom than all family members because you are unclean.
(FGD, Girls, Ulida, 15.02.2018)
- They (girls) don't keep the bag in the parents' home but in the grandmothers' house. Cause its grand mothers who help in counselling girl child concerning growing up and anything to do with menses.
(FGD, Boys, Ulida, Mzimba, 20.02.2018)

Mothers: While mothers were first source of information and close confidants to girls in Salima, they were rarely mentioned in Mzimba. Many answers in qualitative interviews and focus group discussions revealed that traditionally in Mzimba it was a taboo to talk to parents about menstruation or subjects linked to sexuality. Even some girls in Salima mentioned the same observation during focus group discussions.

- We feel shy to talk to our mothers on these issues. And mothers are not open to their daughter on issues of menstruation. (FGD, Girls, Kasangazi, Mzimba, 22.02.2018)
- My parents cannot advise me on sex or what so ever. They cannot talk about that. You see? So even at home parents cannot talk to their children. Even on issues like HIV. We are very reluctant because of the culture. Of course, in our days, because of all this information, we can talk. But usually we don't feel comfortable talking about those issues. (KII, Male teacher, Mathandani, Mzimba, 16.02.2018)
- One's direct parent cannot be telling her about things that make you feel shy, but grand mamma can do that. (FGD, Girls, Masanyanda, Salima, 02.03.2018)

According to girls' statements in qualitative and quantitative interviews, fathers did not take part in counselling on menstrual issues. Some fathers told their girls to listen to their mothers or grandmothers and in some cases they provided the money to buy pads. Fathers were only mentioned to be responsible for advising boys.

- Aaaii, not the father! Here in the villages a girl cannot tell her father! Some can tell them, because now with this education system, some they know. But some are shy and won't tell their father.
(KII, Female teacher, Makali, Mzimba, 22.02.2018)

Female teachers: Girls mentioned female teachers to be confidant supporters at school during menses. More in Salima than in Mzimba, they were also mentioned to be a source of information. In some schools, girls address female teachers to use their private toilet to change or to ask for disposable pads in case of soiling.

- Madam provides us with water at the change room and also she understands this process better here at school, and she knows the utensils that we use (...). We tell madam because it is easy to tell her and she can advise properly on things that we are supposed to use.
(FGD, Girls, Chilanga, Salima, 06.03.2018)

- We teach them that if they reach a time that «I'm not okay», they have to come direct to the teacher and tell her, so that the teacher can help.
(KII, Matron teacher, Kasangazi, Mzimba, 22.02.2018)
- When girls are in menstruation, what we do is, a lady teacher responsible for girls takes an active role: She arranges for that girl to go back to her home. After getting ready for classes, she comes back to the school.
(KII, Head master, Ulida, 15.02.2018)

Male teachers didn't play a role as confidant people to girls in menses in any of the schools, according to girls' statements. Girls didn't address them with questions or ask them for support concerning menstruation and if they have to leave class to change or due to menstrual pain, they pass the message through a female teacher. In two schools, girls even mentioned negative reactions by male teachers who realised that they were in menses. Most teachers in Malawi are male though. In some schools the ratio girls to female teachers (average in visited schools in Mzimba: 139/1 and Salima: 185/1) is making it almost impossible for a girl to address a female teacher.

- For example, they ask what to do when one has started period in class due to change in menstrual cycle and lack of menstrual rooms at school. So, we tell them to be free to meet with any female teacher and ask her to use her bathroom and even ask for pads. (...) Some come to us so we can talk to their class teacher about this issue. Cause they cannot be open to their male teacher. Cause in standard 5, 6, 7, 8, there are only male teachers this time. So sometimes they come to us so we can confirm to their teacher, that they have gone home to change.
(KII, Female teacher, Chibale, 23.02.2018)

Male teachers do teach «Life skills» including adolescence and body changes to boys and girls in most of the schools. As a role model to their pupils, the way they address the subject does of course have a strong influence on the perception of menstruation.

- We ask him but he is not free with us, he can just jump here and there without giving deeper explanation. He explains deeper when it is about boys because he is also a male. That is why we are also not free with him.
(FGD, Girls, Chilanga, Salima, 06.03.2018)
- We have the male-champion teachers. They help us. If the girls come with a problem to me, I deliver that problem to the male teacher: «Can you help us? The boys are doing this and that to the girls. So what can you do to those boys.» So they help us. (KII, Matron teacher, Ulida, 15.02.2018)

Other female family members: Especially girls in Mzimba, who were not comfortable to talk to their mothers, depended on other female family members as confidant people to ask about menstruation.

- If one doesn't have grand mum, then she goes to the sister or friend who will advise her.
(FGD, Girls, Masanyanda, Saima, 02.03.2018)

Other sources: Also, class and the mother groups were important sources of information to girls in both districts. Not any pupil did mention the Internet as a source of information.

b. Boys' sources of information

Boys' sources of information on menstruation and adolescence in girls were investigated through focus group discussions and showed to be very limited. Boys did mostly depend on observations on girls' behaviour: Girls missed school and came back shaved around their faces after some days; they stopped talking to boys or playing around with younger children; suddenly they were restricted from

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cooking and other housekeeping activities; it happened that they soiled their clothes in class or that boys saw them washing and drying their absorbents.

- The boys are not invited and being told but rather they observe if the girl distances herself from chatting with them and even walking together
(KII, Male teacher, Kasangazi, Mzimba, 22.02.2018)
- Grandparents keep this as a total secret. They cannot tell a brother about what has happened to his sister. (...) I noted that sometimes she doesn't cook. (...) I saw that she was removed from the main house (...) and started using her own bathroom.
(FGD, Boys, Chibale, Mzimba, 23.02.2018)

Some of the scientific facts were taught in school and where a boy club was installed, boys had the chance to ask questions about their observations. Some boys mentioned peers and girlfriends as a main source of information, while parents and grandfathers just told them to keep away from girls to avoid pregnancy.

- We have heard from some of the girls who menstruate and our friends tell us.
(FGD, Boys, Ulida, Mzimba, 20.02.2018)

c. Teachers and care givers sources of information

During key informant interviews teachers and members of the mother groups were asked about their own sources of knowledge concerning menstruation and MHM in case they needed additional information. Teachers mentioned the mother groups as their source of information, while mother groups who have not been trained, again relied on the information they got from elder women in the village. While no teacher or parent mentioned the Internet as a source of information, some stated that they had gained information through NGO like Red Cross, UNICEF or Peace Corps.

- Since the coming in of some NGO, maybe sensitising or educating the girls on how they can take care of themselves, this has really helped. (...) Otherwise the matter of girls has improved at the part of sanitation.
(KII, Head teacher, Msambafum, Salima, 07.03.2018)

5.3. Attitudes towards menstruation

This chapter is divided into four sections on different aspects of attitudes towards menstruation in Mzimba and Salima. The first section describes girls' reaction on menstruation onset and how it was linked to the level of knowledge they had before. The second section describes the qualitative findings on initiation rites carried out at menstruation onset. Beliefs and restrictions girls have to deal with from now on are described in section three, while the last section describes the challenges girls mentioned to face during menstruation at school.

5.3.1. Reaction to the onset of menstruation

197 girls who reached menarche responded to the question on their reaction to the onset of menstruation. Answers were assigned to negative, neutral or positive reactions. The onset of menstruation was a bad experience (scared, shocked, embarrassed, disgusted, upset) to 85 % of girls. Only 10% experienced positive feelings towards their first period. A weak but significant correlation was found between girls' preparedness (having information or not before the onset of menstruation) and their negative, neutral or positive reaction (Pearsons' $r = 0.17$; $p = 0.0115$).

- Sometimes onset of menses can take place while they are here at school. And when this happens, their fellow girls will come to us if we are around and tell us what has happened to their friend. Or in some instances they help the girl with a wrapper and escort her home. The friends will inform the parents about the events.

