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# **Acceptability, uptake, and effectiveness of a menstrual health intervention among young women in Zimbabwe**

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Thesis is submitted in accordance with the requirements for the degree of  
Doctorate (Epidemiology)  
of the  
University of London

October 2022

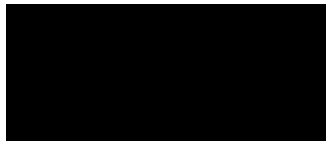
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## **Declaration of originality**

*I, Mandikudza Tembo, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.*

Signed:



Date: 31 October 2022

## **Abstract**

Menstrual health (MH) is fundamental to women's mental, physical, and reproductive health and well-being. Yet, many women face barriers and challenges in managing their menstruation safely and with dignity, especially in low- and middle-income countries. Past and existing MH interventions tend to be implemented independently from other sexual and reproductive health (SRH) services, focus on school-going girls, access to water, sanitation and hygiene facilities, and the provision solely of either MH education or MH products. This thesis aims to bridge the evidence gap by investigating the acceptability, uptake and effectiveness of a community-based MH intervention providing a choice of MH products with MH education and support, among school-going and non-school-going young women aged 16-24 years.

The study was nested within a community-based SRH intervention among youth aged 16-24 years in Zimbabwe called [CHIEDZA](#). CHIEDZA routine intervention data from 27725 female CHIEDZA clients was used to quantitatively assess uptake of MH services, MH product choice and patterns of use over time. Pre- and post-intervention survey data from a prospective cohort of 300 participants was used to investigate the effectiveness of the MH intervention on MH knowledge, perceptions, and practices. MH intervention acceptability and the facilitators and barriers to product choice were investigated through thematic analysis of qualitative focus group discussions and in-depth interviews with healthcare providers and young women.

Results are presented in four peer-reviewed papers that addressed each of the study objectives. Objective 1 was to understand existing knowledge levels, perceptions, and practices around MH among women aged 16–24 years in Zimbabwe and to design and pilot

a complex MH intervention within CHIEDZA. Objective 2 was to investigate MH product choice, continued use or discontinuation of products, and patterns of use over time within the MH intervention. Objective 3 was to assess the effect of the MH intervention on MH knowledge, perceptions, and practices over time. Finally, objective 4 was to describe the acceptability of the MH intervention.

Overall, this thesis demonstrates how a community-based MH intervention was acceptable and effective in improving MH knowledge, perceptions, and practices among women aged 16-24 years in Zimbabwe. Key to intervention acceptability was the choice of menstrual products provided, accompanied by analgesics and MH education and support. MH integration within SRH services was also central in facilitating acceptable female service engagement. Findings further highlight the existing severe unmet need for MH products and information and the contextual sociocultural factors that are central to informing the menstrual experiences of women.



## **Acknowledgements**

Most importantly, I would like to thank all the young women whose stories and experiences informed much of this PhD. Thank you for your willingness to be vulnerable, honest, and consistent. This thesis would not have been possible without you.

I would also like to thank my amazing supervisory team: Suzanna Francis, Jenny Renju, Helen Weiss, and Constance Mackworth-Young. A huge thank you to all of you for your dedicated mentorship and guidance, your consistent support and encouragement, and your wealth of wisdom. Suzanna and Helen, you were both with me from the very beginning and I am incredibly thankful to you both for patiently holding my hand through this journey and being available to have the long and necessary conversations that built the foundation of this thesis. Helen, thank you for always being available and for your consistent encouragement, supervision, and mentorship throughout the PhD journey. Jenny, I would not have been able to publish my first manuscript without you. I thank you for your patience, kindness, and guidance during this particularly challenging point in the PhD journey. I would also like to thank you for always making me laugh and smile during it all. Constance, I am eternally grateful to you for stepping in and helping me finish strong – for helping me push past blocks of frustration and anxiety, for guiding me with kindness, for always providing detailed and thoughtful feedback, and for always welcoming me into your home to talk through the PhD over dinner or a cup of coffee.

A particular thanks to Rashida Ferrand for seeing something special in me and for giving me the opportunity to pursue a PhD. Rashida, you believed in me before I believed in myself. I

will forever be grateful to you for pushing me to be the very best version of myself every day and for showing me what intentional leadership and research excellence looks like. Many thanks to all my colleagues at The Health Research Unit Zimbabwe. You all made coming to work an absolute pleasure and it has been such an honor to work with such passionate and professional individuals. I would especially like to thank Ethel Dauya, Tsitsi Bandason, Ivan Chigonde, and Tendai Muchena. Thank you for making me feel welcome when I joined the THRU ZIM team and for always being available to provide crucial support and sage advice. Thank you also to Leyla Larsson, Vicky Simms, and Nicol Redzo for assisting with the data management and the quantitative analysis. Chido, I would like to especially thank you for meeting me for coffee four years ago and “planting the seed” that led to me being here today. Importantly, this research would not have been possible without the hard work and dedication from the CHIEDZA implementation teams and the study research assistants: Precious Ndlovu, Tafadzwa Nzanza, Pauline Ishumael, and Nancy Gweshe. Thank you also to Bill Corner for helping with the formatting of this thesis.

I would not have made it through the last four years without my amazingly supportive network of friends. Thank you for praying with me and providing much needed spells of fun and relaxation over the last four years.

Finally, I would like to thank my family for their endless love, encouragement, and support. Shami and Fungi, thank you always being there for me, for laughing and crying with me, and for holding my hand through it all. Raymond, my love, thank you for allowing me the space and time to work on this thesis, even as we planned our wedding and started our lives

together, and loving and supporting me through it all. There are no words that could express how grateful I am to you all.

And to the two people I owe everything to, Solomon and Demetria Tembo, this thesis is dedicated you.

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The figures for each of the research papers are included within the papers and not listed here.



## **Glossary**

ACMHM	African Coalition for Menstrual Hygiene Management
ART	Antiretroviral therapy
BCD	Behaviour Centred Design
BRTI	Biomedical Research and Training Institute
CBO	Community-based organisation
CHW	Community health worker
CHIEDZA	Community based interventions to improve HIV outcomes in youth: a cluster randomised trial in Zimbabwe
FGD	Focus Group Discussion
IDI	In-Depth Interview
HICs	High income countries
HIV	Human Immunodeficiency Virus
HTC	HIV testing and counselling
LMICs	Low- and middle-income countries
LSHTM	London School of Hygiene and Tropical Medicine
LTFU	Lost to follow-up
MARCH	Maternal, Adolescent, Reproductive, and Child Health Centre
MH	Menstrual Health
MHH	Menstrual Health and Hygiene
MHM	Menstrual Hygiene Management
MICS	Zimbabwe Multiple Indicator Cluster Survey
MoHCC	Ministry of Health and Child Care, Zimbabwe

MRCZ	Medical Research Council of Zimbabwe
NGO	Non-Governmental Organisation
OR	Odds Ratio
QoL	Quality of Life
RA	Research Assistant
RTIs	Reproductive Tract Infections
SDGs	Sustainable Development Goals
SOPs	Standard Operating Procedures
SRH	Sexual and Reproductive Health
SSA	Sub-Saharan Africa
STIs	Sexually Transmitted Infections
TFA	Sekhon's Theoretical Framework of Acceptability
THRU ZIM	The Health Research Unit Zimbabwe
ToC	Theory of Change
UNAIDS	The Joint United Nations Programme on HIV/AIDS
UNFPA	United Nations Population Fund
UNICEF	United Nations International Children's Emergency Fund
UTIs	Urinary Tract Infections
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organisation
YW	Youth Worker

## **Chapter 1: Introduction**

### ***Background and Rationale***

There is an increasing global focus on the importance of menstrual health (MH) (1). MH is defined as a state of complete mental and physical well-being in relation to menstruation, covering all the factors that inform the menstrual experiences of girls and women (2). It impacts many facets of life including education, employment, social participation, and psychosocial and physical health (3-5). As such, menstruation, and MH more broadly, are integral to women's overall health and well-being (6). Yet, most girls and women across the globe face numerous challenges in managing their menstruation with safety and dignity. These challenges arise from cultural taboos, lack of knowledge and support, limited access to safe and secure water, sanitation, and hygiene (WASH) services, affordable menstrual products, appropriate disposal structures, and pain management (7-9). As a result, many girls and women, particularly those in low- and middle-income countries (LMICs) experience anxiety, isolation, shame, and stigma as they approach menarche and throughout their reproductive years (10-13).

Addressing the physical and psychosocial well-being aspects of MH is essential to achieving the Sustainable Development Goals (SDGs) on gender equality (SDG5), good health (SDG3), education (SDG4), and clean water and sanitation (SDG6) and for human rights, gender equality, and global health (1, 13, 14). There is growing evidence highlighting the importance of MH and how it informs the overall health and well-being of girls and women. However, most programs and research continue to address MH as a stand-alone issue and most interventions tend to solely focus on menstrual product or education provision for school-

going girls (5, 15, 16). There is limited literature looking at the menstrual experiences of MH interventions for out-of-school young women (5, 17, 18). There is also limited literature looking at other critical aspects of MH such as pain management and family planning (18, 19).

In Zimbabwe, there is a recognised need to improve MH as critical gaps remain in understanding and addressing MH-related issues (18, 20, 21). In 2019, the Zimbabwe Multiple Indicator Cluster Survey (MICS) reported that 16.3% of 8543 women aged 15-49 years did not participate in social activities, school, or work in the last 12 months due to menstruation (22). Another study by UNICEF in Zimbabwe also reported that 76% of girls in rural and urban schools felt they had inadequate knowledge concerning puberty and menstruation and experienced shame and stigma, and low self-esteem due to fear and anxiety during menstruation (21). Many of these girls and women lack 1) access to affordable and effective menstrual products; 2) safe facilities in which to wash or dispose of menstrual products both in and outside the home; and 3) consistent and accurate MH-related education and support (23, 24). Robust research on how to implement sustainable and effective MH interventions that address these evidence gaps is needed (1, 18, 25).

Defined as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system, and to its functions and processes,” sexual and reproductive health (SRH) and MH are intrinsically linked (16, 26, 27). Research shows that MH is not only an implicit part of SRH, but also an important lens to understand and address wider SRH needs. Importantly, in conservative LMICs such as Zimbabwe, explicitly including MH in SRH may provide an acceptable and intuitive gateway to

sensitive discussions around puberty and reproductive justice and the secrete provision of SRH services such as contraception and testing and treatment of HIV and other sexually transmitted infections (STIs) (16, 26, 28). However, there are limited data on the design and delivery of such services (16, 26).

In this PhD thesis I add to the evidence-base of effective strategies to address unmet MH need among young women in Zimbabwe. I use mixed methods (qualitative and quantitative) to 1) understand the present knowledge levels, perceptions, and practices around menstruation and MH among women aged 16–24 years in Zimbabwe and develop and implement a comprehensive MH intervention to be integrated within a community-based SRH intervention trial (called CHIEDZA) (Objective 1); 2) investigate MH product choice, continued use or discontinuation of MH products, and patterns of use over time (Objective 2); 3) investigate effectiveness of the MH intervention on MH knowledge, perceptions, and practices (Objective 3); and 4) investigate the acceptability of the MH intervention within CHIEDZA among young women aged 16 – 24 years in Zimbabwe (Objective 4).

### ***Study Setting***

The fieldwork for this PhD was conducted in Zimbabwe, a landlocked country situated in sub-Saharan Africa (SSA) (Figure 1). The country has a population of 15,178,979, with 52.3% being female, and a population growth of 1.48% (29, 30). In total, there are ten provinces (Bulawayo, Harare, Manicaland, Mashonaland Central, Mashonaland East, Mashonaland West, Masvingo, Matabeleland North, and Matabeleland South) in the country with the most densely populated province being Harare. Most of the country's population identifies as

Christian (84.1%), and the largest ethnic groups are Shona (~70%) or Ndebele (~20%) with most Ndebele people being situated in Bulawayo and Matabeleland North and South (31). Zimbabwe also has 16 official languages with Shona (72.1%), Ndebele (16.2%), and English (2.2%) being the most widely spoken (30, 31).

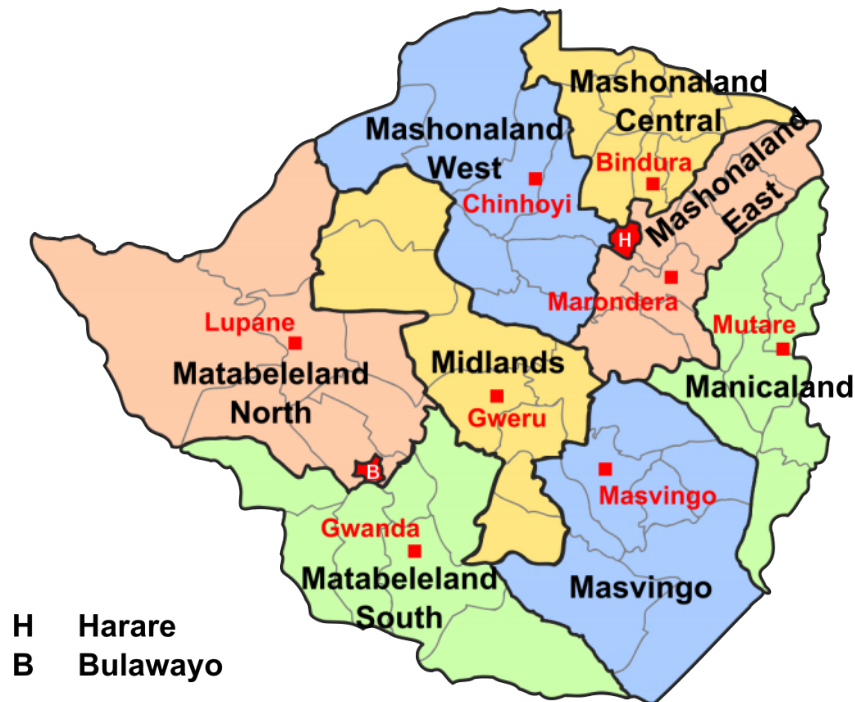


Figure 1 Map of Zimbabwe

(Source: wikipedia.org)

According to the 2020 Zimbabwe Population-based HIV Impact Assessment, HIV prevalence among adults (those aged 15 years and older) in Zimbabwe is amongst the highest in the SSA region at 12.9%, with higher prevalence among women (15.3%) than men (10.2%) (32). Findings also highlighted that annual HIV incidence among young people (defined as those aged 16–24 years) in Zimbabwe remains high at 0.45% which corresponds to 32000 new cases of HIV annually (32). While Zimbabwe has made significant strides towards achieving the UNAIDS 95-95-95 targets, there is still much work to be done to action effective HIV

prevention options and improve access to quality SRH care and support for youth, particularly young women (32, 33).

It is in this setting that the CHIEDZA intervention trial, in which my PhD research was embedded, was conducted. CHIEDZA stands for “Community based interventions to improve HIV outcomes in youth: a cluster-randomized trial in Zimbabwe”. The aim of the trial was to assess the impact of a community-based package of HIV and SRH services for youth aged 16-24 years old on population-level HIV viral load. The intervention trial was implemented over 2.5 years in 12 clusters (communities) across Zimbabwe (34). The CHIEDZA intervention trial consisted of a package of services including STI and HIV testing and treatment, condoms, family planning, risk reduction counselling, and an MH intervention. I developed the MH intervention during the formative research stage of the PhD (described in more detail in the methods chapter of this thesis) (35). The details of the methodology used throughout this work are detailed in Chapter 3 of the thesis and in the methods sections of the relevant papers.

### ***Disciplinary and Personal Perspective***

This thesis is situated in the disciplinary areas of public health and epidemiology. The motivation for this thesis came about through observing the unmet MH needs of young women in Zimbabwe and reflecting on my own experiences as a young Zimbabwean woman. I draw on the principles of public health that view health outcomes, such as MH, through an intersectional lens that considers how complex and interconnected environmental, sociocultural, and economic factors inform the lived experiences of people (36, 37). With that

understanding in mind, I looked to address the determinants of poor and/or inadequate MH using a Behaviour Centred Design (BCD) approach where behaviour change interventions must disrupt the external environment such that there is a “desired change” (38). Informed and motivated by my own menstrual experiences in Zimbabwe, the available MH research literature, and through conducting formative research work, I developed a comprehensive MH intervention. In this thesis, using qualitative and quantitative methods, I assess if this MH intervention “disrupts” the norm to both 1) addresses the unmet MH needs and 2) causes a positive shift in MH practices and behaviours that ultimately result in better long terms MH outcomes among young women (38, 39).

Given the disciplinary and personal perspectives as detailed above, I also explore how MH research findings can be meaningfully disseminated to the public and communities in which the research took place. This resulted in the development of a virtual MH-focused platform called the Bleed Read ([www.thebleedread.com](http://www.thebleedread.com)), which is also available on Twitter and Instagram. The online platform is dedicated to producing and amplifying MH-related information and entertainment content. The Bleed Read was developed to create and promote accurate, positive, and informative MH content for the public, and has partnered with others to produce collaborative productions such as MH-focused podcast recordings, two virtual productions of “The Vagina Monologues”, and an MH-focused art exhibition in Harare, Zimbabwe. I describe this in more detail in the dissemination section of discussion in Chapter 8 of the thesis.



## ***Aims and Objectives***

This thesis aims to investigate the uptake, acceptability, and effectiveness of a comprehensive MH intervention integrated within a community-based SRH intervention among women aged 16-24 years.

The specific objectives are:

1. To understand existing knowledge levels, perceptions, and practices around MH among women aged 16–24 years in Zimbabwe and to design and pilot a complex MH intervention within CHIEDZA
2. To investigate MH product choice, continued use or discontinuation of products, and patterns of use over time within the MH intervention
3. To investigate the effect of the MH intervention on MH knowledge, practices, and perceptions over time
4. To investigate the acceptability of the MH intervention in a community-based SRH intervention (40)

## ***Overview of thesis***

This PhD thesis follows the “research paper style” format following the London School of Hygiene and Tropical Medicine (LSHTM) guidelines. It includes four academic papers, two of which have been published in peer-reviewed journals, one of which have been submitted review for publication, and another which is yet to be submitted for publication. Each paper constitutes a chapter in this thesis (Chapters 4 – 7). Before each paper, I have provided a short overview outlining the rationale for the paper and linking it to the other papers and to the

relevant thesis objectives. The thesis has four additional chapters: this introduction (Chapter 1), literature review (Chapter 2), methodology (Chapter 3) and discussion (Chapter 8).

The overall outline of the thesis is:

**Chapter 1 (Introduction)** provides an overview of the research background, study rationale, disciplinary perspective, research aim and objectives, and the structure of the thesis.

**Chapter 2 (Literature review)** provides a review of the existing literature on MH, MH in public health, the gaps in MH research, and the key principles underpinning this research work.

**Chapter 3 (Methodology)** details the methodology used for this thesis. The chapter provides a general description of the study design, data collection processes, an overview of analyses used, and an overview of the settings and environments in which the research took place.

Details of specific analyses are included in each research paper.

**Chapter 4 (Research paper 1)** addresses Objective 1 of the thesis and is a published paper describing the methods used to design and piloting of the MH intervention integrated within CHIEDZA. Details of how the pilot findings were used to improve and upscale the MH intervention to all the CHIEDZA intervention clusters are presented. The paper is titled *“Menstrual product choice and uptake among young women in Zimbabwe: a pilot study”* and was published in BMC Pilot and Feasibility Studies (41).

**Chapter 5 (Research paper 2)** addresses Objective 2 of the thesis and is a manuscript prepared for publication not yet submitted. This paper investigates overall MH intervention uptake and MH product choice and patterns of use among young women in Zimbabwe aged 16-24 years old. This paper frames the MH intervention as one of the many SRH services within CHIEDZA and assesses how female CHIEDZA clients engaged with MH as part of an SRH package. The manuscript is titled, *“High menstrual health service uptake when given*

*menstrual product choice within an integrated sexual and reproductive health intervention for young people in Zimbabwe.”*

**Chapter 6 (Research paper 3)** addresses Objective 3 of the thesis and is a manuscript under review for publication. The paper details how and why the MH intervention informed changes in MH knowledge, perceptions, and practices over time. The paper also investigates the limitations of the intervention and recommends areas of further investigation and best practices with regards to MH intervention development, implementation, and evaluation. The paper is titled *“Menstrual health interventions improve menstrual health knowledge, perceptions, and practices among young women in Zimbabwe”* and is under review for publication with BMJ Open.

**Chapter 7 (Research paper 4)** fulfils Objective 4 of the thesis and is a published paper which assesses the acceptability of MH intervention within CHIEDZA. This paper uses Sekhon’s thematic framework of acceptability that looks at seven key constructs (affective attitudes, burden, ethicality, intervention coherence, opportunity costs, perceived effectiveness, and self-efficacy) to assess the acceptability of the MH intervention from the perspectives of both the CHIEDZA female clients and the healthcare service providers (40). This paper builds on the findings from Paper 1 (Chapter 4) and uses qualitative methods to give an in-depth understanding of how the MH intervention was delivered and received across all 12 CHIEDZA intervention clusters. The paper is titled, *“Integration of menstrual health intervention in a community-based sexual and reproductive health service for young people in Zimbabwe: a qualitative acceptability study”* and was published in BMC Health Services Research (42).

**Chapter 8 (Discussion)** brings together the findings from the four research papers and summarises the key message of the thesis. This chapter also details the strengths and limitations of the research work, implications of the research work (including

recommendations for policy), conclusions, the public engagement activities related to the research work, and plans for further research.

**Appendices:** All ethical approvals, informed consent forms, MH educational materials, and data collection tools, and other dissemination work such as posters can be found in the appendix section of the thesis.

### ***Role of the candidate***

I was responsible for the overall thesis ideas, development of the study protocol, the MH intervention manual of operations, and all the MH intervention data collection tools, educational materials, and standard operating procedures (SOPs). Additionally, I was involved in writing the grant application which successfully secured funding from the Swiss Agency for Development and Cooperation to procure all of the menstrual products and analgesics used in MH intervention. As part of my research work, I also designed the MH educational pamphlet (Appendix E) and developed the MH sections in the CHIEDZA protocol and manual of operations published elsewhere ([www.chiedza.co.zw](http://www.chiedza.co.zw)).

I was based in Zimbabwe for most of the research period. I managed all the MH intervention components including the MH product procurement throughout the CHIEDZA trial implementation, staff trainings on menstruation and MH, and the day-to-day running of the MH components of the trial across the 12 intervention clusters. I recruited, trained, and supervised all the study research assistants (RAs) that enrolled participants into the cohort study and collected the quantitative and qualitative data. The CHIEDZA study database was managed by Tsitsi Bandason, Vicky Simms, and Nicol Redzo. I prepared and actioned the

analytical plans for this thesis with support from Helen Weiss and Suzanna Francis (quantitative analysis) and Jenny Renju and Constance Mackworth-Young (qualitative analysis).

I wrote this thesis, including writing all the research papers presented in this thesis. I am first author on all papers and wrote the first drafts for each, incorporated feedback from co-authors and peer-reviewers, submitted them for publication, and responded to reviewer comments (where appropriate). Finally, I have attended several national-level and international conferences and workshops for poster and oral presentations of findings from my research work (detailed under the dissemination section of the discussion in Chapter 8 of this thesis).

### ***Funding***

This research was supported by funding from the Swiss Agency for Development and Cooperation, the Wellcome Trust through a Senior Fellowship to Rashida Ferrand (206316/Z/17/Z), and the Fogarty International Center of the National Institutes of Health under Award Number D43 TW009539. I was also supported by the LSHTM Capacity Strengthen Research Degrees scheme in collaboration with The Health Research Unit Zimbabwe (THRU ZIM) at the Biomedical Research and Training Institute

## **Chapter 2: Literature Review**

### ***The definition and importance of menstrual health***

Menstruation is a natural biological process that impacts many aspects of life including social participation, mental and physical well-being, employment, and education (3-5). In 2016, UNICEF and the Joint Monitoring Program of the World Health Organization (WHO) defined adequate menstrual hygiene management (MHM) as having access to clean and effective absorbents; adequate frequency of absorbent change; washing the body with soap and water; adequate disposal facilities; privacy for managing menstruation; and basic knowledge of menstruation and how to manage menstruation with dignity and without fear or embarrassment (43, 44). More recently, this term has been expanded to menstrual health (MH) to reflect the multifaceted nature of the issue and include the sociocultural, environmental, and economic factors that inform the physical and psychosocial well-being of those who menstruate (5, 44). With this understanding in mind, MH is now considered a human right and public health issue that plays an integral role in women's health and well-being (1, 25, 45-47). Achieving MH is being in a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in relation to the menstrual cycle," (2).

### ***Menstrual health experiences in low- to-middle income countries***

Many girls and women face multiple barriers and challenges in managing menstruation and achieving MH more broadly (5, 25, 48). Those in low- and middle-income countries (LMICs) are disproportionately affected (5, 19, 23, 49). A systematic review summarised and appraised qualitative studies on the menstrual experiences of girls and women in LMICs and

reported on the short- and long-term consequences of inadequate MH and provided an integrated model of menstrual experiences in LMICs (50). Critically, this evidence-based model suggested directional pathways that link factors such as resource limitations and sociocultural norms to the reported adverse menstrual experiences of girls and women in LMICs that negatively impact their overall psychological and physical well-being (50). For example, many are faced with harmful menstrual stigma and cultural practices around menstruation that lead to isolation and limited mobility and ability to participate in social and religious practices which then affects their mental health and well-being (50), and many suffer from internalized negative attitudes towards MH-related issues due to the stigma attached to menstrual blood being “dirty” or “impure” and the secrecy around MH practices (50). Many also experience anxiety and shame during menstruation due to a lack of access to safe and secure water, sanitation, and hygiene (WASH) facilities, affordable and effective menstrual products, and pain management (7, 9, 13, 51). Although not very strong, there is some evidence that suggests these challenges in accessing MH products can lead to harmful urinary tract infections (UTIs) and reproductive tract infections (RTIs) due to the use of unsanitary alternative materials or sexually transmitted infections (STIs) from transactional sex in exchange of money for MH products or the MH products themselves (23, 52-54).

In the SSA region, studies among school-going girls in Kenya (55), Uganda (56, 57) and Tanzania (58) report fear, confusion embarrassment, and/or anxiety related to menarche and menstruation in general. These can be linked to a fear of teasing from other students due to leaking or smelling during menstruation and/or unwanted advances from boys as menstruation is often thought to signal a sexual preparedness (53, 59). A qualitative study in

Western Kenya also notes how poor menstrual health can lead to pregnancy, school absenteeism and eventual early school drop-out (60).

While these studies and the systematic review from Hennegan *et al* (50) propose directional pathways and an integrated MH framework to guide MH intervention design and implementation in LMICs, most of the reviewed research on MH intervention models and their impact on MH outcomes was of poor quality (19, 50). Further research is needed to better understand intervention models to address MH needs across the life-course of girls and women in resource limited settings (50).

## ***Menstrual health interventions***

### ***What we know about menstrual health interventions***

In the past, studies to address poor MH in LMICs tended to focus on keeping girls in school through the provision of MH products, education, and support (49, 61). A systematic review by Hennegan and Montgomery (49) critically assessing the current evidence on the effect of MH interventions on education and psychosocial factors among girls and women in LMICs termed these studies as “hardware” or “software” interventions and reported the following:

#### **Hardware interventions**

Hardware interventions aim to increase access to safe and effective MH products and improve WASH facilities to ensure dignified and safe spaces for changing, washing and disposal of MH products (44, 49, 61, 62). There is evidence that the provision of safe and effective MH products can increase school attendance and improve MH practices as girls can avoid the



uncomfortable MH products and the teasing and embarrassment associated with leaking blood and the staining of clothing and/or the unpleasant smells from prolonged use of an absorbent (5, 49, 63). The largest such study to date provided puberty education and menstrual cups or sanitary pads to 751 school-going girls in 30 primary schools in rural Western Kenya and investigated the impact on school drop-out, and STIs and/or RTIs (64). While there was no difference observed in school drop-out, the provision of MH sanitary pads or the menstrual cup was associated with lower prevalence of STIs in the end-of-study survey (control: 7.7% versus pooled menstrual cup and pads arms: 4.3%;  $p=0.012$ ). With regards to WASH, a systematic review by Jasper and colleagues (65) looking at WASH in schools highlighted a lack of safe, private and functional toilets makes managing menstruation at school uncomfortable and, at times, dangerous as students fear sexual attacks from their male peers. To date, there is evidence that MH interventions that address WASH needs improve girls' safety and overall menstrual experiences in schools (49). However, there is still a need to invest in additional research to address WASH in public spaces, outside the school setting, and to fully understand the negative implications of poor WASH support on MH overall (4, 49).

### **Software interventions**

Software interventions aim to improve psychosocial well-being through activities that destigmatize menstruation, dismantle harmful myths and taboos, and address puberty and MH-related knowledge gaps (49, 66). Two such studies, in Iran (67, 68) and in Zimbabwe (69) respectively, provided MH education via school-based trainers, parent groups, and/or group activities and both reported improvements in MH practices and knowledge. There are also examples of studies that provided both hardware and software interventions. For example,

two studies based in Ghana (63) and Uganda (70), looked at school attendance and psychosocial well-being after the provision of sanitary pads and/or puberty education and noted slight improvements in both outcome measures. In the Ghana study, 120 schoolgirls were exposed to either: provision of pads with education; puberty education alone; or no intervention (no pads or education) (63). The study found that the provision of disposable pads and education resulted in a 9% improvement in school attendance over five months. In the Uganda study, 1124 schoolgirls were exposed to one of four conditions: the provision of puberty education alone; reusable pads alone; puberty education and reusable pads; and a control (no intervention) (70). Here, the study reported while school attendance decreased across all conditions, there was a 17.1% greater drop in school attendance for girls in the control arm compared to the intervention arms. Another example is the MENISCUS study in Uganda, where the provision of MH education, reusable pads, and improvements to WASH facilities in schools decreased reported anxiety among girls (from 58.6% to 34.4%;  $p < 0.001$ ) and increased reported use of effective pain management (from 76.4% to 91.5%;  $p = 0.001$ ).

Overall, the systematic review reported limited robust evidence as to the effectiveness of these interventions on girls' and women's education, work, and psychosocial outcomes but noted positive results from software MH interventions that improved MH knowledge and, to a lesser extent, hardware interventions that improved school drop-outs (49).

### ***What needs further investigation***

The systematic review by Hennegan and Montgomery (49), much like the review by Hennegan *et al* that generated the integrated model for menstrual experiences in LMICs (50), also recommended further research into MH interventions and the effects they have on crucial

outcomes of education and psychosocial and physical well-being. Authors also strongly recommended more investment in complex MH interventions that address the various contextual factors that inform MH and in larger randomised trials that can robustly measure the impact of MH interventions (49, 71). Future MH studies need to implement validated measures and develop standardized tools to measure the effect of these interventions across different settings (13). Other critical research gaps identified by the systematic review, and echoed by other researchers, were MH interventions for out-of-school girls and interventions that address MH-related pain and pain management (13, 49, 72).

Since 2016, when the Hennegan and Montgomery (49) review was published, the MH research landscape has expanded (13). As of 2022, research now includes community-based interventions (73), multicomponent interventions (56), investigations into the MH needs of those with disabilities (74), and integration of MH with other aspects of SRH (16). However, research in these areas is relatively new and there remains a need for more evidence generation. For example, with MH and SRH, there is an appreciation of the pivotal role menarche, and managing menstruation thereafter, plays in the reproductive years of life (26). Menstruation signposts the beginning of puberty; creating a natural pathway to crucial conversations around body autonomy and reproductive health (16, 26). Including MH in SRH service provision may be the next step to holistically addressing women's health needs and improving their quality of life (QoL) (6, 16, 21, 44). However, this is not widely accepted and has yet to translate into action. Most MH interventions continue to be developed and implemented separately from SRH (26). Here, more research is needed to understand how to best harness the synergies between SRH and MH in service provision in LMICs.

## ***Menstrual health in Zimbabwe***

In Zimbabwe, most young women have limited access to appropriate menstrual management methods (24, 75). For example, one study by Stichting Nederlandse Vrijwilligers (SNV) conducted in 203 schools in Masvingo, Zimbabwe reported that 72% of girls in rural Zimbabwe had never used sanitary pads (76). Many women and girls in low-income areas throughout Zimbabwe have to improvise with old cloth or newspaper (77). The use of these inadequate products pose high risk of discomfort, infection, or leakage. As a result, many women end up missing school or work due to humiliation and stigma (61, 77). Traditionally, in Zimbabwe, menstruation is considered a private matter that is not discussed openly. MH-related issues are shrouded in secrecy and taboo. Moreover, menstrual blood is often described as “dirty” and menstruating women are considered “unclean”. As a result, many women harbour feeling of shame during their menstruation and tend to hide the fact that they are menstruating at all (78, 79). Anecdotal evidence from MHM program implementors and limited qualitative research from Ndlovu and Bhala (24) on MH research in Zimbabwe also reveals that girls have limited MH information prior to menarche resulting in fear, shame, and embarrassment when managing menstruation, particularly at school. Further contributing to unsupportive environments in the communities, Ndlovu and Bhala (24) note that boys tease and bully girls because they do not understand girls’ behaviours during menstruation.

Despite the global push for MH interventions in LMICs, studies specific to Zimbabwe remain limited (78). Critical gaps remain in addressing the MH needs of women in Zimbabwe (20), despite efforts from Government and developmental agencies to achieve the SDGs by 2030. Apart from a small feasibility study among 43 women aged 18–45 years old to investigate

menstrual practices and perceptions around the use of the Duet (an insertable MH product) (75), there is little to no scientific research looking at MH in Zimbabwe. The existing study contributes to the feasibility of reusable MH product use in Zimbabwe, but the data are not generalizable due to the small sample size, rural setting, and lack of data on MH product choice or use (5, 60, 80).

The literature looking at MH interventions and the menstrual experiences of women in LMICs such as Zimbabwe, highlights several MH-related evidence gaps (13, 18, 49, 50). Specifically, in Zimbabwe, research is needed to i) understand context-specific MH intervention design and delivery, ii) estimate the impact of MH interventions in communities, iii) track MH-related outcomes over time, and iv) outline best practices to meet the MH needs of girls and women (13, 18). This thesis aims to address these research gaps and hence advocate for evidence-driven policy-making that mainstreams MH and places MH services at the centre of SRH and overall well-being of girls and women in Zimbabwe.

In summary:

**What is known:**

- MH is a human right and integral to the physical and mental well-being of girls and women
- There is a large unmet need for MH across the globe and particularly in LMICs
- MH is a multifaceted issue that is informed by context-specific external factors that should be addressed using intersectional and holistic approaches
- MH interventions that provide MH education can improve knowledge and psychosocial well-being

- MH and SRH are naturally linked and there is an opportunity to address women's reproductive using an integrated approach

**What is unknown:**

- What are acceptable and effective MH interventions in the Zimbabwean context
- The mechanisms of change relating to MH interventions and improved MH outcomes such as MH knowledge, perceptions, and practices in LMICs
- The facilitators and barriers to MH product choice
- The pathways and mechanism of change that facilitate a change in the social norms that improve practices and perceptions around MH
- How the different components of complex MH interventions work within specific study contexts
- The effect of MH interventions on MH needs for out-of-school girls and adult women
- Investigating and addressing MH-related pain, especially in LMICs
- The acceptability and feasibility of integrated MH and SRH service provision

***Theoretical frameworks underpinning the research***

***Social Norms***

Understanding and addressing MH needs requires an intersectional approach that considers the many factors that inform the lived experiences of girls and women across the globe. These factors include religion, culture, age, environment, gender, socioeconomic status (2, 47), and operate within a social environment underpinned by unwritten rules, or social norms, that guide human behaviour (81). There is a great body of literature that frames social norms as

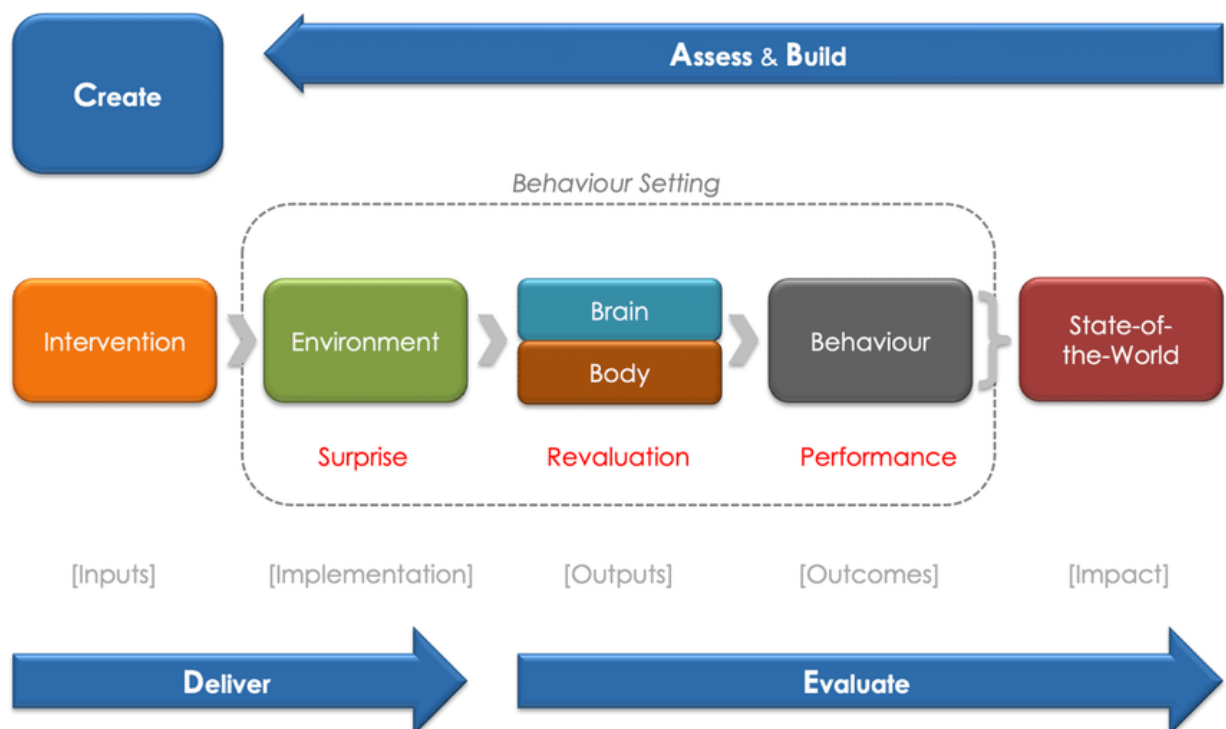
the driving influence for societal practices and behaviours such as female genital cutting and handwashing (82-84). Here, social norms, are a defining feature of human nature that dictates accepted standards of behaviour (85). Building on this definition, social norms theory, first used by Perkins and Berkowitz in 1986 (86), is an evidence-based approach to addressing complex health issues such as alcohol and drug abuse. Here, misconceptions around certain social practices and/or behaviours such as heavy drinking are normalized as the majority of people, fuelled by ignorance and a lack of communication, overestimate how much others drink and in so doing either drink more themselves or encourage others to. Thus leading to the perpetuation of harmful practices falsely shrouded as “normal”(85-87).

Social norms theory proposes that health interventions that aim to uncover and correct falsehoods about a subject matter by encouraging open dialogue and providing accurate information will encourage healthier new norms that will have individual and community level benefits that sustain these healthier norms and motivate others to join in (87). Thus, health interventions, such as MH interventions, that seek to address the sociocultural norms that inform the menstrual experiences of girls and women should be developed through a lens seeking to change behaviour through intentionally disrupting perceptions of what is “normal”. As evidenced by the literature on MH experiences, current MH discourse stigmatises MH, devaluing menstruating girls and women and negatively informing their experiences in the public and private spheres of their lives. MH education or MH provision alone is unlikely to be sufficient to change these longstanding social norms (49, 81). Robust research is needed to understand the mechanisms of change with regards to how and why MH interventions change and/or shift norms to facilitate improvements in MH. This research,

most importantly, can then be used to invest in and implement MH interventions that are acceptable, effective, and sustainable over time (54).

### ***Behaviour Centred Design***

Behaviour Centred Design (BCD), developed by Aunger in 2016, is an innovative approach that uses both scientific and creative methods to change behaviour at both individual and community levels (38). BCD has been used in the private sector to help in the marketing of cosmetics and food products and more recently, has been used in WASH and nutrition interventions (38, 88, 89). It is an applied science that provides a Theory of Change (ToC) for behaviour, and a practical model and design process that guides the creation, implementation, and evaluation of health interventions (Figure 2) (38).



**Figure 2 The behaviour centred design process model (38)**



Informed by the logic that forms the basis of social norms theory, the BCD approach suggests that effective interventions need to introduce something “new” into the environment to trigger a shift/change in thinking and behaviour (38). To know what “new” element to introduce, the model suggests that researchers understand existing norms and practices via formative research with the target population and other relevant stakeholders. Researchers are then to use gathered information to develop/create an intervention or “surprise” that disrupts the existing environment, causes an intrapersonal and/or interpersonal reevaluation, and eventual change in behaviour. Notably, the model emphasises the need to evaluate the process throughout to facilitate a clearer understanding of how the intervention elements interacted with environment to effect the observed changes in the target population.

In this thesis, I use social norms theory to understand the systemic factors that inform MH in Zimbabwe to then design the MH intervention. I also utilise a BCD approach to develop a ToC (detailed in Chapter 3 and Paper 1) that informed the creation, implementation, and evaluation of the MH intervention research study detailed in the chapters to follow.

### ***Literature review summary***

This thesis adds to the limited data on MH interventions in Zimbabwe. Specifically, I will address research gaps by looking at MH intervention acceptability and effectiveness and MH product choice among young women. The research will focus on investigating the integration of MH in SRH service provision in a community-based setting that targets both school-going and out-of-school young women. The research will first look at the understanding current MH knowledge, perceptions, and practices in Zimbabwe to give a robust understanding of the

unmet MH needs among young women. These findings will then be used to develop and implement a comprehensive multicomponent MH intervention. A mixed-methods investigation into the acceptability and effectiveness of the MH intervention will provide robust evidence and insight into intervention development and implementation, and potential pathways linking MH interventions to improvements in education, and physical and psychosocial well-being.

## **Chapter 3: Methodology**

In this chapter, I outline the overall study design for this thesis. Firstly, I provide a statement reflecting on my positionality in relation to the research topic and study context, and how and why this may have, influenced the research process. I then describe the CHIEDZA trial, and the MH intervention nested within it. In describing the MH intervention, I detail the process of obtaining consent, recruitment, and follow-up procedures (including an overview of the PhD timeline and the impact of COVID-19 on the study). I then describe the methods of quantitative and qualitative data collection both for the full MH intervention and for a cohort of women participating in the MH intervention, and an overview of the qualitative and quantitative analytical methods used. Details of specific analyses are provided in each paper's respective methods section.

### ***Positionality statement***

Positionality refers to the positioning of the researcher in relation to the study and the context in which the study is situated i.e. the intervention communities and the study participants in these communities (90). To reduce bias through self-reflexivity and understand the lens through which I viewed the research data, I acknowledge and reflect on my standpoint as the researcher who both developed and evaluated the intervention. While I led on the design, data collection, and analyses in the study, every effort was made to regularly meet with the supervisory team and study research assistants (RAs) to ensure their collective cultural knowledge and expertise guided the study.

The lens through which I viewed this study is as an educated young black Zimbabwean woman from a middle-income household. As a menstruating woman with years of research experience in adolescent and women's health, I combine my first-hand experience of managing menstruation alongside my research expertise in understanding the challenges girls and women face in managing menstruation across the globe. As a young Zimbabwean woman, I related personally to the narratives of the participants involved in the study. The shared understanding of the stigma and taboo around menstruation in Zimbabwe allowed me to appreciate the research context more fully and relate to the participants. However, differences in our environments based on socioeconomic factors limited this overall shared understanding. Ultimately, I stood as both an insider and outsider in relation to both the subject matter of MH in Zimbabwe and the research participants.

Considering my positionality in this research, I used both qualitative and quantitative methods to assess existing MH gaps in Zimbabwe and further understand how these gaps informed the menstrual experiences of young women in resource limited settings in Zimbabwe. I then used these findings to create, implement and evaluate an MH intervention aimed at improving MH outcomes among young women in Zimbabwe.

### ***The CHIEDZA trial***

The MH intervention that this thesis is based on was nested within the CHIEDZA cluster-randomized trial (34). The CHIEDZA trial aims to determine the impact of a community-based integrated package of SRH and HIV services for 16–24 year olds, on population-level HIV prevalence and other key health outcomes. The two-armed community-based trial was conducted in 24 clusters (a geographically demarcated area that included a primary health

care and clinic community centre) in three provinces across Zimbabwe (Harare, Mashonaland East, and Bulawayo) with eight clusters in each province. Each cluster was stratified 1:1 to either receive existing, routine health services (control arm) or CHIEDZA services (intervention arm). The intervention was delivered in community centres in a youth-friendly environment over for 30 months from January 2019 to March 2022. All residents aged 16-24 years in the intervention clusters were eligible to receive the package of CHIEDZA services that included syndromic management of STIs, HIV testing and counselling, condoms, family planning, antiretroviral therapy (ART), ART monitoring and adherence support, general health information and counselling, and the MH intervention. The focus of this thesis will be the findings from the MH intervention within CHIEDZA.