(FGD, Mother group, Machenga, Salima, 08.03.2018)

5.3.2. Initiation rites

The onset of menstruation was linked to becoming a woman and seen as the very important moment in a girls' life in both districts. They were counselled on the meaning of womanhood, the communities' expectations on behaviour in their new role and on how to dress and manage monthly period, according to qualitative interviews and focus group discussions. Qualitative interviews have also shown that girls in the rural areas around Mzimba were kept at home and locked in a room for one to seven days during their first period. Grandmothers visited them to advise them on «how to take care of themselves». The time being kept tended to be reduced in our days. In some cases the girls' hair was shaved in a certain way around her face on the last day, as a sign of maturity.

- Once you reach puberty and you tell your grandmother or sister or sister-in-law, they will lock you in the house until tomorrow when they will release you. They invite older women in the village to come and advice you on issues of menstrual hygiene. The first meal they bring you in that house, they do not put salt. We fear and some of us cry because we don't know the reason for locking us in the house. (FGD, 8 grade girls, Makali School, Mzimba, 22.02.2018)

- And after a week, after she has been advised on this and that, the last day they put a mark. They put a line in her hair at the forehead. So they know, this one is mature.

(KII, male teacher, Mathandani School, Mzimba, 16.02.2018)

- It means that the girl is a grown-up woman and ready to get married some day.

(FGD, Mother Group, Mbwiriwiza, Mzimba, 21.02.2018)

No initiation rites were reported in Salima. But, according to the focus group discussions in Salima, the onset of menstruation was also used as a day of counselling by female community members.

- The elderly parents [women] will take her aside and start counselling her on how she can take care of herself when in menses and what it means. (...) We tell her that she should understand well and should not lose anything that we tell her.

(FGD, Villagers, Seketi village, Salima, 08.03.2018)

No initiation rites for boys were documented in Mzimba or Salima. But, according to qualitative statements male family members like fathers or grandfathers counselled boys, focusing on avoiding pregnancy and relationships with girls. Having a girlfriend was almost set equal with dropping out of school and most boys were told to avoid any connection with girls as long as they did not finish school.

- As parent, when we note that the boy comes home late we know they are grown up. You put nsima for supper and when you go to collect the plates in the morning you find it is still there. As a mother now you confirm the boy is now a man. (...) If you are not careful the next month you hear the girls parents telling you that your boy has impregnated their girl. (...) We tell them to take care and keep away from girls, because it's time for school only, not girls.

(FGD, Villagers, Seketi village, Salima, 08.03.2018)

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- Ladies are dangerous. Like maybe a girlfriend or whatever. That's not good to you. You will drop out of school. Just chat with them as friends. What you do, just keep in mind school until you finish. So that you can think as of now I will make a marriage. That's your time. But now, don't ask about ladies. (KII, Village member, Ulida, Mzimba, 15.02.2018)
- Parents know by appearance of the boy. In addition to that the boy himself knows by experiencing dreams that he is sleeping with a girl. (...) They send the boy for counselling in churches and mosques. Other parents tell their boys to keep away from girls at that age until he finishes school. (FGD, Boys, Chikombe, Salima, 07.03.2018)

5.3.3. Restrictions and beliefs

97% of 421 responding learners, boys and girls, mentioned restrictions that girls in menses had to follow. These restrictions and rules of behaviour were mainly related to interacting with boys, cooking and housekeeping or personal hygiene. Only 3% (4 girls and 7 boys) stated that there were no restrictions for girls during period. Frequencies and types of restrictions mentioned are presented in Table 8.

Table 8: Reported restrictions linked to menstruation

Mzimba	Salima	Total	Answers of 421 learners
88	105	193	Avoid sex
154	34	188	Avoid cooking / housekeeping
72	72	144	Don't talk to boys
16	6	22	Don't put salt in food (2x don't eat salt)
15	1	16	Use separate bathroom
3	7	10	Bath frequently
0	7	7	Dress different (like elderly woman)
1	4	5	Don't enter parents bedroom
2	3	5	Avoid sports
0	4	4	Don't play with younger ones
2	1	3	Don't tell younger girls
0	3	3	Stay indoor
3	0	3	Don't touch clothes of male relatives
1	1	2	Don't go to school
1	1	2	Don't wash your body
4	3	7	Other (see below)
3	8	11	Nothing is different

Other (mentioned once): Always take a bag / Don't start a fire / Don't breastfeed / Don't eat eggs / Don't speak to people / Don't touch traditional medicine, it loses its effectiveness / Don't go around the house, you delay your next menstrual cycle.

Avoiding interaction with boys: According to the answers in quantitative interviews as well as the statements gained in key informant interviews and focus group discussions, girls were told to avoid interaction with boys the moment they got their first menstrual period. While most girls were warned of sexual interaction, others were even told not to chat with boys. The main reason for not interacting with boys mentioned was to avoid pregnancy, followed by the rumour that boys would get sick or even die by having physical contact with a girl in menses.

- There are many beliefs in the villages that affect girls; like girls are told not to speak to boys or seat near boys because if they do, they will not get another period. These beliefs have affected us for some time. But now most cultural beliefs are being neglected and people are no longer following them. (FGD, Mother Group, Kansomera, Mzimba, 20.02.2018)
- We tell them that now they are big they should take care of themselves and avoid playing with boys because they can fall pregnant if they spend time with boys. (FGD, Mother group, Machenga, Salima, 08.03.2018)
- Boys get a disease when they sleep with a girl who is in menses. We tell the girls not to have sex until their period is over. (FGD, Villagers, Seketi, Salima, 08.03.2018)
- They say avoid girls, because girls can burn your private parts (...) and if you play with girls, they can fall pregnant. (FGD, Boys, Chikombe, Salima, 07.03.2018)

Restrictions in cooking and housekeeping: Almost half of all students, most of them in Mzimba, mentioned that girls were either restricted from cooking as such or from putting salt into food or relish during their monthly period. Mainly two reasons for these restrictions were mentioned in qualitative interviews and discussions: People were afraid that food could get contaminated and family members could get sick in the first place. Second, some mothers mentioned that the restriction was a mean of controlling if a girl was pregnant or not: As long as she stopped cooking once a month, the mother knew that she was in her period and didn't worry about pregnancy.

- What can happen is that when it is known that she cooked while in menses, parents will throw away all foodstuffs that she cooked. The reason is that parents are afraid that she can serve contaminated food. (FGD, Boys, Chibale, Mzimba, 23.02.2018)
- If there are kids at home they don't develop tooth. Men and boys get sick or might not be able to bear children. If they find you cooking, they will refuse to eat that food. (FGD, Girls, Makali, Mzimba, 22.02.2018)

Restrictions from other housekeeping activities, like washing male family members cloth, were also in menses. According to a high amount of statements, girls were clearly seen as unclean while in menses. A few statements only showed, that there is a slow tendency to overcome these views and taboos.

- Girls should not cook until they finish their menses (...) and they should sleep alone, not with their sister on the same mat, because they are unclean. (FGD, Mother Group, Mbwiriwiza, Mzimba, 21.02.2018)
- They can use soap, so what? Weather they experience period or not, they are always clean. (...) Those are just taboos you know. Each country, each society, each culture has what? Believes! (KII, Male teacher, Mathandani, 16.02.2018)

Keep menstruation a secret: Especially qualitative data showed that menstruation was seen as a female secret to be hidden from others, mainly from male community members. Some girls were told not to sit next to their father or not to use the same bathroom as the rest of their family, in order to hide their status. Some members of the older generation even complained about the new ease in attitudes towards menstruation.