**Picture: CHIEDZA tents set up on site in the field (picture taken by me)**



**Picture: Poster of female vs male CHIEDZA services on site (pictures by Ardent Media)**

The CHIEDZA intervention teams were separate from the research and evaluation team. Each intervention team included two nurses, four community health workers (CHWs), and two youth workers (YWs). The intervention team went through a two-week training that addressed 1) youth-friendly service delivery, 2) logistics management, 3) principles of counselling, 4) research ethics and Good Clinical Practice, and 5) engaging young people and other community members.

### ***Developing the menstrual health intervention***

The CHIEDZA intervention was designed through formative research work conducted from March to December 2018 (35). This formative work aimed to understand the needs of different stakeholders to optimally design the CHIEDZA intervention to meet these needs.

The MH intervention was available to all female CHIEDZA clients as part of the package of integrated services offered at CHIEDZA. The MH intervention was also designed through the CHIEDZA formative research conducted from October – December 2018 and the details have been published elsewhere (35). As part of this work, I organised stakeholder engagement meetings and conducted FGDs, IDIs, and participatory workshops were conducted with young women (aged 16–24 years old), CHWs, and other relevant stakeholders such as the Ministry of Health and Child Care (MoHCC).

Findings highlighted the need for the MH intervention to address stigma and harmful myths and taboos around menstruation, and provide access to MH education, products, and pain medication.

A ToC was developed for the MH intervention based on lessons from the formative research (details and visual available in Paper 1: Figure 2). The ToC encapsulates how different components of the MH intervention were envisioned to contribute to the intended MH outcomes.

### ***The menstrual health intervention pilot***

The MH intervention was piloted from April-July 2019 in the four intervention clusters in Harare. The pilot was conducted in the Harare province, as CHIEDZA had a phased roll-out plan for intervention clusters that started with Harare province (41).

During the MH pilot, the MH intervention package (Table 1) was delivered to young women by the CHIEDZA intervention team, free-of-charge. In evaluating the implementation of the pilot study, I routinely monitored MH intervention uptake and product choice data, visited the CHIEDZA sites to observe implementation, and attended weekly CHIEDZA intervention team meetings to comprehensively assess and understand the context in which the pilot was being conducted.

**Table 1 MH intervention package**

<b>Hardware</b>		<b>Software</b>
<b>MH Product</b>	<b>Supporting Products</b>	
<p><b>MENSTRUAL CUP</b></p> <p>One cup/participant and one pack of disposable pads)</p>	<ul style="list-style-type: none"> <li>- Soap</li> <li>- MH educational pamphlet</li> <li>- Period tracking diary</li> <li>- Analgesics</li> </ul>	<p><b>Initial education session:</b> One-on-one product demonstration Pain management information</p> <p><b>Scheduled education sessions:</b> Daily implemented MH education group sessions that explore MH myths and taboos and elaborate on puberty and MH</p> <p>MH video</p>
<p><b>REUSABLE PADS</b></p> <p>Two packs of reusable AFRIpads with 4 reusable pads in each pack</p>		
<p><b>UNDERWEAR</b></p> <p>Two pairs of regular underwear available in three sizes (small/medium/large)</p>		



### **Qualitative data collection within the menstrual health intervention pilot**

One focus group discussion (FGD) with all eight members of the Harare CHIEDZA healthcare providers and two FGDs (with 12-15 participants in each) and four in-depth interviews (IDIs) with female CHIEDZA clients were conducted during the MH pilot. FGDs were used to explore the barriers and facilitators to MH intervention uptake and IDIs were used to further investigate factors that informed MH product choice and user experiences of the menstrual cup or reusable pads.

Using semi-structures topic guides, I conducted the FGDs and IDIs with one female RA independent from the implementation team in Shona or English (as agreed by the participants). FGDs took place at the CHIEDZA sites and the IDIs took place at a time and place most convenient to the participant. The FGDs took 45-60 minutes and IDIs took 30-45 minutes. Written informed consent was provided before the FGDs or IDIs were initiated, and pseudonyms were used during the FGDs and in the quotations for confidentiality and anonymity. Detailed methods for the pilot study are included in Paper 1 of this thesis.

Key results from the pilot study highlighted that 1) sociocultural factors were a barrier to menstrual cup uptake; 2) environmental factors were a barrier to reusable pads uptake; 3) education for community members including caregivers and partners is key to intervention acceptability; and 4) there was a great need for MH products and education in the community (41). These results (detailed in Paper 1) were used to refine and scale-up the MH intervention across the 12 CHIEDZA intervention clusters (20). Outside of the changes made to the MH

intervention after the pilot, no other changes were made to the MH intervention once it started.

### ***The final menstrual health intervention***

All female CHIEDZA clients received analgesics (a choice between 12 paracetamol or ibuprofen per month), two pairs of underwear, a bar of soap, a simple period-tracking diary, comprehensive MH education including an MH educational pamphlet, and a choice of either one pack of reusable pads (AFRIpads that can be used for up to two years) or the menstrual cup (the Butterfly Cup that can be used for up to ten years) (visual available in Paper 4: Figure 1). All female clients had the option of swapping their chosen MH product for another after a minimum 3 months of usage and if they brought their existing MH product back to the CHIEDZA site. All the returned MH products were disposed of in a biohazardous waste container and later incinerated.

All clients, male and female, also had the option of viewing an MH educational video and/or attending an MH education session at the CHIEDZA site.



**Pictures: A male CHIEDZA CHW leading a menstrual health information session with young women and men on site at CHIEDZA (pictures taken by me)**

## **Data Collection**

The findings of this thesis are based on data from two groups of participants: 1) all female clients accessing the MH intervention within CHIEDZA and 2) a cohort of 300 of these clients in two randomly selected clusters in the Harare province (Hatcliffe and Budiro) (Table 2).

**Table 2 Thesis objectives and data collection sources**

<b>Objective</b>	<b>Data Collection Points</b>		<b>Type of Data Collection</b>	
	<b>Main CHIEDZA Intervention</b>	<b>Nested cohort of 300 participants</b>	<b>Qualitative Data</b>	<b>Quantitative Data</b>
1. To understand existing knowledge levels, perceptions, and practices around MH among women aged 16–24 years in Zimbabwe and to design and pilot a complex MH intervention within CHIEDZA	x	x	x	x
2. To investigate MH product choice, continued use or discontinuation of products, and patterns of use over time within the MH intervention	x			x
3. To investigate the effect of the MH intervention on MH knowledge, practices, and perceptions over time		x	x	x
4. To investigate the acceptability of the MH intervention in a community-based SRH intervention	x		x	x

### ***Data collection within the menstrual health intervention in CHIEDZA***

Each time a youth client visited CHIEDZA, a trained YW would greet them and introduce them to an available CHW. The CHW would then invite them into the service booth, discuss available services, and either register client (at first visit) or confirm the client's information is already in the system. This was done by collecting the client's fingerprint via a biometric (fingerprint recognition) identification system, known as SIMPRINTS (91), which recorded visits and specific services received within CHIEDZA for each client. Using SIMPRINTS system on a tablet for data entry, fingerprints, age, and sex for each client was recorded and delinked from client's name, birthdate, address, or other identifying information. The CHW would then provide the client with requested services, record services taken up using the tablet, thank the client for visiting CHIEDZA, and encourage the client to revisit in the future.



**Picture: CHIEDZA CHW using SIMPRINTS fingerprint scanner to register CHIEDZA client (pictures taken by Visuals by Corey)**

### ***Quantitative data collection within the menstrual health intervention***

Using the SIMPRINTS system, the CHIEDZA healthcare service providers collected coverage data on all female CHIEDZA clients who took up MH services within the CHIEDZA intervention. This quantitative data included MH intervention uptake, product choice and continuation or discontinuation over time, and pain medication uptake across all CHIEDZA intervention clusters. Access to the data was limited to the study coordinator and specified study personnel. Data was quality controlled on a real-time basis using automated quality checks.

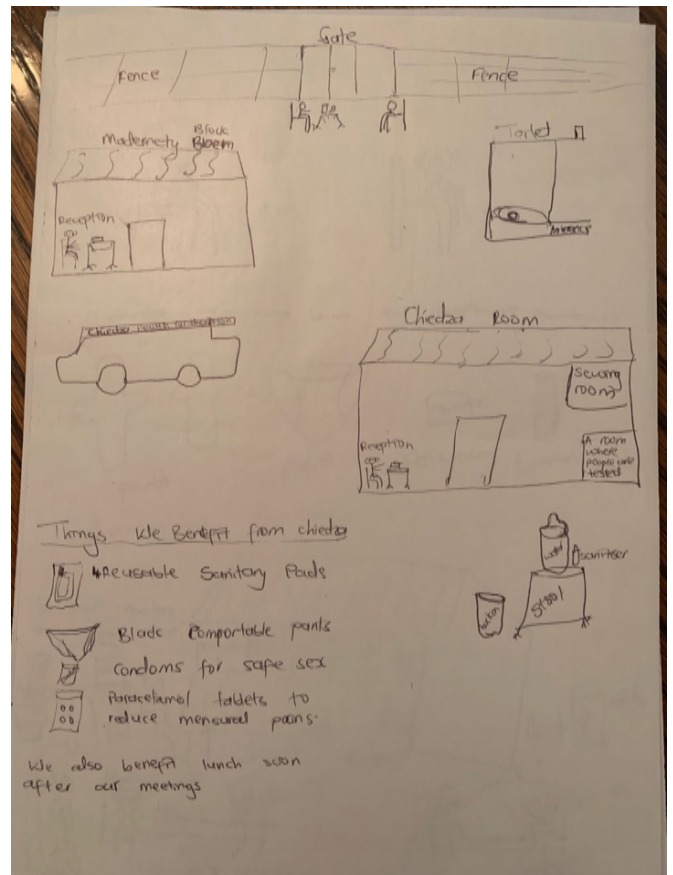
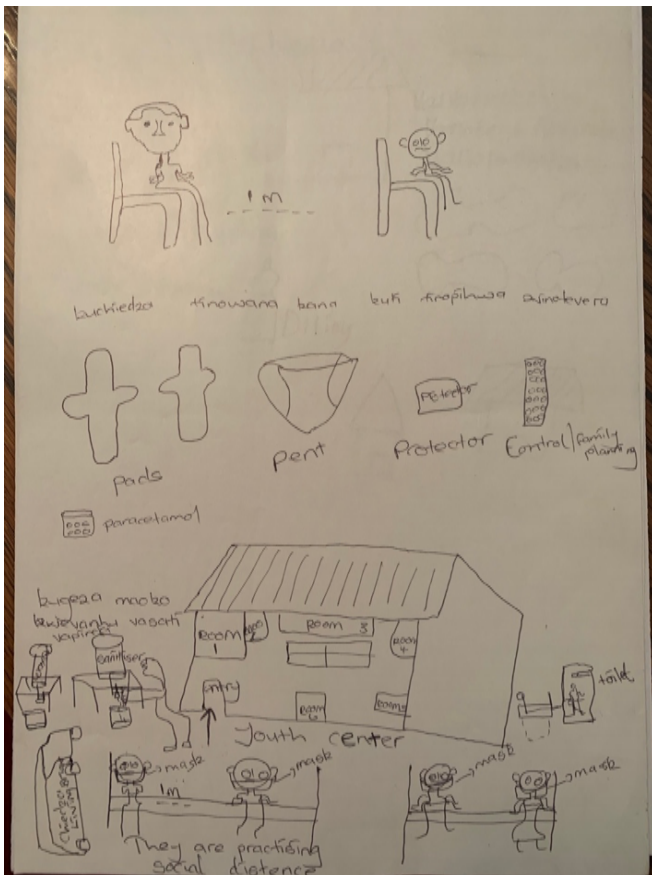
### ***Qualitative data collection within the menstrual health intervention***

FGDs and IDIs were conducted to further investigate normative views around MH, product choice, and the MH intervention within the CHIEDZA intervention clusters. Twelve FGDs were conducted, each with 12-15 female CHIEDZA female clients from all three intervention provinces throughout the MH intervention delivery period. Within each province, female CHIEDZA clients were purposively selected to cover the 16-24 age-range, to include those who had or had not taken up the MH intervention, those using different types of MH products, and those that had changed their MH product of choice over time. We used semi-structured topic guides to explore current MH knowledge, perceptions, and practices (Objective 1) and MH intervention acceptability and effect on MH knowledge, perceptions, and practices over time (Objective 3 and 4). Up to two participants from each FGD (10 participants in total), were then purposively selected to represent different MH product choices for follow-up IDIs to further investigate the factors that informed product choice and use over time (Objective 2). Three FGDs were also conducted with the CHIEDZA healthcare providers from all three

provinces one year into the delivery of the MH intervention. These FGDs were used to reflect on intervention implementation experiences and investigate the overall MH intervention acceptability and effectiveness from the perspective of the providers implementing the intervention (Objective 3 and 4).

I conducted the FGDs and IDIs with two female qualitative RAs independent from the implementation team in either Shona, Ndebele, or English (as agreed by the participants). Each FGD took 1–2 hours and IDIs took 30 – 45 minutes each. Only the RAs and I were aware of each participant’s product choice, and FGD topic guide questions were kept general to prevent stigma and bias during the discussions. Written informed consent was obtained from each participant before conducting the FGDs and the IDIs. Pseudonyms were used in the FGDs and in subsequent quotations to maintain anonymity and for confidentiality.

All the FGDs started with a participatory-drawing component (92). In small groups, during the FGDs, we asked participants to draw and describe CHIEDZA to further explore and understand how participants perceived CHIEDZA and the MH intervention within it. We also asked participants to individually draw and describe how and where they experienced premenstrual symptoms (PMS) including menstrual pain and how they it.



**Pictures: Participatory drawings from focus group discussions (pictures taken by me)**

**Data collection in menstrual health nested cohort study**

In two CHIEDZA intervention clusters in the Harare province (Budiro and Hatcliffe), female CHIEDZA participants who had chosen to take up the MH intervention were recruited to take part in a prospective nested cohort study between December 2019 and February 2020.

The aim of the cohort study was to complement the routine intervention data from the CHIEDZA intervention and further investigate: 1) MH product choice and patterns of use



(Objective 2), and 2) how access to MH products and knowledge informed practices and perceptions over time (Objective 3).

Participants in the cohort study were given a comprehensive period tracking diary, reusable pads, a menstrual cup, and two pairs of period pants in addition to the MH intervention components available to all CHIEDZA female clients.

### ***Sample size for the menstrual health cohort***

The sample size is based on Objective 3: a sample size of 300 participants provides 90% power to detect a positive increase in the proportion of participants answering all MH knowledge questions correctly from 10% to 20% before (pre-) and after (post-) the MH intervention (assuming  $p=0.05$ ). This calculation was based on results from a pre-post study of an MH intervention among school-girls in Uganda (56).

### ***Enrolment of the menstrual health cohort***

Using convenience sampling, all eligible female CHIEDZA participants in two age-strata (16-19 and 20-24 years) were recruited equally into each stratum until a cohort size of 318 was achieved. Recruitment began as soon the CHIEDZA centres opened (11am–noon) and a maximum of 15 participants were recruited on each day to allow for ease of administrative study duties. Two RAs approached CHIEDZA female clients sequentially as they entered CHIEDZA and maintained a tally sheet to record progress towards recruitment target within each age stratum. The total number of approached participants (regardless of whether they end up being enrolled) was recorded daily to determine the sampling fraction. All female

CHIEDZA clients were eligible if they chose to take up the MH intervention within CHIEDZA. Clients were excluded if 1) currently pregnant or intended to get pregnant within the next 1 year, 2) they experienced irregular or absent bleeding within the last 3 months, or 3) they had any condition that, in the opinion of the CHIEDZA RAs, precluded informed consent or made study participation unsafe.

Consenting participants received the MH intervention detailed above and were followed every three months for a year (Figure 3). To reach maximum participation at follow-up, we reminded participants of upcoming visits via phone. We called or texted participants up to three times to reschedule if participants didn't attend their scheduled visit. We also offered a home visit with a trained RA. If a participant did not return to CHIEDZA within four weeks of their scheduled visit, the participant was considered lost to follow-up (LTFU). If LTFU participants later visited CHIEDZA, we recorded that as a visit within a four-week window period around their most recent scheduled visit.

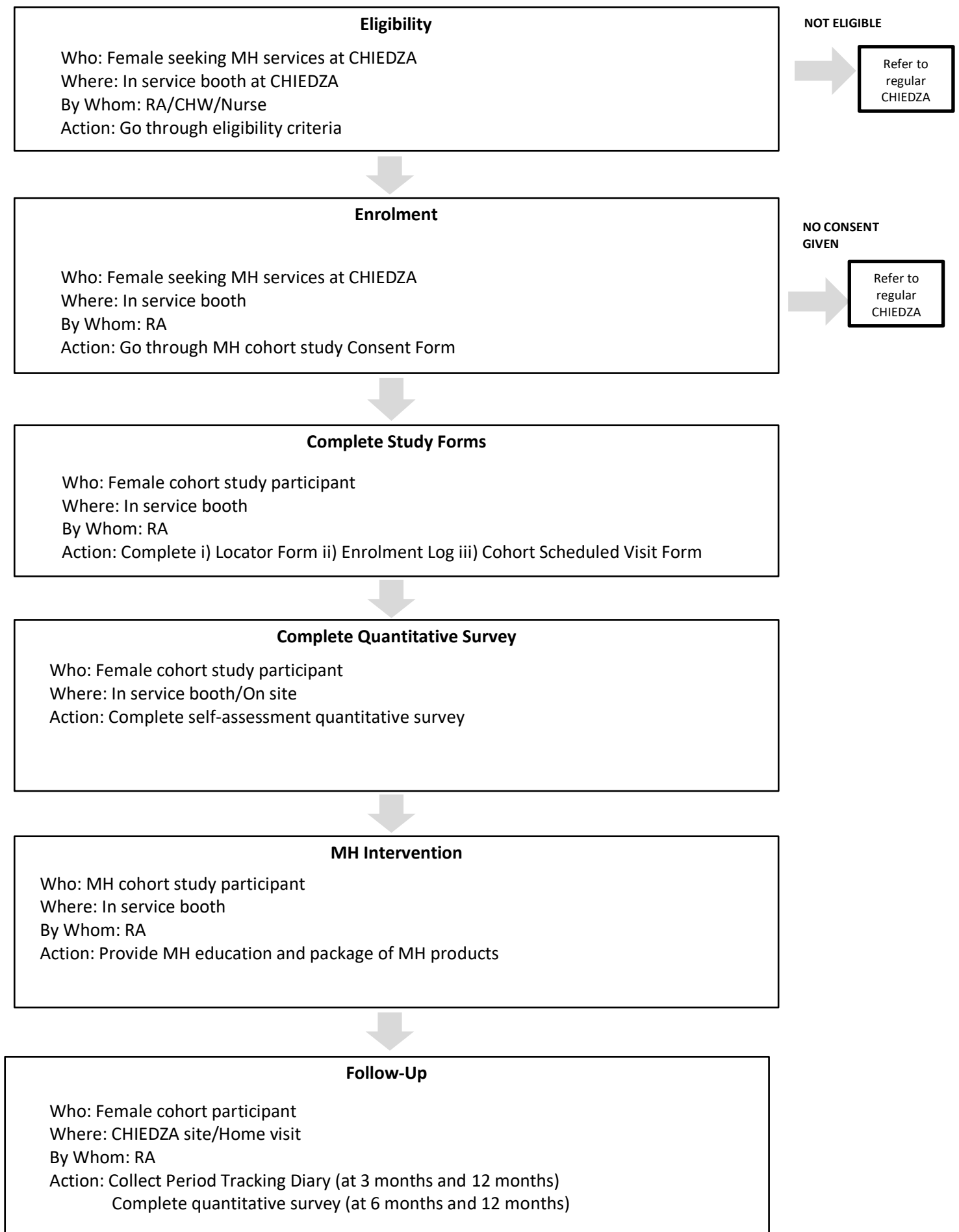


Figure 3 Study cohort follow-up chart

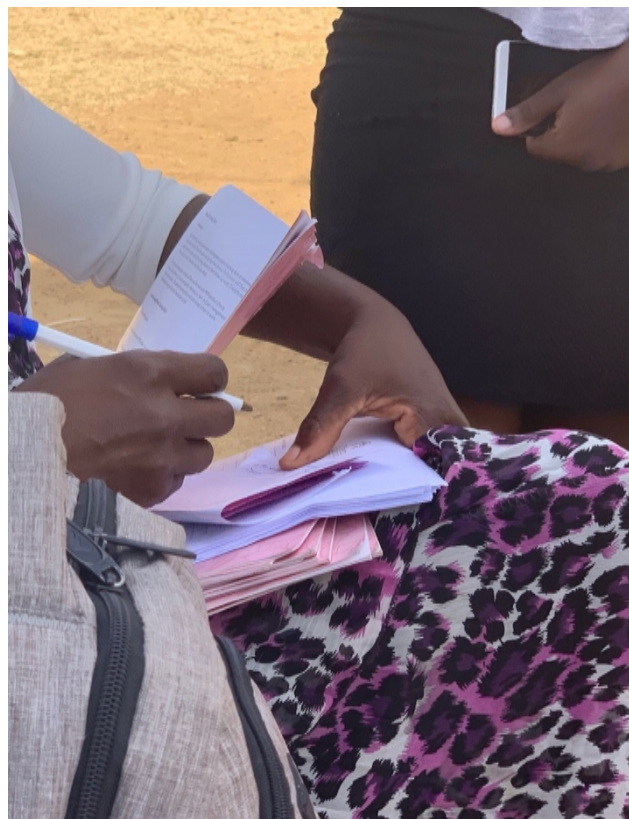
### ***Quantitative data collection with menstrual health cohort***

In addition to the data collected using SIMPRINTS, quantitative data collection within the MH cohort was collected via a self-administrated survey and period-tracking diaries. Participants were asked to complete the survey at three time points: 1) enrolment into the MH cohort (baseline), 2) around 6 months later (midline), and 3) around 12 months later (endline). Informed by findings from the MH intervention pilot (20) and Hennegan's Menstrual Practice Needs Scale (MPNS-36) (93), the survey included data on sociodemographic information and MH knowledge, perceptions, and practices over time (Appendix C). I translated and back-translated all survey questions with input from two RAs. The survey was then piloted and iteratively revised before the study cohort recruitment commenced (94).