- I think it is a taboo. Because parents say if we discuss, something might happen to us. So people are shy to discuss it. (KII, Matron Teacher, Chikombe, Salima, 07.03.2018)
- It's natural that it should be secret. These girls don't know much; they just put on pant without doing proper check on themselves. They need to be told to handle this privately. We of the old generation have to help these girls to understand. These girls are full of shortcuts these days (...) We urge our girls to listen to what we are saying they need to be respectful. (FGD, Villagers, Seketi, Salima, 08.03.2018)

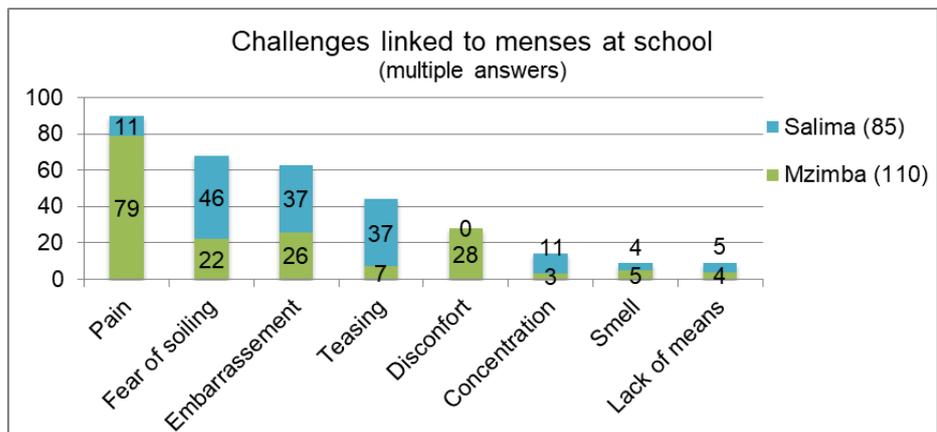
However, according to a few statements by teachers, education has already helped to change attitudes towards menstruation and to open up taboos.

- We learned from school and they taught us that (menstruation) is normal; natural. Like that's how God created us. (KII, Female teacher, Ulida, Mzimba, 15.02.2018)

5.3.4. Subjective challenges: «Boys! All they do is laugh at us!»

182 girls who have started menstruation reported the challenges they faced during menstruation in school. Multiple answers were possible and are presented in Figure 4.

Figure 4: Subjective challenges linked to menses at school



While girls in Mzimba were mainly physically challenged by pain (cramps, headache, nausea, feeling cold, trembling...) and discomfort, girls in Salima mentioned more to suffer psychological challenges like fear of soiling, embarrassment and being teased by boys. The different perception of pains as a challenge was equally reflected in qualitative outcomes: Girls did barely mention any pains during focus group discussions in Salima while girls in Mzimba mainly mentioned to be troubled by stomach cramps but also backaches, headaches and other physical discomfort.

Availability, affordability and attitudes towards painkillers differed according to the statements in key informant interviews and focus group discussions. Mainly Panadol and Buffen but also Tumbocid, Aspirin, Albendazol and Paracetamol were mentioned to be used, while only a few sources mentioned traditional medicine gained from plants. Itches were treated with Vaseline, baby powder, grain meal, Fungi Bact or soap.

- The first thing we give is a traditional herb. If the pain does not go, then we run to buy Panadol. That is the painkiller from the grocery. If we have no money (...) some of us dig a bitter root to ease the pain. If there is no improvement, we take the girl to the clinic.
(FGD, Villagers, Seketi village, Salima)
- No, we don't give them medication. Because this is natural process hence the pain will go as the period goes too. The pain is mostly severely as the period approaches to start but once it starts the pain ends there it natural. In the past they used the traditional herbs but not now, these days we don't use herbs.
(FGD, Mother group, Machenga)

Girls themselves saw being teased by boys as one of their main challenges in both districts. Strong and highly significant correlation was found between the mean of boys knowledge on menstruation in a certain school and girls who mentioned to be teased ($r = 0.35$; $p = 0.000$). Focus group discussions confirmed these outcomes. Teachers and mother group members though were split in their opinions about teasing: some mentioned it as a problem of former times that has been overcome and others still warned about teasing or even harassment by boys.

- It's a private thing. Boys should not know. They can be talking about it (...) and bring shame on you. Anyhow yet it is supposed to be confidential.
(FGD, Girls, Matenje, Salima, 06.03.2018)
- They are now exposed to the boys knowing that now this girl is grown up. «Let us try her!» (...) Some of them can force her. The villages are far away. So when she comes back from school they can hide somewhere: «Hey you! Hey you!» (...) Even if she doesn't want they can touch her breasts. «Let me sleep whit you!»
(KII, Matron teacher, Kamsomera School, Mzimba, 20.02.2018)

5.4. Practices of MHM

The chapter on girls' practices concerning MHM is divided in five sections. Practices levels, measured using a scoring system, are described in the first section. The second section deals with materials used to absorb menstrual flow, their popularity, accessibility and maintenance. Girls personal hygiene during their monthly period and how they use the sanitary infrastructure at school is treated in section three and four, while the last section deals with absenteeism from school during menstrual period in Mzimba and Salima. 197 out of 218 female standard 8 students who had reached menarche (110 in Mzimba and 108 in Salima) responded to questions on their MHM practices.

5.4.1. Score of MHM practices

Seven items concerning girls' menstrual hygiene practices were assessed to develop a practice score: Type of absorbents used, frequency of change, absorbent wash and dry/disposal, storage and transport of materials, frequency of body wash, items used for personal hygiene and use of sanitary infrastructure. Depending on the type of absorbents used, girls who have reached menarche were asked five to

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ten questions on their MHM practices. Answers were scored with 2 points for good hygiene practices, 1 point for fair and 0 for poor practices. A similar system has been used in former studies on MHM (Haque, Rahman, Itsuko, Mutahara, & Sakisaka, 2014) and is described in the literature review in section 2.1.3. To compare the level of practices, scores were indicated as a percentage of the maximum score in the according category: users of disposable, reusable or both materials. 106 girls stated to use reusable materials sometimes and 144 used disposable materials sometimes while 78 out of them were overlapping and used both.

Girls in Mzimba reached a mean practice score of 65%, girls in Salima of 66%. Correlations of practice scores and related variables were calculated using Pearson's r and are presented in Table 9. The answers on practices of 21 girls from Salima were unfortunately not registered due to a technical problem and are therefore not included in statistical calculations.

Table 9: Correlation between practice scores in percentage and related variables (STATA pwcorr)

Independent Variable	N	Scale	% or μ of N	Correlation to Y (Pearsons' r ; p-value)
District	173	M/S	59%	$r = 0.05$; $p = 0.508$ †
Age	173	12 – 20	$\mu=15.3$	$r = - 0.02$; $p = 0.803$ †
Years of mens experience	173	0 – 5+	$\mu=1.5$	$r = 0.04$; $p = 0.612$ †
Had info at onset	173	yes/no	45%	$r = - 0.05$; $p = 0.492$ †
Knowledge (girl score)	173	%	$\mu=54\%$	$r = 0.14$; $p = 0.0560$
Informant				
Peer (f)	173	yes/no	63%	$r = 0.05$; $p = 0.532$ †
Grandmother	173	yes/no	60%	$r = - 0.05$; $p = 0.160$ †
Class	173	yes/no	41%	$r = 0.08$; $p = 0.287$ †
Mother	173	yes/no	40%	$r = - 0.11$; $p = 0.160$ †
Other female family	173	yes/no	39%	$r = 0.05$; $p = 0.931$ †
Mother group	173	yes/no	36%	$r = 0.16$; $p = 0.037$ *
Teacher (f)	173	yes/no	32%	$r = 0.10$; $p = 0.188$ †
Sister	173	yes/no	20%	$r = 0.07$; $p = 0.385$ †
Readings	173	yes/no	15%	$r = 0.10$; $p = 0.198$ †
Red Cross	173	yes/no	09%	$r = 0.11$; $p = 0.157$ †
Health worker	173	yes/no	07%	$r = 0.04$; $p = 0.620$ †
Confidant (girl score)				
Peer (f)	173	yes/no	63%	$r = - 0.08$; $p = 0.295$ †
Grandmother	173	yes/no	60%	$r = - 0.10$; $p = 0.182$ †
Mother	173	yes/no	27%	$r = - 0.12$; $p = 0.121$ †
Other family member (f)	173	yes/no	36%	$r = 0.01$; $p = 0.931$ †
Mother group	173	yes/no	25%	$r = 0.03$; $p = 0.739$ †
Teacher (f)	173	yes/no	32%	$r = - 0.08$; $p = 0.298$ †
Sister	173	yes/no	17%	$r = 0.08$; $p = 0.271$ †
No one	173	yes/no	01%	$r = - 0.11$; $p = 0.154$ †

School level correlations (aggregated practice score)				
Curriculum includes MHM	17	yes/no	47%	$r = 0.17$; $p = 0.525^{\dagger}$
MHM-room installed	17	yes/no	59%	$r = - 0.12$; $p = 0.646^{\dagger}$
Bucket to fetch water	17	yes/no	76%	$r = 0.32$; $p = 0.216^{\dagger}$
Ratio girls per toilet	17	12 – 261	$\mu = 81$	$r = 0.15$; $p = 0.559^{\dagger}$
Ratio girls female teacher	13	44 – 499	$\mu = 160$	$r = - 0.10$; $p = 0.744^{\dagger}$
District (Mzimba / Salima)	17	M/S	59%	$R = - 0.06$; $p = 0.797^{\dagger}$

Please note: $\dagger p > 0.1$ (no significant correlation); * $p < 0.1$; ** $p < .05$; *** $p < 0.001$

Two factors only show a correlations with girls' level of practices on MHM: A small and slightly significant correlation between girls' knowledge on menstruation and their practices was detected ($r = 0.14$; $p = 0.0560$) while age or years of menstruation experience did not significantly influence their practices. Different from all other sources of information or confidants, the variable informant «mother group» showed a small and slightly significant positive correlation with girls practice scores ($r = 0.16$; $p = 0.037$), meaning that girls who stated that they were informed by the mother group of their school, showed slightly better MHM practices.

According to a multilevel regression, differences in practice-scores resulted much more from individual factors than from differences in school settings or districts. Variance on school level accounted for about 10% of individual variances only.

5.4.2. Absorbent use

The material girls used and would have liked to use to absorb their menstrual flow, what materials they had access to and how they maintained them, is described in the following three subsections.

a. Type of absorbent

247 girls in Mzimba and Salima indicated the types of absorbents – materials to absorb menstrual flow – they knew. Out of 218 girls who had reached menarche, 197 were responding to the question on the absorbents they usually used. Figure 5 gives an overview of the absorbents girls mentioned to use regularly. Multiple answers were possible. In addition, the same girls indicated the absorbent they would use, if they had a free choice. Figure 6 shows the distribution of girls' first choices of absorbents. Descriptions and explanations on every mentioned absorbent follow below.

Figure 5: Absorbents actually used

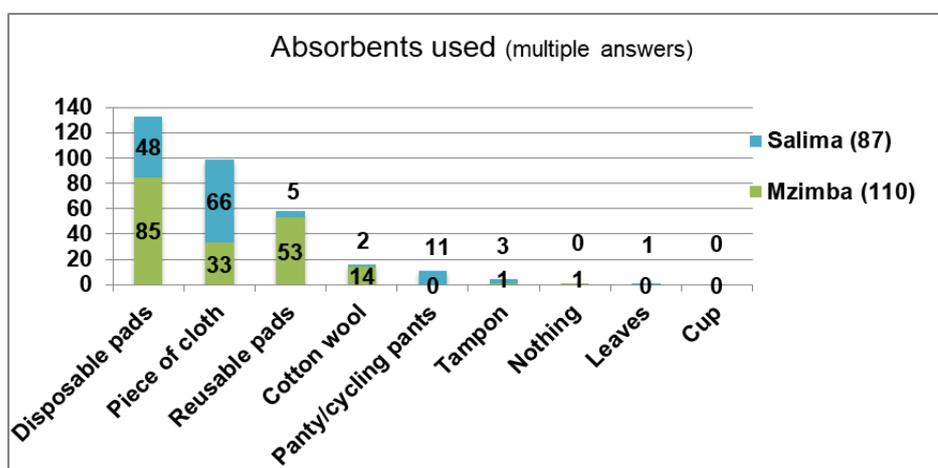
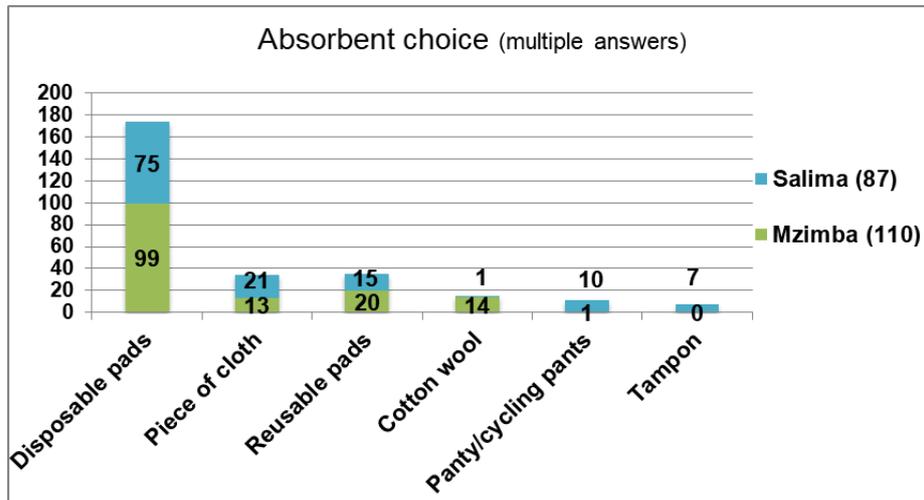


Figure 6: Choice of absorbents



Disposable pads: Disposable pads are an industrial product, designed with a sticky side to fix it to a panty and an absorbing material on the side that gets in contact with the girls' genitals. Most disposable pads available in Malawi are of rather low quality and use synthetic materials. 78% of all interviewed girls in Mzimba and Salima had heard about disposable pads before. Surprisingly 68% of girls who have started menstruation stated to use disposable pads sometimes. 88% of responding girls stated that if they had a free choice on absorbents, they would use disposable pads.

- Disposable pads are better. They are very hygienic. (...) And they need less time management at school. (FGD, Machenga, Salima, 08.03.2018)
- We prefer (disposable) pads, because we don't need to buy soap to wash them. When soiled, we just throw them away. (FGD, Girls, Ulida, Mzimba, 15.02.2018)

Reusable pads: There are two types of reusable pads available in Malawi. Industrially produced reusable pads can be both through organisations but not in the usual shops. They have a waterproof downside and an absorbing upper side and are designed to fix into a panty to absorb menstrual flow. Different from disposable pads they can be washed and reused for up to one year, depending of their quality and maintenance. Industrially produced reusable pads were not known by any answering girl in the sample of this study. Using the term «reusable pads», they were talking of the second, handmade type, sewn from pieces of cloth. Handmade reusable pads are used in the same way but differ in quality and maintenance depending on the design and the materials used. 31% of all interviewed girls had heard about handmade reusable pads before. While handmade reusable pads were very common in Mzimba, they were rarely used in Salima. Reusable pads were girls' second choice in Mzimba and the third choice in Salima. In focus group discussions girls mentioned maintenance of handmade reusable pads as the main negative factor, followed by smell, itching and low absorption. In addition only 20% of the responding girls answered to know how to sew reusable pads.

- We teach them how to make local cloth into pad. When they are in menses we tell them to first put on the piece of cloth then the pant will come on top, then wash hands. That way the young girls gets used and it becomes part of her. (FGD, villagers, Seketi village, Salima, 08.03.2018)

- The problem is, depending on the person, you cannot use (reusable pads). Because it takes maybe one hour and then you need to change again.
(KII, Female teacher, Chibale, Mzimba, 23.02.2018)
- Somehow it is not good to be washing those things. (KII, Matron teacher, Kasangazi, Mzimba, 22.02.2018)

Other local absorbents: A variety of absorbing materials can be squeezed into a panty to absorb menstrual flow if no qualified absorbent is available. 50% of girls who reached menarche mentioned to use a simple piece of cloth and 8% used cotton wool combined with a panty or a cycling-pant. These materials were accessible and affordable in local markets. However, during focus group discussions girls mentioned many challenges in keeping them in place and maintaining them.