Cohort participants were given a three-month period tracking diary at enrolment and at the nine-month visit (Appendix D). The period tracking diaries were also piloted and iteratively revised before the cohort recruitment started. The diaries were used to support participants' efforts to track their periods and to collect data on product choice and patterns of use (Objective 2), MH practices (Objective 3), and school or work attendance during menstruation. I distributed three-month period tracking diaries at enrolment and at the nine-month visit to collect and assess potential changes in MH product choice and use, school/work attendance, and MH pain management from the beginning to the end of the cohort study.

At enrolment, the RAs went through the period tracking diary with each participant, to make sure participants were comfortable and confident using the diaries and that the diaries would be completed accurately. Participants were instructed to complete the period tracking diaries on a daily basis during their periods. The first period tracking diary was collected at the three-month visit. Participants were then given another three-month period tracking diary at the nine-month visit that was then collected at the 12-months visit.

Period tracking diaries were collected at these two timepoints as opposed to only at the end of the cohort study to 1) facilitate comparisons at data collected at beginning versus at the end of the study period and 2) mitigate loss of diaries over the long follow-up period.



**Picture: MH study RA going through the period tracking diaries with participant on site (picture taken by me)**

### ***Qualitative data collection with menstrual health cohort***

FGDs and IDIs were conducted six and 12 months into the cohort study with cohort participants. Semi-constructed topic guides were used to further explore MH knowledge, practices, and perceptions among young women in the communities (Objective 1); the effect of the intervention on MH knowledge, perceptions, and practices over time (Objective 3) and MH acceptability and the facilitators and barriers to MH intervention uptake (Objective 4). FGDs and IDIs were conducted by me and two RAs.

FGDs aimed to generate dynamic discussion and further explore normative, similar, or disparate views on the topics under exploration e.g., perceptions of MH among young women in Zimbabwe or perceptions of MH intervention within communities. IDIs aimed to investigate especially sensitive or private topics regarding menstruation and the MH intervention or individual-specific experiences with MH products e.g., experiences using the menstrual cup or factors that informed individual's MH product patterns of use.

### ***Ethics approval and consent to participate***

This study was approved by the Medical Research Council of Zimbabwe [MRCZ/A/2387], the London School of Hygiene and Tropical Medicine ethics committee [16124 /RR/11602] and the Biomedical research and Training Institute Institutional Review Board (AP149/2018) (Appendix A).

Written informed consent was obtained from all participants before MH cohort enrolment and before the FGDs and IDIs were initiated (Appendix B). No parental consent was needed as the study did not include any participants under 16 years of age. Care was taken to ensure that information materials are developed that are appropriate to the study population, with translation into Shona / Ndebele where necessary and back-translation into English to ensure accuracy. Research staff went through the information with participants and questions were asked to check their understanding of key points before signed consent was collected. Pseudonyms were used during the FGDs and in subsequent use of the quotations from FGDs and IDIs to facilitate confidentiality and maintain anonymity. All recordings were downloaded on to a password-secured laptop for processing purposes and deleted once the data analyses were completed. All reports, study data collection, and administrative forms were identifiable by coded numbers only to maintain participant confidentiality.

All electronic data was stored in a password protected database system, with access granted to authorised staff only. All computers, servers, and networks on which the data are stored were password protected. All collected study data on central computers and servers, remote computers, and hand-held devices, was backed up daily. Backup files were stored separately from the primary electronic storage.

### ***PhD Timeline***

In Figure 4, I outline my PhD timeline and work from September 2018 – October 2022. This timeline provides a summary and overview of the key research points/steps in the PhD journey.

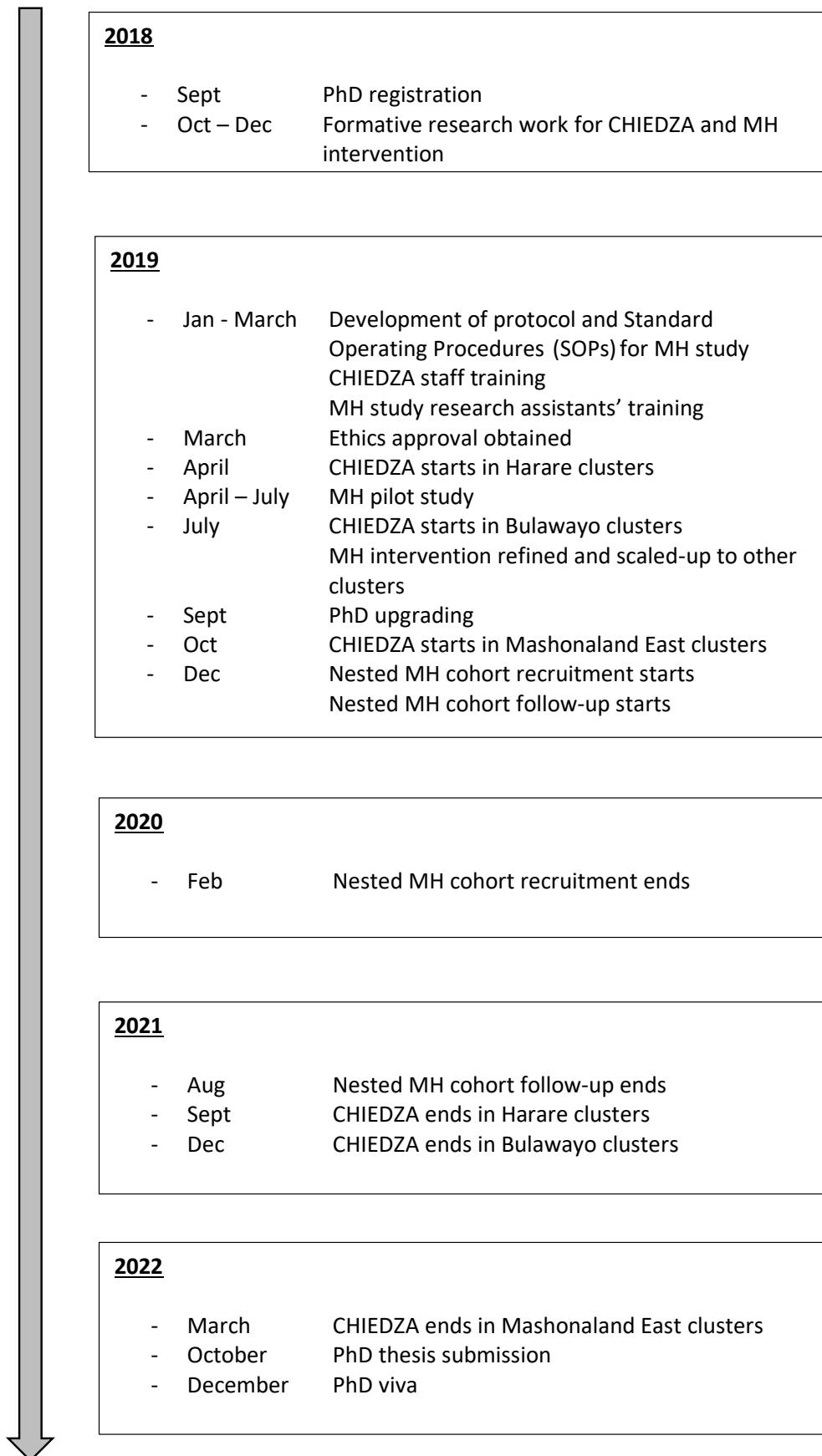


Figure 4 PhD timeline (September 2018 - October 2022)



## ***Impact of COVID-19***

COVID-19 and Zimbabwe's COVID-19 response strategies had several implications for the CHIEDZA trial, MH cohort study, and the intervention communities (95, 96). Since March 2020, the Zimbabwean government has enforced varying degrees of COVID-19 lockdowns and restrictions, accompanied by heavy police presence in communities (96, 97). On March 30<sup>th</sup>, 2020, we ceased all CHIEDZA service provision and recommenced adapted service provision (in compliance with national COVID-19 restriction guidelines) six weeks later (Figure 5). CHIEDZA service adaptations included: 1) mask-wearing; 2) social-distancing; 3) suspension of indoor and outdoor entertainment; 4) limitations on numbers screened and registered at any one time; and 5) limited service hours to allow for service provider and participants to travel home before curfew. These service disruptions and adaptations extended waiting times within CHIEDZA and removed key aspects of the youth-friendly intervention such as sports and social events.

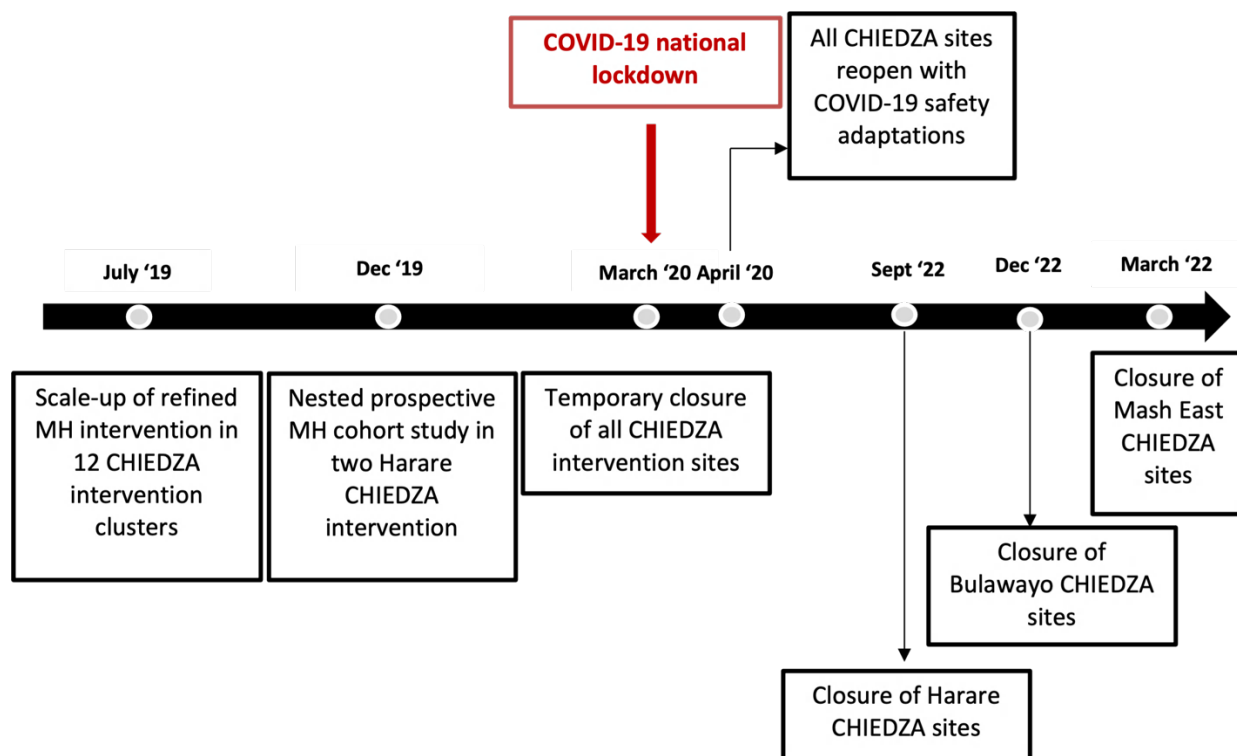


Figure 5 MH study timeline (including COVID-19 closure)

These restrictions not only affected the intervention (96), but also the study communities. In particular, those working in the informal sector and those living in high-density and low-income settings (97). COVID-19 restrictions weakened an already unstable economy and lowered household incomes which led limited access to affordable MH products in the communities. Unable to go to school or work and sustain their livelihoods, many people either sent their children to, or migrated to, the rural areas in search of a more affordable environment. Such migration had negative implications on cohort follow-up and overall exposure to the MH intervention.



**Picture: Long queues of CHIEDZA clients outside CHIEDZA tents after CHIEDZA recommenced adapted service provision (taken by me)**

### ***Data analysis***

Data for analysis included FGDs and IDIs and quantitative data from the SIMPRINTS system and qualitative data from the FGDs and IDIs for all female clients accessing MH intervention within CHIEDZA. Additionally, data for analysis included the quantitative survey, the period tracking diaries and qualitative data from the FGDs and IDIs with the MH cohort. Lastly data includes FGDs and IDIs with the CHIEDZA healthcare service providers.

Quantitative and qualitative data were analysed independently, and the findings were triangulated to deepen overall understanding of how the intervention was operationalized, how it was being received, and how it could be improved. Analysis and initial findings were further interrogated during the regular meetings I had with senior social scientists and statisticians.

General quantitative and qualitative analytical methods are outlined below. Details of specific analyses can be found in specific manuscripts.

### ***Quantitative Analysis***

Quantitative data were analysed using Stata statistical software version 16.1. Quantitative data from all CHIEDZA female clients who took up the MH intervention were stratified by age, cluster and province, to look for relevant patterns. Chi-squared tests were conducted to compare the proportions reporting MH intervention uptake and MH product choice and use disaggregated by age group and province (Objective 2). I also compared the proportions who took up the MH intervention as opposed to other services and the proportions of those who swapped their initial MH product for another, over time. The details of this analysis are described in Paper 2.

Cohort data was analysed using descriptive statistics on participants' self-reported socio-demographic characteristics (age, highest level of education, religion, marital status, job status, school, and source of income) at each data collection timepoint i.e., baseline, six months, and 12 months. I used repeated measures logistic and linear regression to assess the pre-post effect of the MH intervention on the proportion of cohort participants with pre-defined positive outcomes for MH knowledge, perceptions, and practices respectively, adjusting for within-person correlation (Objective 3). The details of this analysis are described in Paper 3.

Cohort data from the period tracking diary entries were analysed using descriptive statistics on MH product choice, product use over time, product patterns of use, and pain management during menstruation (Objectives 2 and 3).

### ***Qualitative Analysis***

The qualitative data from the FGDs and IDIs included translated transcripts and visual drawings. FGDs and IDIs were audio recorded using recorders, transcribed verbatim and then translated into English for inductive and deductive thematic analysis (98). Data analysis of the FGDs and IDIs followed Braun and Clarke's guide to conducting a thematic analysis (99). Initially, I read through all the transcripts for familiarization and coded them manually, before then importing transcripts to NVivo 12. For the analysis of qualitative data for Objectives 1, 3, and 4, I organized the data into pre-defined key themes. For each analysis, coded transcripts were then discussed with and reviewed by the senior social scientist and additional inductive themes and sub-themes were then generated (100).

To investigate existing MH knowledge, practices, and perceptions (Objective 1) and the effect of the MH intervention on pre- and post- MH knowledge, perceptions, and practices over time (Objective 3), I conducted thematic analysis based on the following deductive themes: current MH knowledge, practices, and perceptions, barriers and facilitators to product choice and use, and product user experience (101). I also used quotes from interview participants to highlight thematic areas and to increase understanding of the context. The details of this analysis are described in Papers 1 and 3 of this thesis.

To assess the acceptability of the MH intervention (Objective 4), I conducted thematic analysis based on Sekhon’s Theoretical Framework of Acceptability (TFA) that looks at seven key constructs of acceptability (affective attitudes, burden, ethicality, intervention coherence, opportunity costs, perceived effectiveness, and self-efficacy) (40). I, with the assistance of a senior social scientist, also conducted thematic and visual analyses of participatory drawings to further explore MH intervention acceptability. The details of this analysis are described in Paper 4 of this thesis.

Overall, using the methods detailed above, each of the study objectives were addressed by each of the research papers detailed in Chapters 4 – 7 (Table 3).

**Table 3 List of papers with their objectives and data sources**

Objective	Publication (Submitted and/or published)	Data Used	Cohort Study Participants	Female CHIEDZA Clients	CHIEDZA Healthcare Providers
1	<u>Research paper 1 (Chapter 4):</u> Menstrual product choice and uptake among young women in Zimbabwe: a pilot study.	FGDs, IDIs, and routine intervention data collection via *SIMPRINTS		x	x
2	<u>Research paper 2 (Chapter 5):</u> High menstrual health service uptake when given menstrual product choice within an integrated sexual and reproductive health intervention for young people in Zimbabwe	Routine intervention data collection via *SIMPRINTS		x	

3	<u>Research paper 3 (Chapter 6):</u> Menstrual health intervention improves menstrual health knowledge, perceptions, and practices among young women in Zimbabwe	FGDs and quantitative survey	x		
4	<u>Research paper 4 (Chapter 7):</u> Integration of a menstrual health intervention in a community-based sexual and reproductive health service for young people in Zimbabwe: a qualitative acceptability study	FGDs		x	x

\*SIMPRINTS is a biometric data collection system (91)



## RESEARCH PAPER COVER SHEET

Please note that a cover sheet must be completed for each research paper included within a thesis.

### SECTION A – Student Details

Student ID Number	1805265	Title	MISS
First Name(s)	MANDIKUDZA		
Surname/Family Name	TEMBO		
Thesis Title	Acceptability, uptake, and effectiveness of a menstrual health intervention among young women in Zimbabwe		
Primary Supervisor	Constance Mackworth-Young		

If the Research Paper has previously been published please complete Section B, if not please move to Section C.

### SECTION B – Paper already published

Where was the work published?	BMC: Pilot and Feasibility Studies		
When was the work published?	23 November 2020		
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
Have you retained the copyright for the work?*	No	Was the work subject to academic peer review?	Yes

\*If yes, please attach evidence of retention. If no, or if the work is being included in its published format, please attach evidence of permission from the copyright holder (publisher or other author) to include this work.

### SECTION C – Prepared for publication, but not yet published


Where is the work intended to be published?	
Please list the paper's authors in the intended authorship order:	
Stage of publication	Choose an item.



**SECTION D – Multi-authored work**

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I designed the menstrual health intervention, analysed and interpreted the data regarding intervention uptake and menstrual product choice, and drafted the manuscript
--	--

**SECTION E**

<b>Student Signature</b>	
<b>Date</b>	15/09/22

<b>Supervisor Signature</b>	
<b>Date</b>	26/09/22

## **Paper 1 Overview**

In this Chapter 4 (Paper 1), I describe the development and piloting of a complex MH intervention: the MH intervention nested within the CHIEDZA intervention trial.

This paper draws from the formative work and MH intervention pilot. The findings in this paper speak to the unmet need for MH products and education and support in the community. Findings highlight barriers and facilitators that informed MH intervention uptake and MH product choice in the pilot. The findings also highlight the importance of community engagement and the provision of MH product choice in MH interventions as external factors such as sociocultural beliefs and environmental greatly inform MH intervention acceptability and MH product choice among young women.

The findings described in this paper guided the refinement and up-scaling of the final MH intervention to all CHIEDZA intervention sites.

This paper fulfills research Objective 1:

Objective 1 - To understand existing knowledge levels, perceptions, and practices around MH among women aged 16 – 24 years in Zimbabwe and to design and pilot a complex MH intervention within CHIEDZA.

To note, the term “menstrual health and hygiene (MHH)” is used in this paper as this was the predominant terminology used in the literature at the time of publication.

# Paper 1: Menstrual product choice and uptake among young women in Zimbabwe: A Pilot Study

Tembo et al. *Pilot and Feasibility Studies* (2020) 6:182  
<https://doi.org/10.1186/s40814-020-00728-5>

Pilot and Feasibility Studies

RESEARCH

Open Access

## Menstrual product choice and uptake among young women in Zimbabwe: a pilot study



Mandikudza Tembo<sup>1,2\*</sup> , Jenny Renju<sup>3</sup>, Helen A. Weiss<sup>1</sup>, Ethel Dauya<sup>2</sup>, Tsitsi Bandason<sup>2</sup>, Chido Dziva-Chikwari<sup>2,4</sup>, Nicol Redzo<sup>2</sup>, Constanca Mavodza<sup>2,5</sup>, Tendai Losi<sup>2</sup>, Rashida Ferrand<sup>2,4</sup> and Suzanna C. Francis<sup>1</sup>

### Abstract

**Background:** Menstrual health and hygiene (MHH) is a human rights issue; yet, it remains a challenge for many, especially in low- and middle-income countries (LMICs). MHH includes the socio-political, psychosocial, and environmental factors that impact women's menstrual experiences. High proportions of girls and women in LMICs have inadequate MHH due to limited access to menstrual knowledge, products, and stigma reinforcing harmful myths and taboos. The aim of this pilot was to inform the design of an MHH sub-study and the implementation and scale-up of an MHH intervention incorporated into a community-based cluster-randomized trial of integrated sexual and reproductive health (SRH) services for youth in Zimbabwe. The objectives were to investigate (1) uptake of a novel MHH intervention, (2) menstrual product preference, and (3) the factors that informed uptake and product choice among young women.

**Methods:** Female participants aged 16–24 years old attending the community-based SRH services between April and July 2019 were offered the MHH intervention, which included either a menstrual cup or reusable pads, analgesia, and MHH education. Descriptive statistics were used to quantitatively assess uptake and product choice. Focus group discussions and in-depth interviews with participants and the intervention team were used to investigate the factors that influenced uptake and product choice.

**Results:** Of the 1732 eligible participants, 1414 (81.6%) took up the MHH intervention at first visit. Uptake differed by age group with 84.6% of younger women (16–19 years old) compared to 79.0% of older women (20–24 years old) taking up the intervention. There was higher uptake of reusable pads (88.0%) than menstrual cups (12.0%). Qualitative data highlighted that internal factors, such as intervention delivery, influenced uptake. Participants noted the importance of access to free menstrual products, analgesics, and MHH education in a youth-friendly environment. External factors such as sociocultural factors informed product choice. Barriers to cup uptake included fears that the cup would compromise young women's virginity.

(Continued on next page)

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**Conclusions:** Pilot findings were used to improve the MHH intervention design and implementation as follows: (1) cup ambassadors to improve cup promotion, sensitization, and uptake; (2) use of smaller softer cups; and (3) education for community members including caregivers and partners.

**Trial registration:** Registry: [Clinicaltrials.gov](https://clinicaltrials.gov)

Registration Number: NCT03719521

Registration Date: 25 October 2018

**Keywords:** Menstrual health, Community-based interventions, Adolescents, Youth

## Introduction

Menstruation is an issue that impacts many facets of life such as social participation, mental and physical health, education, and employment [1–3]. Globally, women and girls face numerous challenges in managing their menstruation. These challenges arise from cultural taboos, lack of knowledge, limited access to safe and secure water, sanitation, and hygiene (WASH) services, affordable menstrual products, appropriate disposal structures, and pain management [4–6]. In 2016, the Joint Monitoring Program of the World Health Organization (WHO) and UNICEF defined adequate menstrual hygiene management as access to clean absorbents including sufficient washing, drying, storage and wrapping of reusable absorbents; adequate frequency of absorbent change; washing the body with soap and water; adequate disposal facilities; privacy for managing menstruation; and basic understanding of menstruation and how to manage it with dignity and without fear or embarrassment [7, 8]. More recently, this has been expanded to menstrual health and hygiene (MHH) to include the sociocultural and economic factors that inform menstrual management and impact women's lives [3, 8].