- The girls (...) use cloth. So those materials after just a short time they smell. So it is difficult. Also to change and to wash and to put. And they can easily smell. It is different from those pads. The cloths you squeeze it and it can easily come out again.
(KII, Female teacher, Chibale, Mzimba, 23.02.2018)

Tampons: A tampon is a mass of absorbent material designed to be inserted into the vagina and absorb the menstrual flow at the inside. Hands should be washed before and after inserting a tampon. It is used once, pulled out using a string that is fixed to the absorbents and disposed afterwards. 8% out of all interviewed girls had heard about tampons before. Only 2% of responding girls who have started menstruation stated to use tampons sometimes. 4% indicated tampons as their first choice of absorbents.

Menstrual cups: A menstrual cup is a bell shaped feminine hygiene product usually made of flexible medical grade silicone that is inserted into the vagina during menstruation. Its purpose is to collect menstrual fluid at the inside of the body and preventing it from leaking out. The cup is removed, emptied, rinsed, and reinserted after 4 to 12h, depending on the menstrual flow. Water to wash hands before and after insertion and to rinse the cup between uses is a precondition for using a menstrual cup. After each period, the cup should be put into boiling water for at least 5 minutes and stored in a clean place up to the next monthly period. No interviewed girl in rural Mzimba and Salima has ever heard about or used a menstrual cup. Schools in rural Malawi primary schools do not offer the basic infrastructure to use menstrual cups up to date.

b. Availability and affordability

73% of responding girls who have started menstruation mentioned disposable pads to be available and 24% mentioned reusable pads to be available in the local markets. Only 11% mentioned the availability of tampons. Menstrual cups were available in the capital only. In three schools in Mzimba district female teachers mentioned to provide some disposable sanitary pads to girls in need, in case the school had sources available. Girls in the same schools confirmed that they could ask for pads at the teachers' office in case of emergency.

- We don't receive (pads) but they are there in the head teacher's office. They give them to a learner only if she has soiled herself here at school.
(FGD, Girls, Eswazini, 23.02.2018)

In all school where teachers or mother group members were interviewed, they mentioned the lack of resources as a main challenge to support girls during their period. Where pads were not affordable, matron teachers or mother group members mentioned to help girls in need with a piece of cloth or handmade pads.

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- Depending on the availability of resources in the family we encourage parents to provide for the girls. Some who are better off can afford disposable pads and others use a piece of cloth. As a mother group we prepare some handmade pads, distribute them to a few girls and encourage them to stay clean. But we are not able to produce them for every girl. Our resources are limited. (FGD, mother group, Kamsomera School, Mzimba, 20.02.2018)
- I beg from the nearby villages: «May you help us out with a cloth for them to use? They are in this condition. So, can you give me a piece of cloth, so that I can help a learner?» So they give me a cloth. And they are helped. (KII, Matron teacher, Kamzomera School, Mzimba, 20.02.2018)

A package of 10 disposable pads costs around 600 Malawi Kwacha (\approx 1 USD) in the local markets. 37% of responding standard 8 girls said that they could afford disposable pads. According to the answers on this question, economic power was slightly bigger in Mzimba than in Salima. Mainly parents but also brothers were mentioned to provide the money to buy disposable pads during focus group discussions.

- We cannot manage to buy disposable pads. We don't have the money. They are expensive. They are not affordable for all girls. (KII, Matron teacher, Machenga, Salima, 08.03.2018)
- We can encourage (girls) on how to get money to buy the things they need for hygiene. However, this may make them fall into relationship with boys, so that they get money, and end up dropping out of school. (FGD, Boys, Chikombe, 07.03.2018)

Since wearing a panty is a precondition to use pads or other local absorbent materials and also linked to economic status, girls were asked about the number of panties they possessed. 90% of the girls mentioned to have three panties or more, what allows regular changing and washing between uses.

c. Maintenance of absorbents

According to qualitative data, maintenance of menstrual absorbents remained a taboo or a female secret. Menstrual blood was linked to superstition in addition in some places. Quantitative data reflected this: Girls showed mainly fair or even good practices, as long as spectators could be avoided. Maintenance of absorbents was therefore usually not done at school.

- I don't think that girls can even show where they wash those things, even to their moms. Because one, it is regarded as a taboo and otherwise, with some superstition things. That's why they do hide such things. But at least they do take care of them. (KII, Head teacher, Msambafum, Salima, 07.03.2018)

Change: 80% of the girls who started menstruation changed their absorbents at least twice per school day. 13% said that they avoided changing absorbents at school.

Wash: 88% of girls who use reusable materials used soap to wash them while the others used water only. According to qualitative statements, affordability of soap played the main role.

Dry: Only 17% of the girls who use reusable materials dried them in the sun as recommended to reach best result in hygiene. In focus group discussions they explained to hide their materials so male family members or other people couldn't see them. In addition they feared that materials could get stolen and misused by kids or for witchcraft.

Usually they are advised to dry it in their rooms so that the boys should not see them. In case that somebody might pick it. So, the girls might be ashamed or to shy. Those are secret things. Although the boys know that girls are menstruating, we don't want to be exposed. So usually they dry in their rooms. (...) At home we usually have just one bathroom. So, the brothers and fathers and even other visitors do use it. So it is not save for the girls to hang their things there.

(FGD, Mother group, Matenje, 06.03.2018)

– We put them in our bedroom on a line and cover them with cloth so that a brother shouldn't see them because it is dangerous for boys to see them, so we cover them. And put them in a bag when dry. (FGD, Girls, Masanyanda, Salima, 02.03.2018)

– We are afraid that someone may take the absorbents and use them for rituals. (FGD, Girls, Matenje, Salima, 06.03.2018)

Store and transport: Out of 197 girls who have reached menarche, 51% mentioned to have a closed place to store fresh materials at home. Of 106 girls who use reusable materials sometimes, 75% had a plastic bag or a box to keep the fresh materials clean during transport or at school. 26% of reusable material users kept used materials in the pocket of their skirt or in their school bag while 28% had a plastic bag or a box. 34% stated to hide used materials somewhere at school, for example in the toilet, until they left school.

– Madam told us that we should carry a plastic bag at school and put all soiled absorbents there. Or you can wash in the toilets because they put water and soap, so we can wash the used one and put on a cleaner one. The one you washed is put in a plastic bag and put in the school bag. Just makes sure boys don't touch the bag. (FGD, Girls, Matenje, Salima, 06.03.2018)

Disposal: 86% of the girls, who use disposable materials or disposable pads, dispose it in the latrine. This has to do with the fact that most school had no disposal system installed. Only 4 of 17 schools had a dustbin installed within or next to sanitary infrastructures.

5.4.3. Personal hygiene: «We teach them how to take care of their selves»

Caregivers and female teachers repeated the statement «We teach them how to take care of their selves» during all key informant interviews and focus group discussions. The communities' expectation of girls to bath frequently and dress neat was reflected in qualitative and quantitative outcomes: out of 197 girls who have started their period, 98% stated to wash their body daily or more. In focus group discussions most girls mentioned to bath about three times a day during their menses. Even boys stated that this was what they expected from their female peers.

– We talk to these girls, and counsel them how they can clean themselves. They are told to frequently clean themselves. It all depends on the culture, but what we can say is that if she cooks, that doesn't mean that she adds the menses to what she is cooking. What matters is preparing the girls to adhere to hygiene practices. Then they can do anything. (FGD, Mother group, Kamsomera, Mzimba, 20.02.2018)

– On normal occasions we wash only once but when having monthly perio, we wash twice or three times a day (...) to avoid smelling bad and to reduce getting itches and burning sensations. (FGD, Girls, Ulida, Mzimba, 15.02.2018)

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- We could tell them to bathe at least 3 times a day. They can start in the morning then bath when they are back from school and then thirdly before they go to bed.

(FGD, Boys, Msambafum, Salima, 07.03.2018)

69% use soap to wash their body and their private parts. The ones who didn't use soap mostly mentioned affordability of soap as a reason during focus group discussions. One group mentioned to avoid soap due to health risks that the mother group warned them about.