Improving MHH will contribute to achieving the Sustainable Development Goals (SDGs) on gender equality (SDG5), good health (SDG3), education (SDG4), and clean water and sanitation (SDG6) [9]. Yet, most girls and women in low and middle-income countries (LMICs) continue to have inadequate MHH [10]. Current options for menstrual products include disposable pads and tampons and cost-effective and environmentally friendly reusable pads, period pants, and the menstrual cup. However, many women and girls from LMICs use ineffective and unhygienic menstrual materials such as cloth, toilet paper, or old underwear [11]. Discomfort during menstruation due to ineffective menstrual products and pain relief may result in heightened anxiety, lack of confidence, and absenteeism from school, work, sports, and other socially or economically beneficial activities [12, 13]. Moreover, lack of accurate menstrual knowledge and the proliferation of harmful sociocultural norms can lead to myths and taboos that also contribute to the negative menstrual experiences of young women in LMICs [3].

A systematic review in 2016 highlighted the potential for interventions to improve MHH-related outcomes among women and girls but noted a lack of evidence on optimum models for delivery of MHH interventions [10]. Since then, several intervention studies have been conducted in LMICs but vary in quality and focus almost exclusively on girls in school [3]. Little is known about how girls and young women respond to or experience non-school, community-based MHH interventions, and which factors inform intervention or product uptake [14].

The aim of this pilot study was to assess and refine the design and implementation of a comprehensive MHH intervention incorporated into a cluster randomized trial of a package of integrated HIV and sexual and reproductive health (SRH) services for youth delivered in community-based settings across Zimbabwe (the CHIE DZA trial) (registered in [clinical trials.gov](https://clinicaltrials.gov):NCT03719521). Pilot findings informed two studies: the implementation and scale-up of the MHH intervention within the CHIE DZA trial; and a nested longitudinal MHH sub-study investigating the acceptability, uptake, and effectiveness of an MHH intervention on MHH knowledge, practices, and perceptions among young women aged 16–24 years in Zimbabwe (Fig. 1).

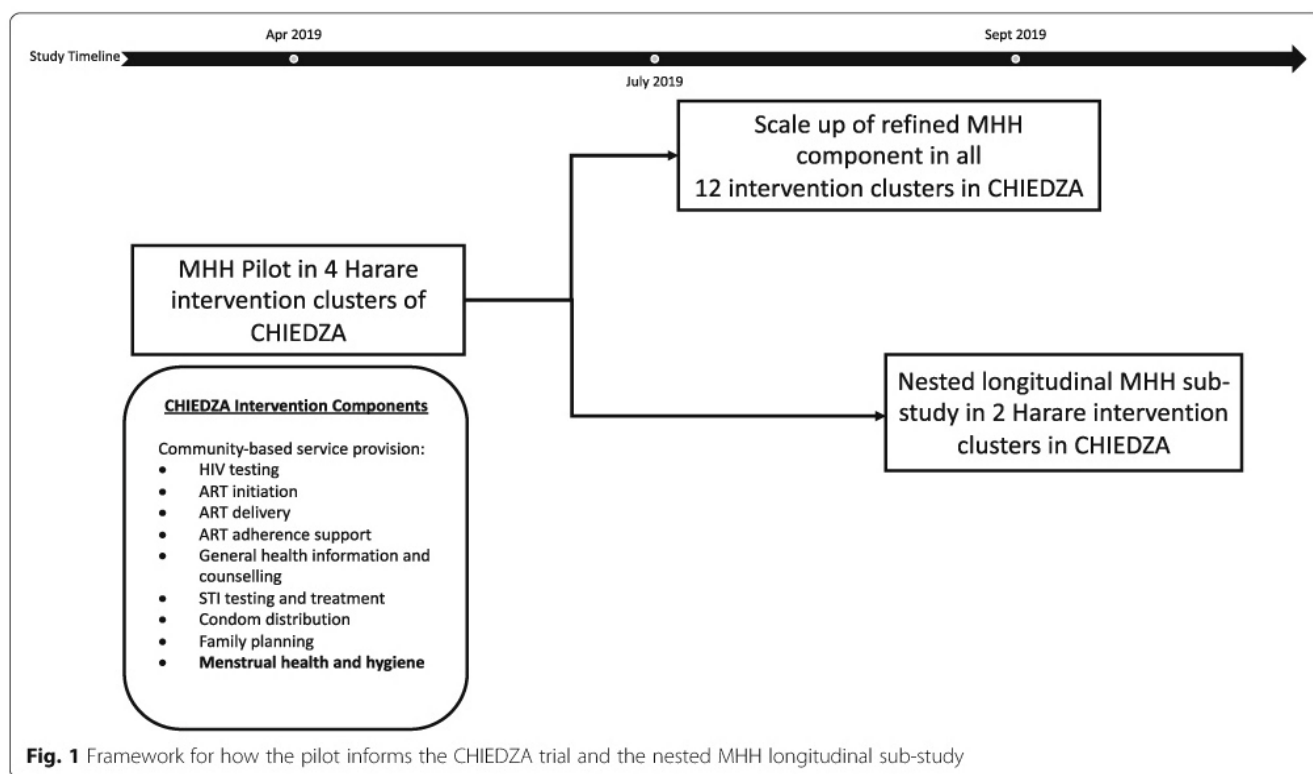
The objectives were to investigate (1) the uptake of a novel comprehensive MHH intervention, (2) menstrual product preference, and (3) the external sociocultural, economic, physical, and environmental factors that informed intervention uptake and menstrual product choice among young women in a community-based SRH programme.

## Methods

### Study setting and participants

This study was nested within the ongoing CHIEDZA trial that seeks to determine the impact of an integrated community-based package of SRH and HIV services for 16–24 year olds on population-level HIV prevalence and other health outcomes. The two-arm trial is conducted in 24 clusters (a geographically demarcated area that includes a community centre and a primary health care clinic) in three provinces in Zimbabwe (Harare, Mashonaland East, and Bulawayo), with eight clusters per





**Fig. 1** Framework for how the pilot informs the CHIEDZA trial and the nested MHH longitudinal sub-study

province. Each province is stratified 1:1 to either existing, routine health services (control arm), or to receive a package of SRH and HIV services (intervention arm). The intervention arm services are delivered in community centres over a 2-year period. All residents aged 16–24 years in the intervention clusters are eligible to access CHIEDZA services.

In the current paper, we describe an MHH pilot study which included female participants accessing CHIEDZA services at the four intervention clusters in the poor and urban settings of the Harare province.

**The MHH intervention**

Formative work that included a combination literature review, stakeholder engagement, and qualitative focus group discussions (FGDs), in-depth interviews, and participatory workshops were conducted with young women (aged 16–24 years old), community health workers (CHWs), and other community stakeholders such as relevant community-based organizations and the Ministry of Health and Child Care to inform and develop a Theory of Change (ToC) for the MHH intervention. Details of the formative work will be published elsewhere. The ToC recognizes that successful and sustainable MHH interventions need to address stigma and harmful myths and taboos around menstruation, access to MHH education and products, and access to pain medication. The aim of the ToC was to encapsulate how different components of the intervention would contribute to the intended outcomes (Fig. 2). Based on this, the MHH intervention, to

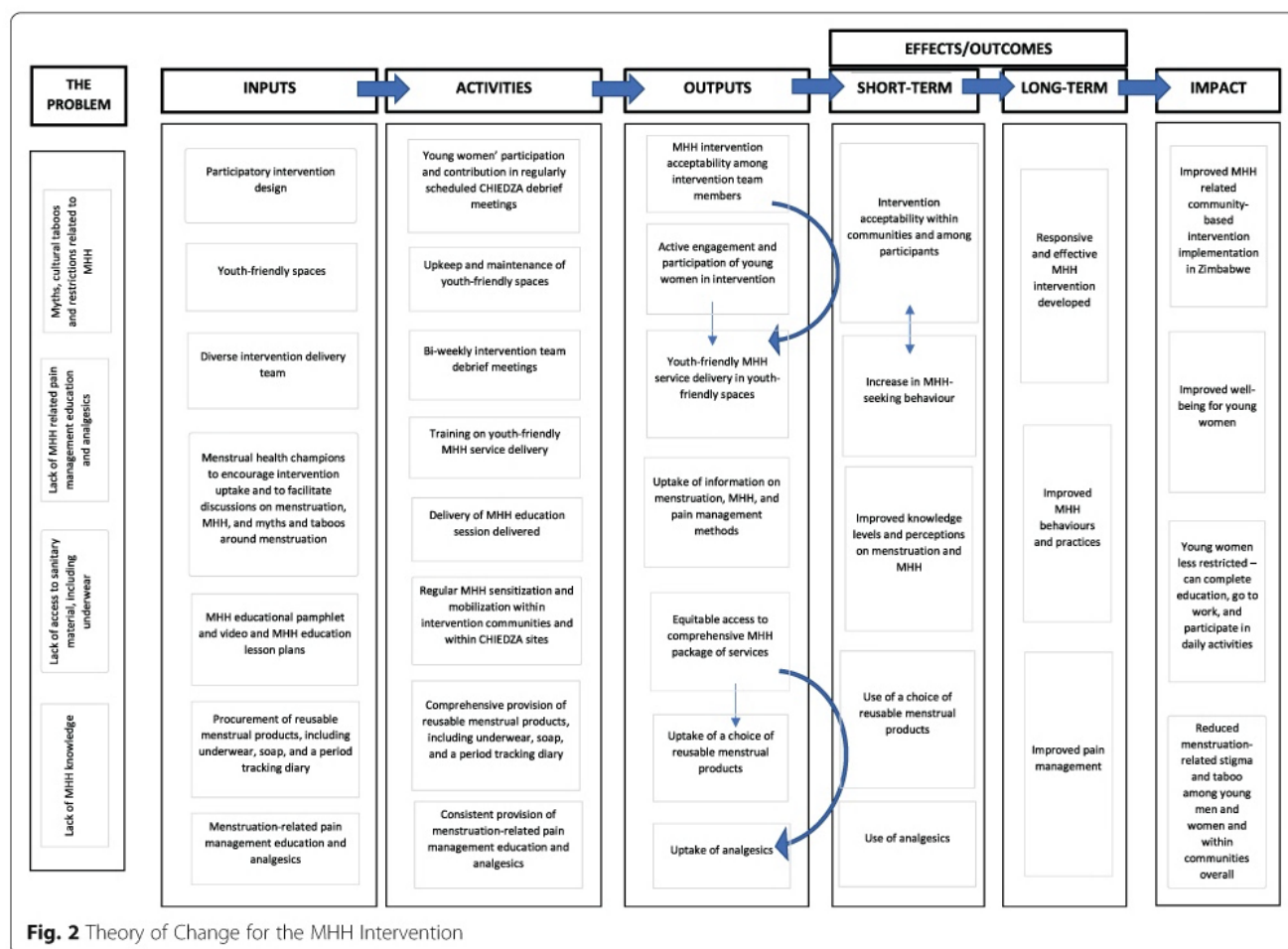
be piloted within the ongoing CHIEDZA trial, was designed to include analgesics (paracetamol or ibuprofen), two pairs of underwear, a bar of soap, a simple period-tracking sheet, comprehensive MHH education including an MHH educational pamphlet, and a choice of either a menstrual cup or reusable pads (Fig. 3). The MHH package was provided free-of-charge and delivered to young women within CHIEDZA trial. The MHH intervention was delivered by an intervention team that included two nurses, three community health workers (CHWs), two youth workers, and one counsellor. The entire intervention team went through a 2-week training that addressed (1) youth-friendly service delivery, (2) logistics management, (3) principles of counselling, (4) research ethics and Good Clinical Practice, and (5) engaging young people and other community members.

**Study procedures**

The pilot study was a prospective mixed-methods study conducted from April to July 2019 in all four intervention sites in Harare. In evaluating the implementation of the pilot study, we routinely monitored uptake and coverage data from the CHIEDZA trial and attended weekly CHIEDZA intervention team meetings to more fully understand the context in which the MHH intervention was being conducted [15].

**Quantitative methods**

Each attendance at the CHIEDZA service is tracked in real-time using a biometric system [16]. Fingerprints,



**Fig. 2** Theory of Change for the MHH Intervention

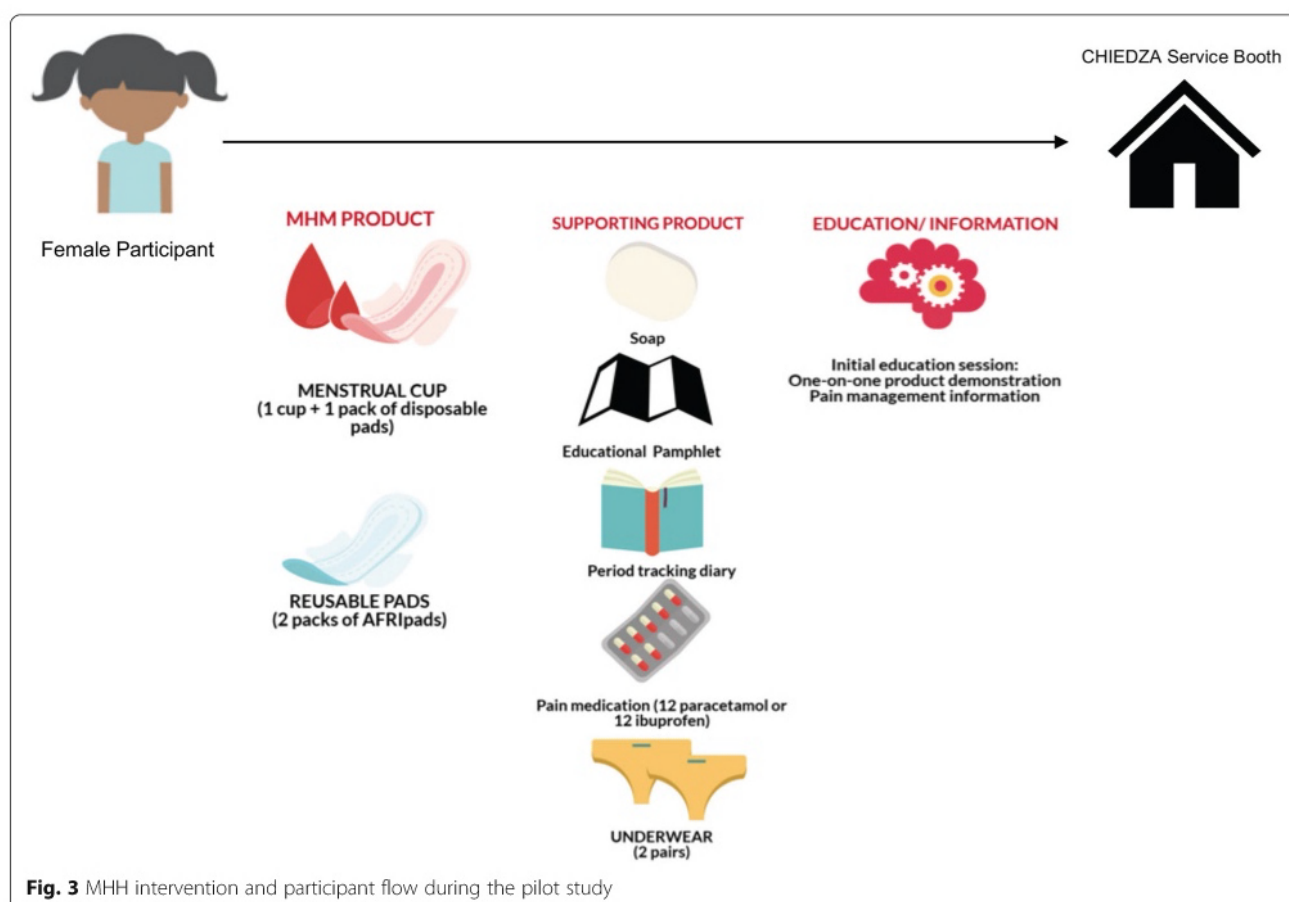
age, and sex for each participant is recorded and delinked from participant's name, birthdate, address, or other identifying information. Additionally, the services taken up by participants at each attendance are recorded on electronic tablets. Data for the female participants who accessed CHIEDZA services in the four Harare sites were used to assess intervention uptake and product choice. MHH intervention uptake was calculated as the proportion of women who took up MHH services of those who attended CHIEDZA. Z tests were conducted to compare the proportions reporting MHH intervention uptake and MHH product choice disaggregated by age group.

**Qualitative methods**

We conducted one focus group discussion (FGD) with the intervention team and two FGDs and four in-depth interviews (IDIs) with female CHIEDZA participants to explore the factors that influenced uptake of the intervention and choice of menstrual product. The intervention team's FGD included all eight team members: there were three males (aged 24–32 years old) and five females (aged 24–44 years old). The FGD explored their

understanding of, and attitude towards, the MHH intervention, their experiences of delivering the intervention, and their own experience of using the available products. For the FGDs with participants, we used purposive sampling to select 12–15 women to participate in two FGDs disaggregated by age (16–19 and 20–24 years old). Participants were selected to include those who did, and did not, take up the MHH intervention, and those who chose the menstrual cup or reusable pads respectively. At midline (two months into the pilot study), participants were screened (over the period of a week) by a female research assistant (RA), informed about the study, and asked if they were willing to be contacted via telephone to participate in the FGDs and subsequent IDIs. Two FGD participants from each age group were purposively selected to represent different product choices (two for the menstrual cup and two for the reusable pads), for follow-up IDIs to explore the factors that informed menstrual product choices.

The FGDs and IDIs were conducted face-to-face by an experienced female RA in either Shona or English (as agreed by the participants), used semi-structured topic guides and were audio-recorded. FGDs took 45–60 min



and IDIs took 30–45 min. FGDs took place at the CHIEDZA site outside of usual opening hours to ensure confidentiality. IDIs took place at a time and place most convenient to the participant. Written informed consent was provided before the FGDs or IDIs were initiated.

Audio recordings of the FGDs and IDIs were then directly transcribed into English for analysis. Data was analysed using thematic analysis based on the following broad themes: current MHH knowledge, perceptions, and practices, facilitators and barriers to product choice, and product user experience [17]. Codes were generated based on these themes and sub-themes emerging from the transcripts. All transcripts were coded manually by MT and reviewed by a senior social scientist (JR). Themes and coding were continually reviewed and refined to capture emerging new codes. Verbatim quotes from interview participants were captured to highlight thematic areas and to increase our understanding of the context.

Quantitative and qualitative data were analysed independently and then the findings triangulated to deepen our understanding of how the intervention was working, how it was being received, and how it could be improved. These findings were then further interrogated during the weekly CHIEDZA intervention team meeting. Collectively, the group would reach a consensus on any

changes or actions needed based on the evidence from the data and their experiences.

## Results

### MHH intervention uptake

Of the 1732 eligible participants who sought services at the CHIEDZA centres between April and July 2019, 1414 (81.6%) took up the MHH intervention at their first visit. There was no evidence of a difference of uptake between the four sites. There was strong evidence for a difference in uptake by age group with 690/816 (84.6%) of 16–19 year olds compared to 724/916 (79.0%) of 20–24 year olds accessing the MHH package ( $p = 0.003$ ).

From the qualitative data, key themes related to factors that influenced uptake of the MHH intervention were access to free menstrual products and analgesics, youth-friendly intervention delivery, and access to MHH information.

### Access to free menstrual products and analgesics

Almost all participants, particularly younger women, cited the MHH intervention as the reason behind their initial CHIEDZA visit:



“I personally came here with an intention to get pads and when I entered into the CHIEDZA booth, I saw a very friendly service provider and felt comfortable and free to talk” (FGD, 16–19 years old).

A key motivating factor for the observed high uptake was the provision of free reusable menstrual products, particularly reusable pads. Most participants reported having to use old socks or cotton wool in the absence of the menstrual product they would prefer to use or were able to afford before the economic downturn in Zimbabwe:

“sometimes I would also use cloths when I didn’t have enough pads to last my period” (FGD, 20–24 years old).

Almost all participants reported that they were “grateful” and “happy” that the intervention provided them with a choice of menstrual products which they could not afford and did not have access to before. MHH intervention team members also reported that the free products were “the most important hook” for young women that accessed the CHIEDZA services:

“...those who are coming in for menstrual hygiene, they are going out and inviting others for menstrual hygiene. They are only telling them that if you go to the community you can get pads, you can get a cup or something. They are not really raving about other services but it’s all about menstrual hygiene... the communities love the products we have” (FGD, Nurse).

Some participants reported experiencing pain during their menstrual periods and cited access to monthly analgesics as an additional reason for taking up the MHH intervention.

Almost all participants chose to take up the MHH intervention. Of those that did not, most only declined uptake because their menstrual product of choice was unavailable on the day of their visit.

#### **Youth-friendly intervention delivery and access to MHH information**

Participants had learned about the MHH intervention in CHIEDZA through community mobilization efforts facilitated by the intervention team:

“...we were on our way from clinic and we were told to go to the community hall to get some pads” (FGD, 20–24 years old).

Once at CHIEDZA, participants reported being “treated well” and many found the service providers “friendly” and “helpful”. MHH intervention uptake was both a function of the provision of needed menstrual products and youth-friendly service provision facilitated by the delivery team. Participants highlighted how the intervention staff, unlike their parents or teachers, provided much needed access to MHH information in a safe, non-judgemental environment and in a way in which resonated with them:

“I think this is a good programme because it helps us. Some children might have questions but they are not able to ask their parent, they might not be open to their parents but CHIEDZA, you are free to ask and say things you want” (FGD, 16–19 years old).

Many participants described how their only conversations about menstruation began and ended at menarche and were limited to menstrual product use and basic hygiene guidance. The MHH intervention provided young women an avenue to learn more about menstrual health from trained staff and to talk through their MHH-related concerns and anxieties in a safe space:

“When I entered into the booth, I saw a very friendly service provider and felt comfortable and free to talk and I was able to express my feelings and to openly seek the help I needed, and I was assisted there. Getting pads was now an extra benefit” (FGD, 16–19 years old).

Participants highlighted the MHH-related education sessions with the intervention staff. These sessions gave participants an opportunity to feel the menstrual products, to observe menstrual product use demonstrations, and to openly discuss myths and taboos around menstruation in private consultation. All the intervention team members reported that the MHH component of CHIEDZA was received with “gratefulness” and was the “most popular” service.

Overall, both the provision of free menstrual products and youth-friendly service provision were highlighted as key facilitators to intervention uptake. However, older participants seemed to be more motivated by the former rather than the latter as most of them had children with them or household responsibilities to get back to and thus did not have the time to engage in the MHH-related education sessions or other youth-friendly activities within CHIEDZA.



**Menstrual product choice among participants**

Of the 1414 participants who took up the MHH intervention, 1244 (88.0%) participants chose to receive the reusable pads and the remaining 170 (12.0%) chose a menstrual cup on their first visit. There was strong evidence of a difference of product choice by age, with 50/690 (7.2%) of 16–19 year olds to take up the MHH intervention choosing the menstrual cup versus 120/724 (16.6%) of 20–24 year olds ( $p < 0.001$ ) (Fig. 4). The qualitative data with clients and the intervention team highlighted key themes related to factors that influenced product choice: barriers and facilitators to the uptake of menstrual cups; and barriers and facilitators to the uptake of reusable pads.

**Barriers to the uptake of menstrual cups**

Sociocultural norms negatively influenced both the delivery and the uptake of the menstrual cup among participants. Participants reported that they and their caregivers in the community were hesitant about inserting the cup into their vagina. Most feared that the cup would “take their virginity”. Some feared that the “big” cup would be too difficult or painful to insert. Others thought the cups were stiff and hard and feared that the cup would stretch out their vagina making them undesirable for men to have sex with. The FGD with the intervention team members also highlighted these fears, and this affected their ability to promote cup uptake, with many explaining their struggles with delivering clear messaging to allay these concerns:

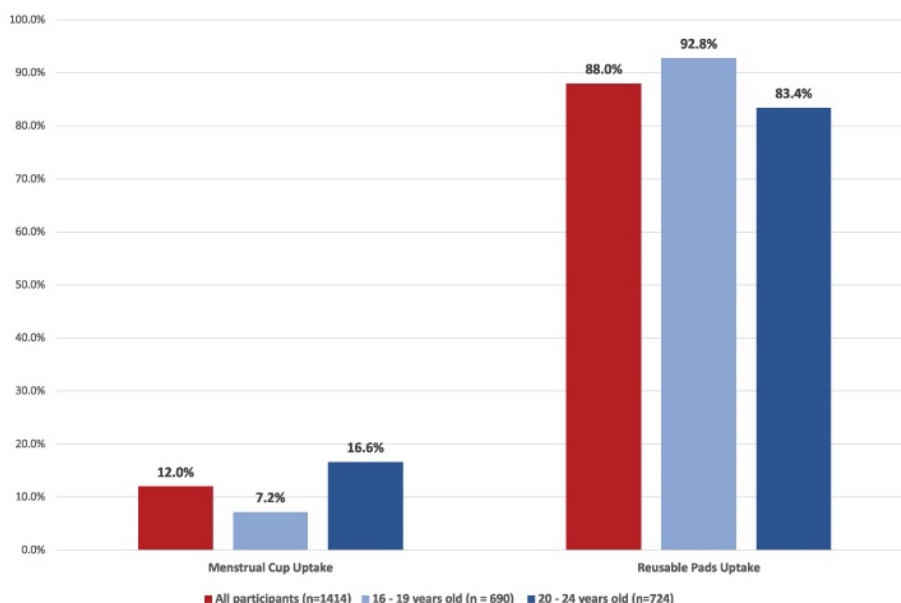
“I think it’s also an issue of needing to look at our cultural values. It’s about what are we told from childhood about virginity and inserting such big things. So that issue is a concern and how would you tackle it if you want to introduce a cup” (FGD, Community health worker).

Participants mentioned that the intervention team appeared reluctant to talk about and distribute the cup, and some expressed that they would have been willing to trying the cup if it had been talked about during service delivery:

“I just heard someone saying cup, but I did not know which cup she was referring to... I got pads instead of cup, and then I was like a cup? I did not get it, I thought she is talking about a cup of tea. I honestly thought that the CHIEDZA people had been unfair, and I wanted to go back and to get a cup” (FGD, 20–24 years old).

**Facilitators promoting the uptake of menstrual cups**

The main factors that facilitated menstrual cup uptake included anecdotal evidence of menstrual pain relief and the prevention of leakage. Some participants chose the cup over the reusable pad as it could be cleaned and dried discreetly. Even though most participants chose the reusable pads, many raised concerns over their need to “keep [their menstruation] a secret”, and challenges in washing and drying their pads outside where other family members and neighbours could see.



**Fig. 4** Menstrual product choice disaggregated by age group

The majority of participants gave negative accounts of their menstrual experiences and often described menstrual blood as “dirty” or “impure”. Many spoke about being restricted from housework, social or religious gatherings or sports while others expressed fears of leaking or “spoiling” their clothes leading to being “teased” by boys or chastised by other females during their menstrual periods. Informed by these negative perceptions and experiences of menstruation, some participants chose the menstrual cup over the reusable pads as they felt it was less likely to leak:

“The time for menstruation is so annoying because you will be anxious and you will be afraid of spoiling your clothes, you may not feel comfortable with a pad, so I decided to try a cup” (IDI, 20–24 years old).

Others that chose to take up the menstrual cup also cited “pain relief” as reason for uptake:

“[Other participants] told me that period cup heals period pains slowly. If you continue to use it you end up not having period pains” (FGD, 20–24 years old).

Limited access to water in the communities and seasonal rains also informed product choice. Some of the participants who opted for the cup cited the fact that it did not require much water to wash or time to dry as reusable pads as the reason for their choice:

“the cup is very smart, and you don’t need to do much washing, but you just remove it and empty it” (IDI, 20–24 years old).

#### **Barriers and facilitators promoting the uptake of reusable pads**

The main facilitators included peer influence (particularly for participant’s aged 16–19 year olds) and the similarity between reusable pads and disposable pads. Participants noted that the reusable pads were most similar to disposable pads they had used before and therefore the less “scary” than the cup. Many of the participants, particularly those aged 16–19 years old, were encouraged to visit CHIEDZA by a classmate that had previously visited the intervention site:

“We were in class and Rashna brought her pads and started to show us, ‘see what they look like, and see what they look like!’ So I said, ‘Where did you get them?’ and she said ‘I got them from the community centre, on Tuesdays.’ Today is my second time coming here, when I came for the first time, I was given pads” (FGD, 16–19 years old).

Overall, the few barriers to reusable pads uptake seemed to be linked to the environmental factors that facilitated menstrual cup uptake.

#### **Discussion**

In this pilot study of a novel comprehensive MHH intervention, the uptake was high. Key factors to intervention uptake, and the SRH program more broadly, were the availability of free menstrual products and analgesics, youth-friendly intervention delivery, and access to tailored MHH education. Most young women preferred reusable pads to menstrual cups. Barriers to reusable pads uptake were limited to environmental factors such as limited access to the amount of water needed to wash the pads, concerns about appropriately drying pads in the wet season and discomfort around openly drying the pads. Highly influential facilitators to uptake of reusable pads included peer influence amongst younger women, the appearance of the pads, and the comfort and familiarity derived from the similarity of the reusable pads to the more well-known disposable pads. Despite anecdotal evidence of menstrual cups reducing leakage and menstrual pain and being easier to clean than reusable pads, uptake was negatively informed by strong sociocultural beliefs around the preservation of virginity, lack of promotion of the cup from the intervention team, fear around the size of the cup which was perceived to cause vaginal stretching or pain, and/or anxiety around an inability to insert it properly. This study highlights the importance of context-specific interventions and informed choice when offering MHH services to young women.

Our study findings support similar findings from other LMICs that note that most young women face challenges in accessing menstrual products and only learn about menstruation at menarche and even then, the information is limited and skewed by local myths and taboos [18, 19]. These barriers then lead to feelings of isolation, shame, and fear that negatively inform how young women experience menstruation over time [3].

Data on community-based MHH interventions in LMICs is limited [3, 20]. This study provides evidence of the need for MHH interventions in community-based settings. Young women want access to MHH information, analgesics, and menstrual product choice and, if possible, young women positively respond to these services being delivered in youth-friendly spaces by supportive and friendly staff. The principles of Behaviour Centred Design (BCD) theory posit that behaviour change interventions must disrupt the external environment with a “surprise” that causes a shift in the target individual that results in the desired change or “performance” [21, 22]. Nested within a larger SRH intervention, the qualitative data from the pilot study suggests that the MHH component may have been the most attractive



service of the SRH package—effectively acting as the “surprise” that disrupted the community environment causing young women to come to CHIEDZA with the prospect of being rewarded with much needed free menstrual products, information, and support. Our hypothesis is that MHH services can facilitate access to broader SRH and HIV services within CHIEDZA. While the pilot data does not provide quantitative evidence that other SRH services in CHIEDZA were subsequently taken up, we can posit that the MHH intervention increased female engagement with CHIEDZA services. We will be able to investigate this further in the larger study. Robust evidence for the potential “pull factor” of MHH interventions in SRH programming could present a strong case for the integration of MHH in SRH and HIV programming for young women.

Reusable menstrual products are both cost-effective and environmentally friendly. There is also anecdotal evidence from study participants that menstrual cups reduce instances of leakage and period pain, particularly from those participants that previously used tampons to manage their periods. Despite these benefits, barriers to menstrual cup uptake centred around sociocultural norms that discourage insertable products due to (1) fears of “losing virginity” by rupturing the hymen, or (2) fears of hurting or stretching the vagina due to the size of the cup. Young women, particularly unmarried women, are often discouraged from inserting products into their vagina to preserve the hymen as a sign of one’s purity and virginity before marriage [23]. Our results highlight that these sociocultural norms influenced, not only, the participants but also the intervention team members as well. Despite extensive training on menstrual cup use, most of the intervention team members reported to have found it difficult to promote the menstrual cup because of their sociocultural beliefs. The tenets of BCD state that sustainable and effective interventions need to consider factors outside of the behaviour setting as these external factors inform participant behaviour [21]. Our findings suggest that product choice goes beyond provision—external environmental factors such as access to water and sociocultural factors in the community also play roles in the decision-making process. With a growing body of work to scale-up use of the menstrual cup in LMICs, understanding social and contextual factors will prove critical to improving acceptability [24]. Importantly, as reflected in our findings, intervention acceptability has to be considered and addressed from the perspective of both the participants and the service providers [25].

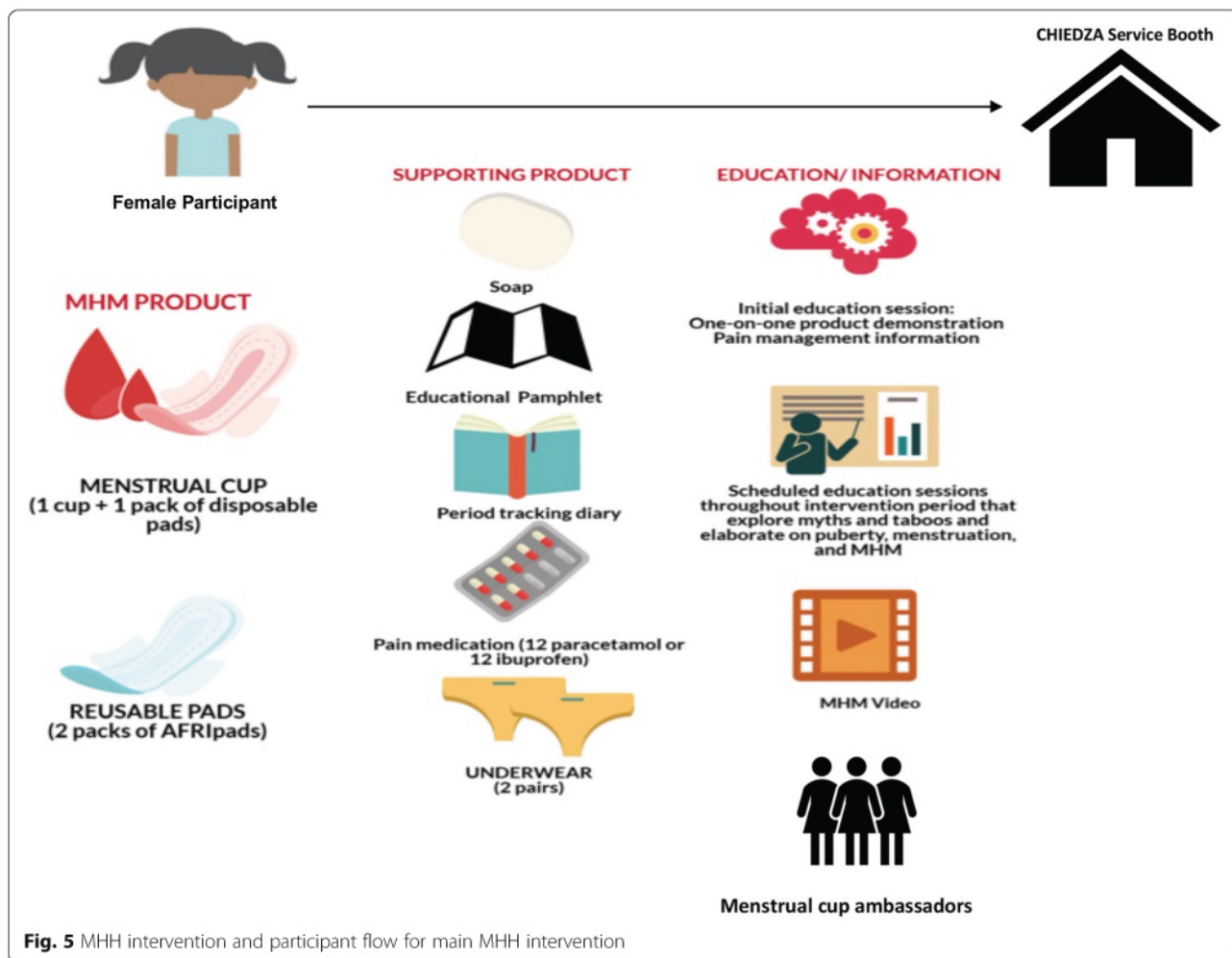
MHH is now recognised as an important public health issue worldwide [26], with an increase in MHH advocacy and research globally [14, 27]. Collaborative networks such as the Menstrual Health Hub and the African

Coalition for Menstrual Health Management and advocacy efforts such as the “MHM in Ten” initiative, globally recognized “Menstrual Hygiene Day”, and the annual co-hosting of the MHM in Water, Sanitation and Hygiene (WASH) in Schools virtual conference have all played important roles in placing MHH at the centre of international research and development dialogue and in mobilizing efforts to address the MHH needs of girls and women in LMICs [27–30]. However, apart from a small feasibility study investigating menstrual practices and perceptions around the use of the Duet (an insertable menstrual product) and a cup acceptability study with 54 young women, little scientific data on MHH needs or experiences among young women in Zimbabwe is available [23, 31]. A systematic review of menstrual health interventions conducted in 2020 also highlights limited research into the lived experiences of young women that engage with MHH interventions in LMICs with most of the existing data focusing on school-based interventions and education outcomes [14]. This pilot provides crucial MHH programming information that has contributed to the development and implementation of improved a multi-component MHH intervention that aims to improve MHH knowledge, practices, and perceptions among young women in Zimbabwe.

Findings from the pilot informed the following changes to the MHH intervention within CHIEDZA (see Fig. 5):

1. Implementation of trained menstrual cup ambassadors to increase cup promotion and sensitization and to provide ongoing support for new cup users
2. Procurement of smaller and softer menstrual cups that are less intimidating to new users and are less likely to cause discomfort or pain during insertion
3. Implementation of group-based MHH education sessions aimed at demystifying menstruation and facilitating MHH dialogue for participants
4. Inclusion of community members such as mothers, fathers, partners, and caregivers, in MHH discussions

Strengths of the study were the availability of real-time quantitative data and the use of a mixed-methods approach to gain an in-depth understanding of the various contextual and individual factors that influenced both the engagement of young women with MHH intervention and menstrual product choice. Limitations of the study are that data were only collected on menstrual product uptake at single point in time and uptake does not necessarily translate to product use. Additionally, pilot data was collected from a fairly small sample in



**Fig. 5** MHH intervention and participant flow for main MHH intervention

poor urban settings in Harare, Zimbabwe therefore the data may not be generalizable to all young women, such as women in rural or high-income settings. Due to the sensitive nature of the discussions, qualitative data collection may have been informed by social desirability bias leading to inaccurate reporting of factors informing menstrual product choice.

**Conclusions**

To our knowledge, this is the first study to investigate MHH intervention uptake and product choice in a community-based setting in an LMIC. Overall, the pilot study results showed an unmet need for comprehensive MHH interventions in the community. Results also highlighted the strong influence of sociocultural and environmental factors on menstrual product choice and economic factors in informing participant engagement overall. Community-based interventions should be context-specific and multicomponent focused to fully address the MHH needs of young women. Importantly, access to MHH

education, pain management medication, and a choice of MHH products in youth-friendly SRH programming may act as facilitating factors to increase female engagement in SRH services and improve young women’s SRH outcomes over time.

**Supplementary Information**

The online version contains supplementary material available at <https://doi.org/10.1186/s40814-020-00728-5>.

**Additional file 1.** MHH Intervention Uptake and Product Choice at First Visit. Quantitative data extracted from biometric system highlighting MHH intervention uptake and product choice during pilot period.

**Abbreviations**

BCD: Behaviour Centred Design; CHW: Community Health Worker; FGD: Focus Group Discussion; IDI: In-Depth Interview; LMIC: Low and Middle Income Countries; MHH: Menstrual Health and Hygiene; MHM: Menstrual Hygiene Management; NGO: Non-Governmental Organisation; RA: Research assistant; SDGs: Sustainable Development Goals; SRH: Sexual and Reproductive Health; UNICEF: United Nations Children’s Fund; WASH: Water, Sanitation, and Health; WHO: World Health Organization



**Acknowledgements**

The authors would like to thank all the participants in the study.

**Authors' contributions**

MT designed the MHH intervention, analysed and interpreted the data regarding intervention uptake and menstrual product choice, and drafted the manuscript. JR analysed the qualitative data and was a major contributor in writing the manuscript. HW and SF assisted analysed the qualitative and quantitative data collected and contributed to the writing of the manuscript. TL collected qualitative data from participants. RF, CDC, CVM, and ED contributed to the coordination of the study and the critical revision of the manuscript. NR and TB assisted with quantitative data capturing and analysis. All authors read and approved the final manuscript.

**Funding**

Swiss Agency for Development and Cooperation funding, the Wellcome Trust through a Senior Fellowship to RAF (206316/Z/17/Z), and the Fogarty International Center of the National Institutes of Health under Award Number D43 TW009539.

**Availability of data and materials**

All data generated or analysed during this study are included in this published article (and its supplementary information file).

**Ethics approval and consent to participate**

This study was approved by the Medical Research Council of Zimbabwe [MRCZ/A/2387], the London School of Hygiene and Tropical Medicine ethics committee [16124/RR/11602] and the Biomedical research and Training Institute Institutional Review Board (MRCZ/A/2387). Written informed consent was provided before the FGDs or IDIs were initiated. Pseudonyms were used during the FGDs and in subsequent use of the quotations to facilitate confidentiality and maintain anonymity. All recordings were downloaded on to a password-secured laptop for processing purposes and deleted once the data analyses were completed

**Consent for publication**

Not applicable

**Competing interests**

The authors declare that they have no competing interests.

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Received: 8 September 2020 Accepted: 16 November 2020

Published online: 23 November 2020

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## RESEARCH PAPER COVER SHEET

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Student ID Number	1805265	Title	MISS
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Thesis Title	Acceptability, uptake, and effectiveness of a menstrual health intervention among young women in Zimbabwe		
Primary Supervisor	Constance Mackworth-Young		

If the Research Paper has previously been published please complete Section B, if not please move to Section C.

### **SECTION B – Paper already published**

Where was the work published?			
When was the work published?			
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
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### **SECTION C – Prepared for publication, but not yet published**

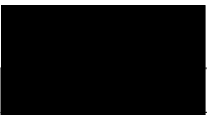
Where is the work intended to be published?	BMC Reproductive Health
Please list the paper's authors in the intended authorship order:	Mandikudza Tembo, Victoria Simms, Helen A. Weiss, Tsitsi Bandason, Nicol Redzo, Leyla Larsson, Ethel Dauya, Tafadzwa Nzanza, Pauline Ishumael, Nancy Gweshe, Precious Ndlovu, Chido Dziva Chikwari, Constancia Vimbayi Mavodza, Jenny Renju, Suzanna C. Francis,

	Rashida A. Ferrand, Constance R.S. Mackworth-Young
Stage of publication	<b>Not yet submitted</b>

**SECTION D – Multi-authored work**

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I designed the MH intervention, and collected, analysed, and interpreted the quantitative data, and drafted the manuscript
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**SECTION E**

<b>Student Signature</b>	
<b>Date</b>	15/09/22

<b>Supervisor Signature</b>	
<b>Date</b>	26/09/22



## **Paper 2 Overview**

In this paper (Chapter 5), I investigate female engagement with the main MH intervention, when delivered as part of the SRH package of services offered within CHIEDZA. I used quantitative data collected from all CHIEDZA clients to investigate overall female engagement with CHIEDZA services i.e., number of visits over time, MH service uptake and product choice, and uptake of other CHIEDZA services. In this paper, the MH intervention is referred to as an “MH service” as it is offered to CHIEDZA female clients, free-of-charge, as part of the larger integrated package of SRH services in CHIEDZA alongside condom provision, family planning, risk reduction counselling, HIV testing, and ART adherence support.

The findings presented in the paper demonstrate that the MH service addressed an unmet need for MH products and education among young women in the community and was well received and taken up by most of the CHIEDZA female clients. The findings also explore product choice and continued or discontinued use product use over time and highlight a preference for reusable pads as opposed to the menstrual cup, particularly among younger women aged 16 – 19 years old. These findings build on the pilot findings (Chapter 4) that showed high MH intervention uptake and a MH product preference for reusable pads as opposed to the menstrual cup in the intervention communities.

Findings of this paper also highlight the importance of MH product choice as there is strong evidence of young women choosing to swap from one MH product to another over time. Lastly, the paper notes the importance of maintaining MH product supply chains, as incidences of stock-outs negatively informed MH intervention uptake.

This paper fulfills research Objective 2:

Objective 2 - To investigate MH product choice, continued use or discontinuation of products, and patterns of use over time within the MH intervention

## **Paper 2: High menstrual health service uptake when given menstrual product choice within an integrated sexual and reproductive health intervention for young people in Zimbabwe**

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**Keywords:**

Menstrual health, integrated services, adolescents, menstruation, community-based

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## **Abstract**

### **Background**

Achieving good menstrual health (MH) remains a challenge for many women. MH needs to be understood and addressed as integral to women's health and overall well-being. This study aims to examine MH service uptake, including MH information, analgesics, and a choice of MH products (between the menstrual cup and reusable pads) and continued use or discontinuation of MH products within an integrated intervention in Zimbabwe called CHIEDZA.