- We wash private parts with water only because using soap causes cancer. (...) The mother group taught us. (...) If you don't wash frequently you produce bad smell. (...) Boys make fun of girls who smell. So, we bath twice or three times a day

(FGD, Girls, Kasangazi, Mzimba, 22.02.2018)

5.4.4. Use of sanitary infrastructure

Out of 197 responding girls who reached menarche 93% stated to use the sanitary infrastructure at school to manage their menses. The 7% who stated not to use it were asked for their reasons. They mentioned the lack of privacy, that the sanitary infrastructure was not clean or out of order or that they lacked time to go there during break time. In the schools where no MHM-room was installed, students and teachers complained about it.

- If they don't feel comfortable they can change at the teachers houses. But others they just go home, those close around the school they go home, change and come back to school.

(KII, Female teacher, Chibale, Mzimba, 23.02.2018)

- It is very important (to have a MHM-room); as we said we built one made of grass but boys can follow the girls and pip on what the girls do in the shelter; this cannot be good. We wish the girls had a brick shelter where no one can pip through and know that such a girl is in menses.

(FGD; Mother group, Kamsomera, Mzimba, 20.02.2018)

49% of responding girls mentioned that they preferred to use the latrine for MHM, even if there was a MHM room installed at their school. Investigating the reasons was possible during focus group discussions: Girls mentioned the need of utensils like water buckets, soap and dustbin or drying line. Lacking this equipment, the MHM-room didn't provide any additional benefit compared to the latrine. Girls preferred to use the latrine because it offered the possibility to do everything at the same time: Use the toilet, change the absorbent and throw used materials into the latrine.

- And on utensils like buckets and basins, they are not enough, because we have to take into consideration the issue of infection prevention. Imagine one basin used by all the girls here, puts lives at risk of contracting diseases.

(FGD, Mother group, Mzimba, Kamsomera, 22.02.2018)

Especially in schools with self-constructed change rooms, girls complained about the condition and the lack of privacy. One focus group mentioned that boys would discover that they were in menses if they used the MHM-room. In three schools with an MHM-room installed by Red Cross, it did not seem to be in use. Key informant interviews revealed that the door of the MHM-room was broken some time ago in one school while in the second school girls had to go to the teachers' office to ask for the key to use the MHM-room. In the third school, the room was not yet in use because handing over had not taken place (3 months after construction works were completed). To inaugurate the room, the school planned to invite the parents and the village chiefs, according to the head master.

- There is a change room, which the school constructed even though it's not yet ready because it is not cemented and there is no door. And so whenever we need to change we call a friend or female teacher to stand near the door and watch over anyone who may come.
(FGD, girls, Eswazini, Mzimba, 32.02.2018)
- Girls should be encouraged to use the hygiene shelter constructed there so that they help themselves and gain confidence in class.
(FGD, Villagers, Seketi, Salima, 08.03.2018)

5.4.5. Absenteeism

The association between menstrual period and girls' absenteeism was investigated based on girls' reports on their school attendance, since attendance records were not available. 197 girls who have reached menarche reported to attend or miss school during their monthly period. 18.8% stated to miss school due to menses. Table 11 gives an overview of how many girls were absent from school and how much time they missed according to their self-reporting.

Table 11: Self-reported absenteeism and time missed in school

	Mzimba (110)	Salima (110)	Total (197)
Girls attending school as usual: n (%)	97 (88.2%)	63 (72.4%)	160 (81.2%)
Girls missing school during monthly period: n (%)	13 (11.8%)	24 (27.6%)	37 (18.8%)
Range: days absent girls miss in monthly period	0.25 to 3	0.25 to 4	0.25 to 4
Mean: days absent girls miss in monthly period	1.37	1.41	1.86
Total mean: days all girls miss per monthly period	0.16	0.6	0.35

Significantly more girls stay out of school during periods in Salima (27.6%) compared to Mzimba (11.8%) ($r = 0.20$; $p = 0.005$). In addition, girls indicated the time they usually stayed out of school during their monthly period. Girls in Salima did also report to miss more time than the ones in Mzimba. While the time absent ranged from $\frac{1}{4}$ to 3 days per monthly period in Mzimba, girls stayed away between $\frac{1}{4}$ and 4 days in Salima. This resulted in a total average of 0.16 missed school days per girl in menarche per monthly period in Mzimba and 0.6 school days in Salima. Table 12 gives an overview of correlations between school attendance (not missing any school during menses / missing school during menses) and related variables.

Table 12: Correlation between attendance during menses and related variables (STATA pwcorr)

Independent Variable	N	Scale	% or μ of N	Correlation to Y (Pearsons' r; p-value)
District (Mzimba)	197	yes/no	50%	$r = 0.20$; $p = 0.005^{**}$
Knowledge (girl score)	197	0-10	$\mu = 54\%$	$r = 0.22$; $p = 0.002^{**}$
Avg. knowledge boys	197	%	$\mu = 36\%$	$r = -0.21$; $p = 0.003^{**}$
Informant (girl score)				
Peer (f)	197	yes/no	63%	$r = 0.01$; $p = 0.914^{\dagger}$
Grandmother	197	yes/no	60%	$r = 0.05$; $p = 0.497^{\dagger}$

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Class	197	yes/no	40%	$r = 0.10 ; p = 0.155†$
Mother	197	yes/no	41%	$r = - 0.26 ; p = 0.000***$
Other female relative	197	yes/no	38%	$r = 0.19 ; p = 0.008**$
Mother group	197	yes/no	39%	$r = 0.14 ; p = 0.048*$
Teacher (f)	197	yes/no	32%	$r = - 0.23 ; p = 0.001***$
Sister	197	yes/no	21%	$r = 0.05 ; p = 0.447†$
Readings	197	yes/no	14%	$r = 0.15 ; p = 0.031*$
Red Cross	197	yes/no	09%	$r = 0.10 ; p = 0.156†$
Health worker	197	yes/no	06%	$r = 0.12 ; p = 0.086$
Confidant (girl score)				
Peer (f)	197	yes/no	64%	$r = - 0.14 ; p = 0.050*$
Grandmother	197	yes/no	59%	$r = - 0.00 ; p = 0.993†$
Mother	197	yes/no	30%	$r = - 0.34 ; p = 0.000***$
Other female relative	197	yes/no	36%	$r = 0.14 ; p = 0.050*$
Mother group	197	yes/no	29%	$r = 0.03 ; p = 0.722†$
Teacher (f)	197	yes/no	36%	$r = - 0.05 ; p = 0.483†$
Sister	197	yes/no	21%	$r = 0.02 ; p = 0.785†$
No one	197	yes/no	01%	$r = 0.05 ; p = 0.496†$
No information at onset	197	yes/no	52%	$r = - 0.09 ; p = 0.224†$
Practice score	197	%	$\mu = 66\%$	$r = 0.19 ; p = 0.012*$
Absorbent used				
Disposable pads	197	yes/no	68%	$r = 0.30 ; p = 0.000***$
Reusable pads (handmade)	197	yes/no	29%	$r = 0.03 ; p = 0.722†$
Cloth	197	yes/no	50%	$r = - 0.11 ; p = 0.109†$
Tampon	197	yes/no	02%	$r = 0.07 ; p = 0.334†$
School level correlations (aggregated attendance bin)				
Curriculum includes MHM	17	yes/no	47%	$r = 0.06 ; p = 0.806†$
MHM-room installed	17	yes/no	59%	$r = - 0.29 ; p = 0.261†$
Bucked to fetch water	17	yes/no	76%	$r = - 0.15 ; p = 0.565†$
Ratio girls per toilet	17	-	$\mu = 81$	$r = - 0.32 ; p = 0.209†$
Ratio girls female teacher	13	-	$\mu = 160$	$r = - 0.33 ; p = 0.266†$
District (Mzimba / Salima)	17	M/S	59%	$r = 0.49 ; p = 0.047*$

Please note: †p > 0.1 (no significant correlation); *p < 0.05; ** p < .01; *** p < 0.001

Taking into account that students in Salima district showed more knowledge on menstruation but at the same time missed more school during menses, admitted reason to take a closer look at the association between knowledge and menstruation linked absenteeism. Girls individual knowledge on menstruation was significantly positive associated with staying in school during monthly period: The more knowledge a girl had, the bigger was the chance that she reported not to miss school during her monthly period ($r = 0.22$; $p = 0.002$). The negative correlation was found in boys' knowledge: An average boys' knowledge score per school was created as a new variable and significantly confirmed the suspected association. The

higher the average boys' knowledge level on menstruation was in a certain school, the higher was the risk of girls in the same school, to stay absent during their monthly period ($r = -0.21$; $p = 0.003$).

Being informed by the mother group, another female relative, through readings or a health worker had a slight positive effect on girls' attendance in school, while having mothers or female teachers as a source of information or confidant people was negatively correlating with school attendance. The correlation between mothers as confident people and school attendance was even strong and highly significant negative (-0.34 ; $p = 0.000$), indicating that girls who discussed MHM with their mothers were more likely to miss school. Even a regression with other correlating factors confirmed this result. Other district related variables that have not been measured might confound this result though, since mothers were confidants and sources of information in Salima only.

A medium but highly significant correlation was found between girls using disposable pads and their school attendance during monthly period ($r = 0.30$; $p = 0.000$), meaning that the risk to miss school was significantly lower in users of disposable sanitary pads.

A multivariate regression presented in Table 13 comparing the influence of the correlating factors confirmed the negative correlation between the confidant mothers and school attendance, as well as the positive correlation of girls' knowledge and the use of disposable pads with attendance in school during menses.

Table 13: Multivariate regression model explaining attendance (STATA logit)

Independent Variable	Scale	Coefficient	(p-value)
District (Mzimba / Salima)	M/S	- 0.39	0.471
Mother is informant	yes/no	- 0.60	0.236
Mother is confidant	yes/no	- 1.46	0.005**
Knowledge score girl		5.78	0.001***
Absorbent: disposable pads	yes/no	0.92	0.037*
Intercept		- 0.93	0.360
Pseudo R ²		0.24	
N		196	

Please note: $tp > 0.1$ (no significant correlation); * $p < 0.05$; ** $p < .01$; *** $p < 0.001$

Key informants confirmed in most interviews and focus group discussions, that girls missed school during monthly period. But they also mentioned other reasons for absenteeism in school like early marriage, frustration due to low performance and lack of support due to understaffing or boys doing piecework. Some teachers mentioned the lack of support and encouragement by the communities as a main reason for absenteeism of girls and boys.

- But mostly here the problem is the community. They don't encourage the girls, their children to go to school.
(KII, Matron teacher, Kasangazi, Mzimba, 22.02.2018)
- They (the boys) rather try to get a little cash than going to school. They just go for piece work. Many boys have dropped.
(KII, Head teacher, Kasangazi, Mzimba, 22.02.2018)

5. Results

- However, in general it was noticeable that a lot has been done to raise awareness for the importance of school (national campaign to «Keep girls in school») and that people on all levels worked together to avoid absenteeism. Qualitative interviews and focus group discussions showed, that in general, parents wanted their children to be in school and to learn for their future.
- We discussed it with the parents as well as with the learners, that it is not good to stop the girls from going to school. Since we talk to the parents and to the learners, learners don't miss school, because they are advised locally.
(FGD, Mother group, Matenje, Salima, 06.03.2018)
- Even those people from the village are trying to make that everything is going well for the girls. They are helping each other (...) and try to talk to them. Because if you cannot go to school, nothing is good for you! So, we have to take school as important.
(KII, Male villager, Ulida, Mzimba, 15.02.2018)
- We can help the girls in menses by giving them notes for them to copy which they missed when they were at home in menses.
(FGD, Boys, Ulida, Mzimba, 20.02.2018)

The 37 girls (24 in Salima and 13 in Mzimba) who mentioned to regularly miss school during their monthly period were asked for their main reason during quantitative interviews. The reason they mentioned most frequent in both districts was pains, followed by lack of means to manage menses at school or on the way there. This included the lack of absorbents, water disposal systems within the sanitary infrastructure, soap and also the lack of space to manage menses in privacy.

- We face challenges because the school does not have a change room and we go home to change. Others don't come to school during their monthly period for fear of soiling their clothes. We feel shy and the boys make fun of us especially when you have soiled your clothes. This makes us go home as we don't have female teachers to tell our problem (FGD, Girls, Makali, Mzimba, 22.02.2018)
- She misses a lot in class because she doesn't have materials she can use during school time. (FGD, Boys, Ulida, Mzimba, 20.02.2018)
- For those living far from school, to go back and change is a problem. And (...) if the boys notice that they have gone home for this issue, so most of the boys they laugh at them. Then they cannot come back to school. Maybe after 3 days they come and they lose some classes. (KII, Female teacher, Chibale, Mzimba, 23.02.2018)

6. Discussion

The monthly period still puts many girls in rural Malawi in challenging situations, which have ramifications for their health, wellbeing and empowerment. The development of adequate and evidence-based measures and programmes requires an in-depth understanding of the dynamics of this phenomenon. This research sought to explore knowledge, attitudes and practices (KAP) and associated influencing factors of Menstrual Hygiene Management (MHM) of pupils in primary school environments in rural Malawi. Unlike prior research, this study also involved boys. The project, which was commissioned by the Malawi Red Cross Society (MRCS) with funding from Swiss Red Cross (SRC), investigated MHM at 17 primary schools in two districts (Mzimba and Salima) between February and April 2018. The mixed-method design combined a cross-sectional survey (n = 522), 29 focus group discussions (n ≈ 200) and key informant interviews (n = 13).

The findings of this study are discussed in the first section of this chapter. The second section describes the limitations and opens the field for further investigation beyond the scope of this study. A third and more action-oriented section presents project-specific recommendations to Malawi Red Cross Society to address the improvement of MHM in rural Malawi.

6.1. Conclusions

Standard 8 learners (age 12 to 20) in rural Mzimba and Salima had fair knowledge on menstruation in general. Girls knew significantly more than boys in both districts. They gained their knowledge on menstruation and its management at the onset of menstruation that initiates intense counselling by woman of older generations. Additional years of experience did not lead to more knowledge in girls, while boys gained more knowledge with every year of life. The onset of menstruation happened between 10 and 16 years (mean = 13,77 years) and was a negative experience to most girls. Confirming the results of other studies, the research showed that girls were usually unaware of menstruation before its onset and were shocked or scared having their first menses. Even if their preparedness to the onset had no significant influence on their later practices, systematic and early information could avoid a negative perception of becoming a woman.

Pupils in Salima gained significantly more knowledge on menstruation than the ones in Mzimba. Even if mother groups (a female parent committee) were installed in all schools, the ones in Salima had received much more training. The curricula of all schools included «Life skills» where adolescence was treated as a subject; but mainly teachers in Salima mentioned to talk about MHM. In both districts, schools lacked reliable and accessible sources of information for pupils and their influencers.

Girls mentioned different sources of information in the two districts, what confirms the previous research findings that sources of information on MHM differ between geographical areas according to local traditions. Girls in Mzimba gained information mainly from peers and grandmothers and showed scruples to talk to their mothers or female teachers, while mothers and female teachers were mentioned as the first source of information in Salima. Most sources of information mentioned by girls showed a small positive association with their level of knowledge. But especially girls with a sister or the mother group as their source of information on MHM knew significantly more.

In Mzimba, initiation rites were common with grandmothers and elder women counselling the girls on menstruation issues. This practice, however, was not reflected in higher knowledge scores; the subject of menstruation remained more a private issue and taboo. In both districts girls were seen as unclean and were restricted from several activities during their periods. According to these findings,

the girls' influencers need to be involved and provided with the right information in order to reach behaviour change, to overcome taboos and restricting traditions, allowing girls to feel proud.

Significantly more teasing was reported of girls in Salima, where the boys' average knowledge level was higher. A higher average knowledge level on the part of the boys was associated with more absenteeism of girls during their menstruation. This gave strong reason to assume that opening up the taboo about menstruation led not only to more teasing but also to a more difficult and challenging situations for girls in menses at first. While withholding general information on menstruation from boys cannot be an option, these findings suggest to focus on the way the information is transmitted. Only sensitised people who feel comfortable with the subject can be a positive role model in attitudes towards menstruation and guide boys in building a supportive environment. Another crucial element in empowering girls is privacy: girls in most schools did not have the chance to hide their status of menstruation, since systems like having to ask for a key to use the MHM room at the teachers' office forced them to reveal that they were in menses.