### **Methods**

This study used quantitative data collected from female clients aged 16-24 years, who visited CHIEDZA services in three Zimbabwean provinces (Harare, Mashonaland East, and Bulawayo) from April 2019 – March 2022. All non-pregnant female CHIEDZA clients were eligible to take up MH services (information and/or products). Descriptive statistics and chi-squared tests were used to investigate MH service uptake and product choice and use over time.

### **Results**

Overall, 36991 clients visited the CHIEDZA sites. Most clients (27725; 75.0%) were female. Of these, almost all (26746; 96.5%) took up the MH service at least once. Of these, 25165 took up an MH product and most (23346; 92.8%) clients chose reusable pads and 1819 (7.2%) chose the menstrual cup. Clients aged 20-24 years old were more likely to choose cups than reusable pads compared with those aged 16-24 years (9.4% vs 6.0%;  $p < 0.001$ ). The proportion of clients choosing cups also varied with province, from 2.4% in Mashonaland East to 6.6% in

Harare and 13.4% in Bulawayo ( $p < 0.001$ ). Over the implementation period, 300/1819 (16.5%) of clients swapped from the menstrual cup to reusable pads and 83/23346 (0.4%) swapped from reusable pads to the menstrual cup.

### **Conclusions**

Integration of MH within an SRH intervention proved central to young women seeking SRH services. High uptake demonstrates how the MH service provided much needed access to MH products, information, and support in the community. Consistent access to a choice of products was important, as MH service uptake was affected by stock-outs of MH products and MH product choice and use over time varied by age and location.

## ***Introduction***

Menstrual health (MH), defined as having access to the materials, facilities, and support to manage menstruation with privacy and dignity, is integral to women's empowerment, reproductive health, and overall well-being (6, 44). To effectively manage menstruation, women need to have access to affordable and effective menstrual products, pain management, education and support, and water, sanitation and hygiene (WASH) facilities (44, 93). Many young women are affected by both shame and taboo around menstruation and lack of access to appropriate infrastructure, menstrual products, education, and support (6, 13, 18). Lack of access to MH support and products can lead to embarrassment and isolation during menstruation, poor education and school drop-out, and transactional sex, which in turn increases the risk of early age at pregnancy and sexually transmitted infections (18, 23, 53, 70, 102-104).

With a growing understanding of the importance of MH, a variety of interventions have been implemented to mitigate the impact of inadequate MH (105). However, most of these interventions have i) framed MH as an isolated issue, ii) targeted school-going girls, and iii) focused on the provision of MH education or products, but rarely both (49). While these interventions provide some evidence that MH interventions can improve MH outcomes such as MH knowledge and practices, the research, in some cases, is limited in quality and rigor (49). Evidence is required to support the design, implementation, and evaluation of effective multicomponent MH interventions.

MH is a core part of sexual and reproductive health (SRH) (26, 44, 106). Menstruation is a key feature of women's reproductive years thus making MH a natural entry point and acceptable



pathway to understanding and addressing women's reproductive needs (16, 26). Integrating MH within SRH service provision can be an effective and acceptable model to maximize healthcare resources, provide comprehensive care, and increase female engagement with critical health services in the community (107). This is important as young women face many barriers when seeking healthcare and are often the most vulnerable to adverse reproductive health outcomes linked to risky sexual practices, harmful myths and taboos around MH, and poor MH practices (50, 108, 109). Despite this, there is limited research to inform best practices and acceptable and sustainable approaches to integrated service provision (16). There is need for investment and research into interventions that integrate MH in SRH service provision, provide access to both safe and effective MH products with MH education, and include out-of-school girls and women (42, 54).

The aim of this study is to investigate i) the uptake of an MH service that provided analgesics, MH education and a choice of MH products (the menstrual cup or reusable pads), ii) MH product choices, and iii) continued use or discontinuation of MH products within a comprehensive integrated SRH intervention, implemented from April 2019 – March 2022, in three provinces across Zimbabwe.

## ***Methods***

### ***Study design and setting***

This quantitative study was nested within a community-based, cluster-randomised trial, called CHIEDZA, aimed at investigating the impact of an integrated HIV and SRH intervention for young people in Zimbabwe aged 16-24 years on population-level HIV outcomes. (CHIEDZA

trial registration number in clinical trials.gov: NCT03719521) (34). The CHIEDZA intervention included HIV testing and treatment with adherence support, as well as family planning, management of sexually transmitted infections (STIs), condoms, referrals for voluntary medical male circumcision (VMMC) counselling and MH services (described below) provided free-of-cost in a youth-friendly environment. The CHIEDZA intervention was delivered in existing community centres by a multidisciplinary team, led by team of trained healthcare providers comprising of two youth workers, one counsellor, two nurses, and four community health workers (CHWs). CHIEDZA was conducted in three provinces in Zimbabwe (Harare, Bulawayo, and Mashonaland East [Mash East]) with eight clusters per province randomised 1:1 to the intervention or to existing services (control arm) April 2019 – March 2022.

Healthcare provider training addressed youth-friendly service delivery and research ethics, Training also included comprehensive MH education that addressed puberty and body autonomy, harmful myths and taboos around menstruation, and correct use and maintenance of reusable MH products. Training materials used can be found elsewhere ([www.chiedza.com](http://www.chiedza.com)). Providers were also given menstrual cups and reusable pads for their own use.

### ***The menstrual health service***

The MH service available to all female CHIEDZA clients included two pairs of underwear, MH education and support, a simple paper-based period-tracking diary, a bar of soap, analgesics (12 paracetamol or ibuprofen), and a choice between either a menstrual cup (the Butterfly Cup that can be used for up to ten years) ([www.vivalily.com](http://www.vivalily.com)) or a four-pack of reusable pads (AFRIpads that can be used for up to two years) ([www.afripads.com](http://www.afripads.com)). The MH service also included trained menstrual cup ambassadors placed on site for menstrual cup sensitization

and user support over time. All female CHIEDZA clients also had the option to collect a dose of analgesics once a month every month and to swap their original MH product choice for another after a minimum three months of usage.

### ***Data collection***

Every attendance to CHIEDZA was captured using biometric system called SIMPRINTS (91). At first visit, a client provided a registration fingerprint which was converted into a unique identifier. No identifying information such as name or address was collected. Age, sex, and type of service taken up at each visit was documented for each client and linked to their unique ID. At subsequent visits, CHIEDZA service providers used client fingerprints to track client history and actively record services taken up at relevant visits. Data was collected using electronic tablets. All female clients that attended CHIEDZA were eligible to take up the MH service, unless pregnant. If a client's choice of MH product was unavailable, this was recorded as a "stock-out" occurrence and clients were advised on when to return to pick up their preferred product. Recorded "stock-outs" were almost always incidences of stock-out of reusable pads. If female clients sought out MH information only, it was recorded as "MH service". If female clients sought out MH information and chose an MH product, it was also recorded as an "MH service" uptake event and the choice of MH product was recorded. If female clients only sought out analgesics, it was recorded as a "pain management uptake" event.

Descriptive analysis of data for the female clients who accessed CHIEDZA services across the 12 clusters was used to assess overall engagement with CHIEDZA i.e., number of visits over time, MH service uptake and product choice, and uptake of other CHIEDZA services. MH

service uptake was calculated as the proportion of women who took up MH services of those who attended CHIEDZA.

Chi-squared tests were conducted to compare the proportions taking up MH services and MH product choice overall and by province and age group (16-19; 20-24 years). The data were analysed using Stata version 16.1 (StatCorp, Texas, USA).

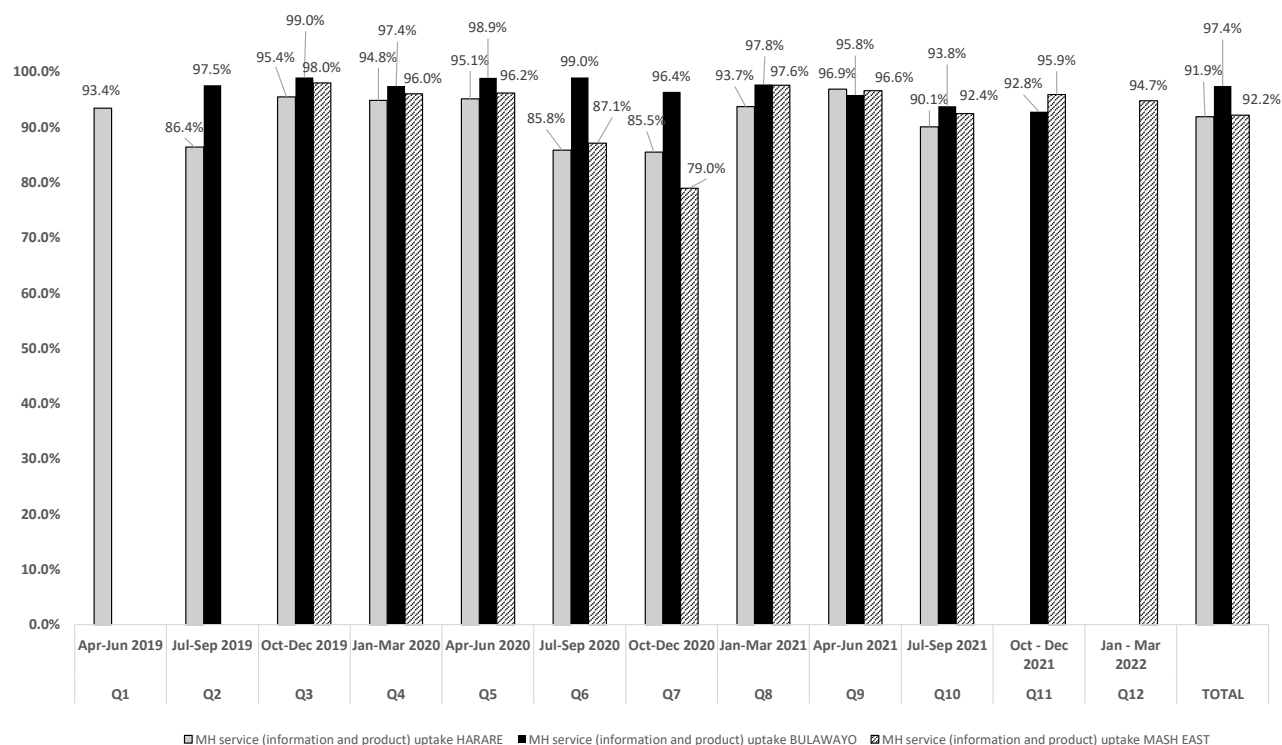
## **Results**

Overall, 75.0% (27725/36991) of the clients that accessed CHIEDZA services between April 2019 – March 2022 were female. Over half of female clients (16600, 59.9%) only visited the CHIEDZA sites once. This was similar when disaggregated by province (Harare 59.8%; Bulawayo 54.6%; Mashonaland East 64.5%). Of the remaining 40.1% of female clients, 5353 (19.3%) visited CHIEDZA sites two times, 2254 (8.1%) visited CHIEDZA sites three times, 1209 (4.4%) visited CHIEDZA sites four times, and 2039 (8.3%) visited CHIEDZA sites five or more times. The median number of visits per female CHIEDZA client was one visit (IQR: 1-2).

### ***MH service uptake***

MH services (MH information only or MH information and MH product of choice) were offered to all the 27725 female CHIEDZA clients, and almost all (n=26746; 96.5%) accepted. MH service uptake was consistently high with over 85% uptake in each quarter throughout the intervention period (Figure 1). However, there were periods between July – December 2020 with slightly lower MH service uptake in two of the three provinces (85.5% and 87.1%

from July – September 2020 in Harare and Mashonaland East respectively; and 85.5% and 79.0% uptake from October–December 2020 in Harare and Mashonaland East respectively).



**Figure 1. MH service uptake from April 2019 – March 2022 disaggregated by province**

Most female CHIEDZA clients (24027; 86.7%) took up MH services at first visit. Of those who didn't take up MH services at the first visit, 37.3% took up MH services at the second visit, and 19.2% took up MH services in a subsequent visit (Table 1). Similar results were found across the provinces and different age groups.

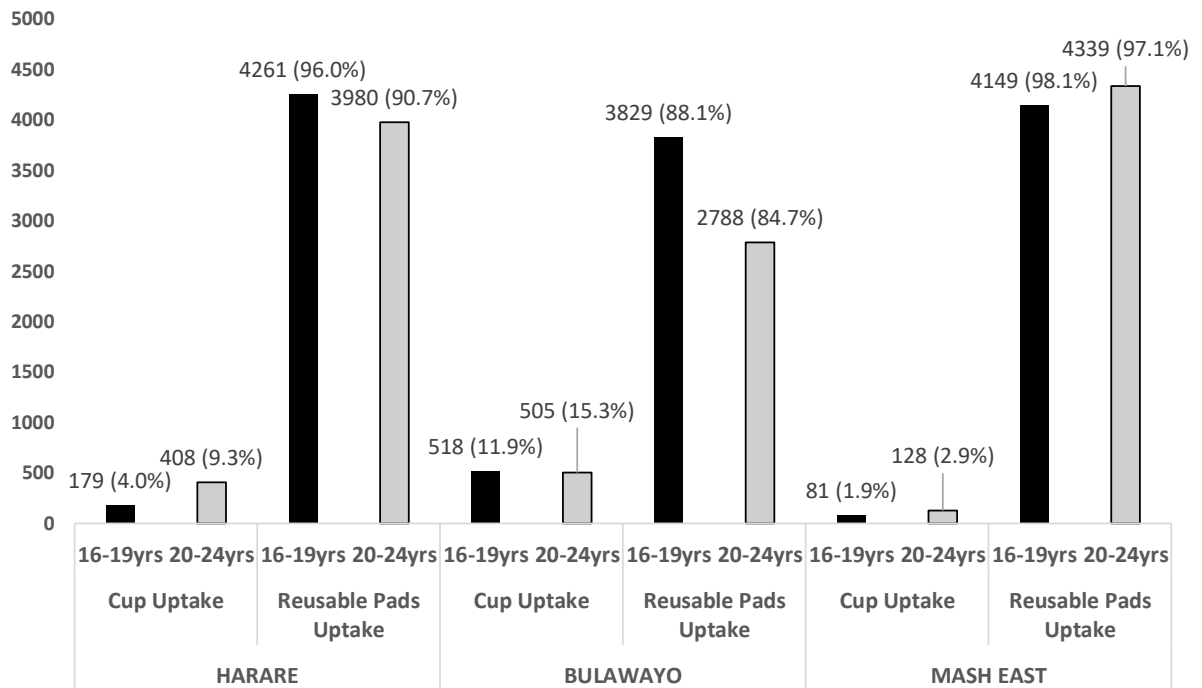
**Table 1. MH services uptake by number of visits disaggregated by province**

	MH service uptake	1 <sup>st</sup> Visit	2 <sup>nd</sup> Visit	Subsequent Visit
<b>TOTAL</b>	Eligible MH service (info + product)	27724	6086	15167
	Took up MH service (info + product)	24027	2268	2905
	% Took up MH service (info + product)	86.7%	37.3%	19.2%

<b>HARARE</b>	Eligible MH service (info + product)	9609	2056	5219
	Took up MH service (info + product)	8391	652	892
	% Took up MH service (info + product)	87.3%	31.7%	17.1%
<b>BULAWAYO</b>	Eligible for MH service (info + product)	8406	2119	5656
	Took up MH service (info + product)	7052	871	1098
	% Took up MH service (info + product)	83.9%	41.1%	19.4%
<b>MASH EAST</b>	Eligible MH service (info + product)	9709	1911	4292
	Took up MH service (info + product)	8584	745	915
	% Took up MH service (info + product)	88.4%	39.0%	21.3%

### ***MH product choice and continuous use vs discontinuation over time***

Of the 25165 clients that took up MH products (a choice of either the menstrual cup or reusable pads) from April 2019 – March 2022, most chose reusable pads (23346/25165 (92.8%) rather than the menstrual cup (1819/25165 (7.2%) (Figure 2). There was strong evidence of a difference in product choice by age with 778/12239 (6.0%) of 16-19 year olds compared to 1041/12148 (9.4%) of 20-24 year olds choosing menstrual cups as opposed to reusable pads ( $p < 0.001$ ). There was also strong evidence of a difference in MH product choice by province with a higher proportion of clients choosing the menstrual cup in Bulawayo 1023/7640 (13.4%) as opposed to Harare 587/8828 (6.6%) or Mashonaland East 209/8697 (2.4%) ( $p < 0.001$ ).



**Figure 2 MH product choice over time by province and age group**

During the intervention timeframe, 300/1819 (16.5%) swapped from the menstrual cup to reusable pads and 83/23346 (0.4%) swapped from reusable pads to the menstrual cup (Table 2). Discontinuation of the menstrual cup in favour of reusable pads varied by province, with higher discontinuation in Bulawayo (192/1023; 18.8%) compared to Harare (77/587; 13.1%) or Mashonaland East (31/209; 14.8%) ( $p < 0.05$ ). Discontinuation of the menstrual cup in favour of reusable pads also varied by age group, with higher discontinuation among 16 – 19 year olds (156/778; 20.1%) compared to 20 – 24 year olds (144/1041; 13.8%) ( $p < 0.05$ ).

Table 2 MH product choice and continued use vs discontinuation of use by province

	Initial MH Product Choice	Age Group (years old)	N	Ever swapped to other MH product n (%)
TOTAL	Menstrual Cup	16-19	778	156(20.1%)
		20 - 24	1041	144 (13.8%)
		TOTAL	1819	300 (16.5%)
	Reusable Pads	16-19	12239	35(0.3%)
		20 - 24	11107	49 (0.4%)
		TOTAL	23346	83 (0.4%)
HARARE	Menstrual Cup	16-19	179	30 (16.8%)
		20 - 24	408	47 (11.5%)
		TOTAL	587	77 (13.1%)
	Reusable Pads	16-19	4261	13
		20 - 24	3980	25
		TOTAL	8241	38 (0.5%)
BULAWAYO	Menstrual Cup	16-19	518	116 (22.4%)
		20 - 24	505	76 (15.0%)
		TOTAL	1023	192 (18.8%)
	Reusable Pads	16-19	3829	16
		20 - 24	2788	19
		TOTAL	6617	35(0.5%)
MASH EAST	Menstrual Cup	16-19	81	10 (12.3%)
		20 - 24	128	21 (16.4%)
		TOTAL	209	31 (14.8%)
	Reusable Pads	16-19	4149	5 (0.1%)
		20 - 24	4339	5 (0.1%)
		TOTAL	8488	10 (0.1%)

### Stock-outs

Incidences of stock-out of MH products of choice at each eligible participant visit were also recorded. There were MH product stock-outs throughout the CHIEDZA implementation period with higher rates between July – December 2020 (Table 3). Overall, CHIEDZA sites in Bulawayo were particularly affected with 1164 incidences as opposed to 662 and 646 in Harare and Mashonaland East respectively.

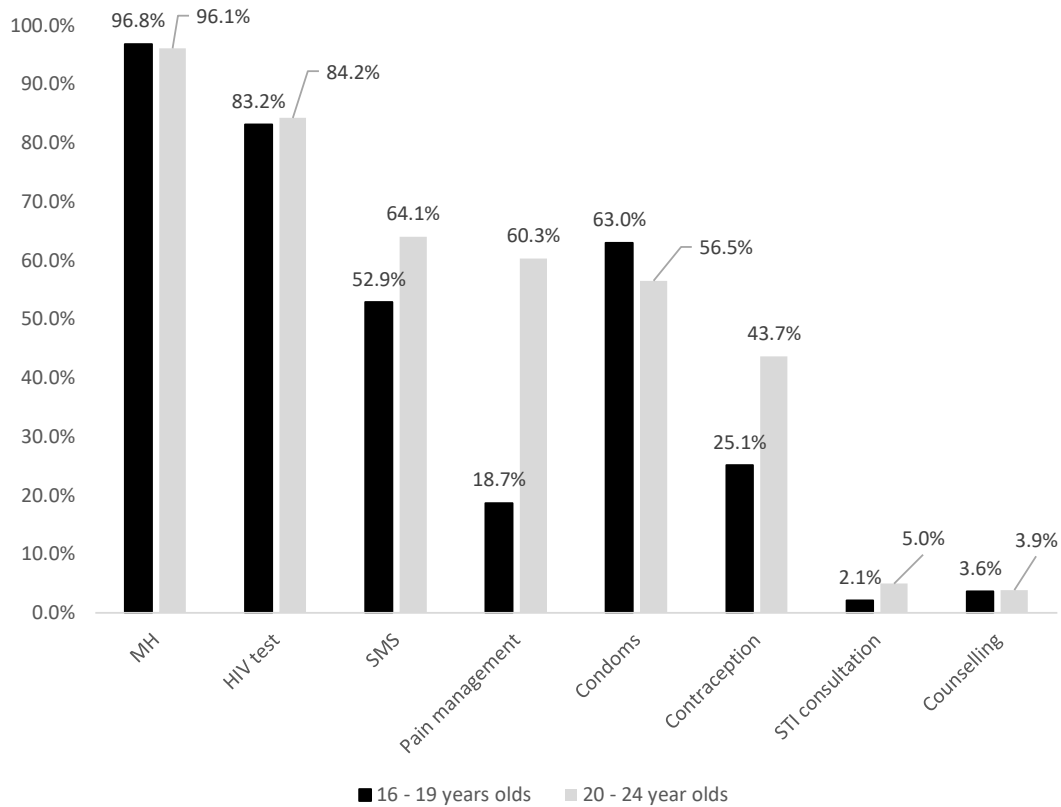


Table 3 Recorded incidences of MH product stock-outs

	2019			2020				2021				TO TAL	
	Apr- Jun	Jul- Sep	Oct- Dec	Jan- Mar	Apr- Jun	Jul- Sep	Oct- Dec	Jan- Mar	Apr- Jun	Jul- Sep	Oct - Dec		Jan - Mar
<b>HARARE</b>	56	138	0	0	28	289	83	2	1	65	0	0	662
<b>BULAWAYO</b>	0	58	13	258	165	355	236	0	1	65	13	0	116 4
<b>MASH EAST</b>	0	0	0	0	0	277	312	2	2	48	0	5	646

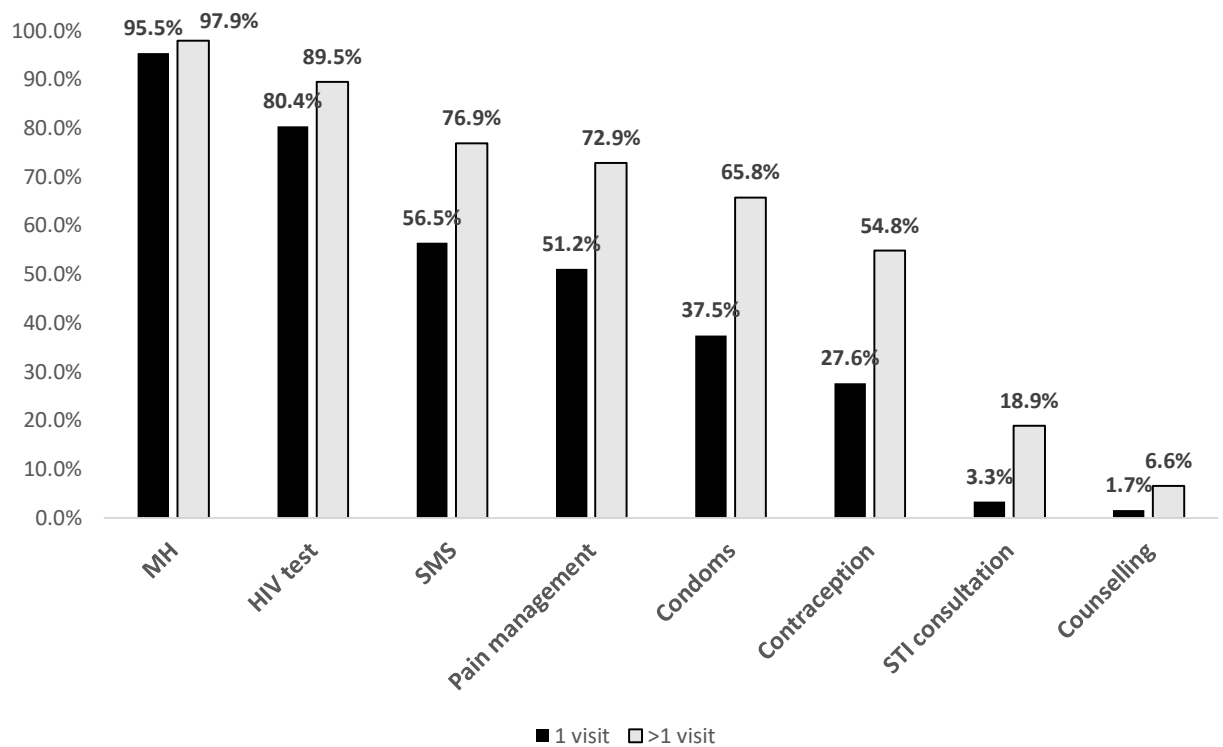
***Other services within CHIEDZA***

Of all the CHIEDZA services available to female CHIEDZA clients, the MH service had the highest uptake (96.5%), and this was consistent by age group (96.8% among 16 – 19 year olds 96.1% among 20 – 24 year olds). Other services highly taken up alongside MH included HIV testing (16 – 19 year olds: 83.2%; 20 – 24 year olds: 84.2%), condoms (16 – 19 year olds: 63.0%; 20 – 24 year olds: 56.5%), SRH sensitization via SMS (16 – 19 year olds: 52.9%; 20 – 24 year olds: 64.1%), and pain management, although only for 20 – 24 year olds (60.3%) (Figure 3).