Girls practiced moderate MHM in Mzimba and Salima with no significant differences between the two districts. Schools did generally not provide the means and the privacy for better MHM practices, lacking soap and a functional water system within sanitary infrastructures and, in Salima only, being far from reaching national standards on student/toilet ratio. Girls' knowledge and having the mother group as a source of information was slightly associated with their practices. Based on this result, a positive impact on girls' practices can be expected if future interventions manage to raise girls' knowledge combined with giving them options for MHM decisions, taking the local differences and influencers into account.

Stronger association was found between girls' knowledge and their presence in school during menses, but could also be explained by giving higher importance to education in general. Pains and soiling remained challenges to girls and caused absenteeism according to their statements. Significant association was found between girls using disposable sanitary pads and their attendance in school during menses. The association suggests that providing access to proper absorbents, independent of a girls' economic status, will lower the risk of absenteeism during menses.

6.2. Limitations and outlook

A major limitation of the KAP study design lays in its reliance on self-perception. Concerning attitudes, practices and absenteeism, no external means of validation were used. A compromise in validity through different interpretations of interviewees, enumerators and investigator, taboos surrounding the subject that prevented some interviewees of talking openly and most of all, a social desirability bias, cannot be ruled out (Klesges et al., 2004). The fact that the study was carried out in cooperation with MRCS, an organization well known for its development projects in the area, might have increased the risk of a desirability bias, hoping for a future benefit. Very high return of informed consent sheets for example, indicated a sense of duty to contribute to interventions initiated through school or MRCS.

The study focused on in-school pupils only and did not capture any information of drop-out students. Their tracking was beyond the scope of this study due to missing registers and population census and remains an unexplored field for further investigation. Attendance registers could further generate a more valid external means for investigating absenteeism.

Study data showed a negative correlation between school attendance and average knowledge of boys in the same school as well as having mothers as confidants. These unexpected outcomes remained scientifically unexplained and open a field for further investigation.

6.3. Practical recommendations

Based on the evidence gained from this study, this section offers a compilation of recommendations with regard to MHM programming in the scope of the Integrated Community Based Health Program of Malawi Red Cross Society. Access to clean and comfortable absorbents, access to adequate WASH, timely access to knowledge and support have been identified as the three fields with a need for intervention. Recommendations focus on sustainability, accessibility, affordability and cultural acceptability of menstrual health solutions. In addition, involving girls in decision-making and the development of ideas and strategies has a huge potential to result in better quality and acceptability of MHM interventions and should be considered in every programme.

6.3.1. Access to clean and comfortable absorbents

Clean and comfortable absorbents should be accessible to girls in rural schools, independent of their economic status. Investigation in Mzimba and Salima showed that over one third of girls could afford disposable pads available in the local markets and that the use of disposable pads had a positive impact on their attendance in school.

- They should be no difference between someone in menses and the one not in menses. Like we are sitting here, no one can tell who is in menses now. This is because we have prepared ourselves neatly. This means that similarly girls can come to school neatly and not be recognised that they are in menses. (...) The girls don't need to inform someone that now she is going to clean herself. She just stands up goes to the bathroom. When she gets there, she finds there is water and a bucket. (FGD, Mother group, Kamsomera, 20.02.2018)

Looking for solutions to provide access to the remaining two thirds of targeted girls who could not afford disposable pads, the provision of the industrial reusable AfriPads (<https://www.afripads.com/>) seemed to offer the best price-performance ratio. Their usability has been approved in several scientific trials as well as in a small trial done by the Danish Red Cross in Malawi. AfriPads are provided through their Malawian branch based in Zomba in packages of 2 or 4 waterproof, comfortable pads, easy to maintain and lasting for about one year. The package of 4 pieces allows regular change and includes one bigger pad for days with heavy flow. Orders cost 4000 MKW (≈ 5.40 \$) per package of 4 pads, including a suit of education materials and an initiative training.

- We hear that the other mother groups are taught how to sew sanitary pads. They can sell them to get some funds. So, they can give pads to female learners and at the same time use the money they gained from other customers to buy soap. (FGD, Mother group, Matenje, 06.03.2018)

Previous studies showed that the distribution of sanitary pads had to be combined with puberty education to lead to a change in absenteeism. It is therefore important to comprehensively plan the introduction of sustainable pad interventions and accompanying measures. Based on these outcomes I recommend to make AfriPads available at local grocery stores and to install a voucher system for pupils with economic limitations in rural schools. The additional provision of training on how to sew hand-made reusable pads offers an additional, independent alternative and the freedom for girl to choose the solution that fits them most.

Furthermore, MRCS has the reputation and power to lobby for equity in access to proper MHM. Sanitary products like AfriPads, reusable pads and tampons are not yet tax-free in Malawi. Authorities should be convinced to put MHM on their agenda and to support MHM policies and finances, not only to keep girls in schools but also to empower them. Tax exemption of MHM products could be a first step to improve access to means for MHM.

6.3.2. Access to adequate WASH

To meet the national standard of one toilet per 60 pupils in Salima primary schools, additional latrines have to be constructed. This opens the opportunity to optimise the alignment of sanitary infrastructure with girls needs, based on the findings that are described below. To meet menstruating girls needs has to be part of the definition of sanitation and should be seen as an official duty by schools. As representatives of the target group, schoolgirls who have reached menarche should be included into the planning.

This study shows that girls rarely use the MHM rooms provided by the project. Girls who preferred to use the latrine for absorbent change instead of the MHM rooms mentioned three reasons: first they wanted to visit one place only to use the toilet and change their absorbent at the same time during a short school break. Second, they could get rid of reusable materials by throwing it into the latrine, since no other disposal system was in place. And third, using the usual latrine allowed them not to disclose their menstruation status. Based on these findings, it is recommended to combine latrines and MHM rooms to just one type of sanitary infrastructure for girls, offering the benefits of both types: a latrine to use the toilet and for disposal, space to put a water bucket, a water drainage and a shelf to put soap, clothes or fresh absorbents during wash and change. Pulling down the wall in between could combine MHM rooms already built with the girls' latrine next door. The combination and a neutral name could further avoid disclosure of menstruation status of users.

The disposal of non-biodegradable absorbents in the latrine does not affect menstrual health and is therefore beyond the scope of this study, but it has to be taken into account in the planning of latrines capacity and reprocessing, as long as no alternative disposal system will be in place.

Sustainably functional hand washing facilities and soap are a precondition for hygiene practices and should be put in place in all schools in both districts. Most bucket-based systems were out of order, boreholes too far from sanitary infrastructure and without any privacy. Sanitary infrastructures should offer washing facilities behind the privacy screen. Pulling a water pipe to the inside of the sanitary infrastructure seems to be the most sustainable option to guarantee hygienic practices. I recommend to include girls and their influencers in the planning and design and to hand over structures and materials with training and the responsibility for their maintenance, to guarantee uninhibited and appropriate use.

6.3.3. Timely access to knowledge and support

Girls and boys, but also their informants need to be enabled to access reliable information. Girls should know about menstruation before they reach menarche, to avoid a traumatising experience at the onset. Study outcomes show, that mother groups have a positive influence on girls knowledge and their attendance in school. Existing entry points like mother groups and life skill teachers can be used to reach pupils and their influencers.

- The mother group (in Eswazini) complained bitterly that we haven't trained them. And this is very true. We have constructed a very big latrine for them, but we haven't built their capacity. (FGD, Manfoster, Debriefing, Salima, 09.03.2018)

I recommend providing training to teachers of «life skills» and mother groups, including interested villagers and traditional counsellors on MHM. In addition to content, trainings should include the subject of knowledge gathering and management, to build a sustainable information body. Potential harms of capacity building interventions, like the reinforcement of stigma that encourages boys to tease girls, need to be taken into account to be avoided. Especially teachers, male and female, should be sensitised on transferring information as a role model and in a way that encourages a supportive environment for girls in menses. According information materials should be placed at every school, accessible to teachers, influencers and pupils, to serve as a reliable source of information.

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