**Figure 3 Uptake of CHIEDZA services among female clients by age group**

Overall, the MH service had the highest uptake at first visit (95.5%). Other services taken up at first visit included HIV testing (80.4%) and SRH sensitization via SMS (56.5%) (Figure 4). For female CHIEDZA clients that visited CHIEDZA more than once, most took up the MH service (97.9%), HIV testing (89.5%), SRH sensitization via SMS (76.9%), and pain management (72.9%).



**Figure 4 CHIEDZA service uptake among female clients disaggregated by number of visits to CHIEDZA**

### ***Discussion***

This study shows a high uptake of MH services, with over 96.5% of female clients who visited the CHIEDZA sites taking up MH information and/or an MH product over the implementation period. The MH service was the most accessed CHIEDZA service among young women. This suggests a large unmet need for MH products and education among young women across Zimbabwe, and adds to the evidence base advocating for MH interventions,

This study demonstrates the value of integrated service provision that places MH at the centre of SRH service provision for women (1, 16, 21). When given the opportunity to choose SRH services within an integrated package, young women, regardless of age or geographical

location almost always chose to take up the MH service. Given these findings, it is essential that MH is integrated in SRH service provision. Also, given that most female CHIEDZA clients also took up HIV testing, SRH sensitization, pain management, and condoms, our findings suggest that these services may also be important to young women and thus should be prioritized in integrated SRH service provision.

More females as opposed to males engaged with the CHIEDZA service overall. The dominant female presence together with the high MH service uptake at first visit and popularity of the MH service overall, suggests that the MH service may have had a particularly strong influence on bringing young women to CHIEDZA. This finding is further supported by a qualitative study we conducted to explore the acceptability of the MH service within CHIEDZA (42). Here, particularly during the COVID-19 pandemic, when markets were closed, less money was available in the household, and social activities and games within CHIEDZA were suspended, the MH service became the sole *“pull factor”* framing CHIEDZA as a *“women’s service”* and encouraging young women to visit CHIEDZA (42, 97). These findings are similar to those found in a study looking at MH access through a peer-led SRH service for youth in Zambia before and during the COVID-19 pandemic (73). In the Zambian study, access to MH products and education through community-based SRH service addressed an unmet need for MH support and proved to be essential to young women in the community, particularly during the COVID-19 pandemic (73).

Our study provides additional evidence to the literature looking at the how external factors such as supply chains and COVID-19 restrictions inform service implementation and delivery (110). Across the CHIEDZA sites in Harare and Mashonaland East, dips in MH service uptake

coincided with recorded incidences of stock-outs and the COVID-19 restrictions in Zimbabwe in 2020. In March of 2020, the Zimbabwean government announced a mandatory nationwide lockdown (111) and all CHIEDZA service provision was paused for six weeks from March 30<sup>th</sup> – May 18<sup>th</sup>, 2020. This lockdown also negatively affected procurement and delivery of MH products to CHIEDZA sites across the country. Cumulatively, mobility restrictions for clients under lockdown, paused service delivery, and a lack of MH products of choice resulted in lower MH service uptake overall. This finding again highlights the importance of consistent MH product supply in MH and SRH service delivery, even in a pandemic.

This study emphasises the importance of MH product choice, highlighting the gaps in most current MH interventions which provide access to either reusable pads or menstrual cups (41, 112). Our research suggests that factors such as age and geographical location inform MH product choice and use over time. Women, particularly younger women, in Zimbabwe prefer reusable pads to the menstrual cup (20). Of the few young women that did opt for menstrual cups, many later swapped out the menstrual cup for reusable pads. Very few clients chose to swap out the reusable pads for the menstrual cup in the study. Our research, in contrast to other study findings (113, 114), provides quantitative evidence that, given product choice, menstrual cups may not be the preferred MH product option among young women in Zimbabwe. The reluctance to opt for and/or use the menstrual cup may be due to an unwillingness to try a novel menstrual product or unwillingness to use an insertable product that may affect their “virginity”(41, 78, 115). It should be noted that despite MH and menstrual cup sensitization and education via MH education groups, MH educational materials, and “menstrual cup champions” on site, these barriers to menstrual cup uptake

remained (42) (resources available: [www.chiedza.co.zw](http://www.chiedza.co.zw)). With that in mind, our findings add critical insight into the limited acceptability of the menstrual cup in Zimbabwe.

A closer look at the findings in Bulawayo also provide insight into the importance of product choice. For Bulawayo, geographical location was associated with MH product choice, continued use vs discontinuation of use of product of choice, and stock-outs. Despite Bulawayo having the highest frequency of stock-outs, MH service uptake remained. Bulawayo also had the highest menstrual cup uptake and highest product swapping from menstrual cups to reusable pads. Given this, we hypothesise that in the absence of product choice (when reusable pads were not available), young women chose to take up the menstrual cup, but when given the opportunity to swap after three months, many opted to swap the menstrual cup for reusable pads once available. This unique opportunity to prospectively collect data on product choice across different settings in Zimbabwe provides evidence that suggests 1) MH product choices can shift over time and may be informed by location-specific contextual factors in different areas of Zimbabwe and 2) while young women in some parts of Zimbabwe may be more willing to try novel products such as the menstrual cup, their preference over time, is reusable pads. This preference may be informed by user experience or other factors but it is important that interventions address this change in informed choice when addressing unmet MH needs (2, 112).

### ***Strengths and limitations of the study***

This is one of the first MH studies to integrate MH into SRH service provision and investigate MH product choice and pain management for non-school going young women in a

community-based setting (16, 116). Uniquely, our study also offered clients a choice of reusable MH products and pain management and used a robust quantitative approach to assess the factors that informed pain management practices and MH product choice and use over time (112). We used a large dataset from female clients from diverse environments across Zimbabwe for our analysis to increase generalisability. Bias was mitigated as quantitative data was collected prospectively.

Our study also had some limitations. Observed uptake of the MH products may not have equated to use over time. However, this was further explored qualitatively in another study that showed high uptake was also linked to high use of MH products, particularly the reusable pads (42).

## **Conclusion**

Overall, this study showed high uptake of the MH service among young women. Inclusion of MH services within multicomponent SRH interventions may be the key to increasing female engagement with other critical SRH services such as family planning and HIV testing (16, 25, 26, 42). Implementors should ensure that supply chains remain stable and consistent to meet service demands. These study findings should encourage policymakers, donors, and implementors to increase their commitment to integrated SRH service provision that sets MH as integral part of reproductive health, especially for young women.

## **Declarations**

*Ethics approval and consent to participate*

This study was approved by the Medical Research Council of Zimbabwe [MRCZ/A/2387], the London School of Hygiene and Tropical Medicine ethics committee [16124/RR/11602] and the Biomedical Research and Training Institute Institutional Review Board (AP149/2018). Our study did not include participants under 16 years old.

### ***Consent for publication***

Not applicable

### ***Availability of data and materials***

The datasets used and/or analysed during the current study are available from the corresponding author on request.

### ***Authors' contributions***

MT designed the MH intervention, and collected, analysed, and interpreted the data, and drafted the manuscript. SF, HAW, and JR contributed to design of the MH intervention and the analysis plan. CMY and HAW were major contributors in writing the manuscript. VS, HAW, and LL assisted in analysing the quantitative data. TB and NR assisted with quantitative data collection and management. RAF is the Principal Investigator of the CHIEDZA Trial. RAF, CDC, CVM, and ED contributed to the coordination of the study and critical revisions of the manuscript. All authors read and approved the final manuscript.

### ***Competing interests***

No competing interests.

### ***Acknowledgements***



The authors would like to thank all the participants in the study.



## RESEARCH PAPER COVER SHEET

Please note that a cover sheet must be completed for each research paper included within a thesis.

### SECTION A – Student Details

Student ID Number	1805265	Title	MISS
First Name(s)	MANDIKUDZA		
Surname/Family Name	TEMBO		
Thesis Title	Acceptability, uptake, and effectiveness of a menstrual health intervention among young women in Zimbabwe		
Primary Supervisor	Constance Mackworth-Young		

If the Research Paper has previously been published please complete Section B, if not please move to Section C.

### SECTION B – Paper already published

Where was the work published?			
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Where is the work intended to be published?	BMJ Open
Please list the paper's authors in the intended authorship order:	Mandikudza Tembo, Helen A Weiss, Leyla Larsson, Tsitsi Bandason, Nicol Redzo, Ethel Dauya, Tafadzwa Nzanza, Pauline Ishumael, Nancy Gweshe, Precious Ndlovu, Chido Dziva Chikwari, Constanca Vimbayi Mavodza, Jenny Renju, Suzanna C. Francis, Rashida A. Ferrand, Constance

	R.S. Mackworth-Young
Stage of publication	<b>Submitted</b>

**SECTION D – Multi-authored work**

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I designed the MH intervention, and collected, analysed, and interpreted the quantitative and qualitative data, and drafted the manuscript
--	--

**SECTION E**

<b>Student Signature</b>	
<b>Date</b>	15/09/22

<b>Supervisor Signature</b>	
<b>Date</b>	26/09/22

## **Paper 3 Overview**

This paper (Chapter 6) details results from the MH cohort study, with data collected from the MH cohort prospectively from December 2019 to August 2021. The MH cohort study was nested within the MH intervention, which in turn was nested within CHIEDZA. This paper uses quantitative and qualitative data collected from the MH cohort to assess the pre- and post-intervention effect of the MH intervention on MH knowledge, perceptions, and practices among young women aged 16 – 24 years in Zimbabwe.

The findings described in this paper show that the MH intervention improved the key MH outcomes of knowledge levels, perceptions, and practices among young women. The findings also highlighted that the provision of a combination of comprehensive MH education, analgesics, a choice of menstrual products, and support over time were key to intervention effectiveness. This finding was also highlighted in Chapter 5 as it showed uptake of pain management analgesics and MH product swapping over time.

Importantly, the paper adds to the research showing that MH interventions can be used to improve poor menstrual health indicators across the globe and recommends that these MH interventions should, where possible, engage with both people that menstruate and wider communities to additionally address sociocultural norms and environmental factors.

This paper addresses research Objective 3:

Objective 3 - To investigate the effect of the MH intervention on MH knowledge, practices, and perceptions over time

## **Paper 3: Menstrual health intervention improves menstrual health knowledge, perceptions, and practices among young women in Zimbabwe**

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**Keywords:**

Menstrual health, knowledge, effectiveness, adolescent health, menstruation, practices

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## ***Abstract***

**Objectives:** While integral to women’s physical and mental well-being, achieving good menstrual health (MH) remains a challenge for many women. This study investigated the effectiveness of a comprehensive MH intervention on menstrual knowledge, perceptions, and practices among women aged 16-24 years in Harare, Zimbabwe.

**Design:** Prospective cohort study with pre-post evaluation of an MH intervention.

**Setting:** Two intervention clusters in Harare, Zimbabwe.

**Participants:** Overall, 303 female participants were recruited, of whom 189 (62.4%) were seen at midline (median follow-up 7.0; IQR:5.8–7.7 months) and 184 (60.7%) were seen at endline (median follow-up 12.4; IQR:11.9-13.8 months). Cohort follow-up was greatly affected by COVID-19 pandemic and associated restrictions.

**Intervention:** The MH intervention provided MH education and support, analgesics, and a choice of menstrual products in a community-based setting to improve MH outcomes among young women in Zimbabwe

**Primary and secondary outcomes:** Effectiveness of a comprehensive MH intervention on improving MH knowledge, perceptions, and practices among young women over time. Quantitative questionnaire data was collected at baseline, midline, and endline. At endline, thematic analysis of four focus group discussions was used to further explore participants’ menstrual product use and experiences of the intervention.

**Results:** At midline, more participants had correct/positive responses for MH knowledge (adjusted odds ratio (aOR)=12.14; 95%CI:6.8-21.8), perceptions (aOR=2.85; 95%CI:1.6-5.1), and practices for reusable pads (aOR=4.68; 95%CI:2.3-9.6) than at baseline. Results were similar comparing endline with baseline for all MH outcomes. Qualitative findings showed that sociocultural norms, stigma, and taboos around menstruation, and environmental factors such as limited access to water, sanitation, and hygiene facilities affected the effect of the intervention on MH outcomes.

**Conclusions:** The intervention improved menstrual health knowledge, perceptions, and practices among young women in Zimbabwe, and the comprehensive nature of the intervention was key to this. MH interventions should address interpersonal, environmental, and societal factors.

### **Trial registration**

Registry: [Clinicaltrials.gov](https://clinicaltrials.gov)

Registration Number: NCT03719521

Registration Date: October 25, 2018



## Strengths and limitations of the study

- This is one of the first menstrual health studies to assess the effectiveness of a multicomponent menstrual health intervention that provided both “hardware”, through a choice of menstrual products and analgesics, and “software”, through menstrual health education and support, for young women in a community-based setting
- The study used a validated measuring tool (MPNS-36) that has been used in other low- to middle-income countries to comprehensively assess the effect of the menstrual health intervention on key menstrual health outcomes, adding to a key evidence gap in robust quantitative research in menstrual health outcome measures
- The study used a mixed-methods approach that used both qualitative and quantitative analysis to comprehensively assess effects of the intervention on menstrual health outcomes over time, adding to the research supporting the implementation of comprehensive evidence-based menstrual health interventions to improve poor menstrual health indicators across the globe
- Qualitative data may have been prone to social desirability bias due to the sensitive nature of the discussions around menstruation, and recall bias due to being collected retrospectively
- The conclusions of this study may be limited due to the lack of a control group, therefore other unmeasured environmental or external factors, such as natural growth and maturity, may have influenced the observed outcomes

## ***Introduction***

Menstrual health (MH) encompasses a state of physical and psychosocial well-being that is informed by access to MH knowledge and products and supportive environment (2, 16, 44, 117). MH is integral to women's health and overall well-being (118) but MH remains a challenge for many women, especially those in low- and middle-income countries (LMICs) (5, 49). Faced with the stigma and taboo surrounding menstruation, the lack of access to affordable menstrual products and inadequate quality MH education and support, MH remains a critically unaddressed issue (7, 10-13). Many girls and women experience shame, anxiety, and/or untreated pain during their menstruation as they are forced to use ineffective or unhygienic alternatives such as old cloth or poor-quality disposable pads to manage their menstruation. In some instances, this lack of access to MH products and/or education on how to use menstrual products properly can lead to harmful reproductive tract infections or dangerous practices such as transactional sex in effort to access better menstrual products (52, 53).

Acceptable and effective MH interventions are integral to addressing and improving women's health outcomes (16, 26). Informed by a growing understanding of the challenges that women face in managing menstruation, interventions have been implemented in different contexts, especially in LMICs (49, 116). A systematic review of MH interventions and their effect on health outcomes among women in LMICs cautiously reported that MH interventions can inform some positive changes in MH-related outcomes such as MH knowledge levels and menstrual attitudes (49). The review highlighted several gaps and weaknesses in MH intervention research. Many MH intervention studies tend to focus on school-going girls (66)

and exclusively address either access to MH “hardware” such as menstrual products and water, sanitation, and hygiene (WASH) facilities in which to manage menstruation, or access to MH “software” such as MH education and support targeted at demystifying and destigmatizing MH-related issues, but rarely both (17, 49, 116). Moreover, without validated and standardized tools and measures for MH outcomes more broadly, most studies lack robust evaluations, making it difficult to reliably assess the effect of interventions on MH-related outcomes (49, 93).

Evidence-based MH interventions that address access to menstrual products, pain management, and the larger systemic factors that inform menstrual experiences are needed in Zimbabwe, as elsewhere (20). In 2019, 21.8% of women aged 15–19 years and 18.8% of women aged 20–24 years in Zimbabwe reported not participating in social activities, school, or work in the last 12 months due to menstruation (22). Many of these women face challenges in accessing safe and clean WASH facilities to attend to manage their menstruation at home, school, or work. Some are unable to participate in social activities or concentrate on their work or duties due to unaddressed menstrual pain or discomfort and fear of leaking in public as they are forced to use ineffective old rags, cotton wool, or tissue paper to manage their menstruation (23, 24).

The aim of this study was to address this evidence gap by investigating the effectiveness of a comprehensive MH intervention integrated within a community-based sexual and reproductive health (SRH) service on MH knowledge, perceptions, and practices among young women in Zimbabwe.

## ***Methods***

### ***Study design and setting***

We conducted a prospective cohort study from December 2019 to August 2021, using quantitative and qualitative methods to assess MH outcomes. The study was nested within a cluster randomised trial of community-based integrated HIV and SRH intervention for young people aged 16-24 years (CHIEDZA trial registration number in clinical trials.gov: NCT03719521) (34). CHIEDZA provided a package of free-of-charge SRH services that included HIV testing and treatment, condoms, risk reduction counselling, contraception and testing and treatment of sexually transmitted infections and an MH intervention (described below) in a youth-friendly environment. CHIEDZA was delivered in 12 intervention clusters in three provinces across Zimbabwe (Harare, Bulawayo, and Mashonaland East) from April 2019 to March 2022. Within each province, the CHIEDZA services were delivered by a team of trained healthcare providers comprising two youth workers, one counsellor, two nurses, and four community health workers (CHWs). Participants in the cohort study were followed up every three months for a year.

At baseline and six-month and 12-month visits, participants completed a quantitative questionnaire. At the three-month visit, participants handed-in their completed period tracking diaries and at nine-months, participants were given another period-tracking diary to be completed and handed in at the 12-month visit.

### ***The menstrual health intervention***

The MH intervention was preceded by a pilot (from April-July 2019) in all four Harare intervention clusters (20). Results from the pilot were used to refine and inform the scale-up

of the intervention across all 12 CHIEDZA intervention clusters. The final MH intervention available to all female CHIEDZA clients included comprehensive MH education and support, provision of a period-tracking diary, two pairs of normal underwear, a choice between either reusable pads (AFRIpads that can be used for up to two years) ([www.afripads.com](http://www.afripads.com)) or the menstrual cup (the Butterfly Cup that can be used for up to ten years) ([www.vivalily.com](http://www.vivalily.com)), as well as soap, pain management advice and pain medication (a choice between paracetamol or ibuprofen).

### ***Cohort participants***

A subset of CHIEDZA female clients who chose to take up any component of the MH intervention in two of the Harare intervention clusters (Budiriro and Hatcliffe) were recruited to the prospective cohort study by two research assistants (RAs) (NG and PN) between December 2019 to February 2020. Equal numbers were sought in two age-strata (16-19 and 20-24 years old) until a cohort size of 318 was reached. Clients were excluded if 1) they were currently pregnant or intended to get pregnant within the next year; 2) they experienced irregular or absent bleeding within the last 3 months; or 3) had any condition that precluded informed consent or made study participation unsafe.

Those who consented to participate in the cohort study received two period tracking diaries and three different types of reusable menstrual products including: 1) reusable pads; 2) a menstrual cup; and 3) three pairs of period pants (VivaLily period pants that can be used for up to two years).

Overall, the MH intervention was from April to July 2019, scale-up of MH intervention across all 12 CHIEDZA intervention clusters commenced in July 2019, and recruitment of a subset of CHIEDZA clients for the MH cohort began in December 2019.

### ***Sample size and COVID-19 disruptions***

The planned sample size of 300 cohort participants provided 90% power to detect an increase in positive MH outcomes from 10% at baseline to 20% at six-month visit or 12-month visit. This calculation was based on results from a pre-post study of an MH intervention among school-girls in Uganda (56).

COVID-19 and Zimbabwe's response strategies impacted the overall CHIEDZA intervention (95, 96). Unable to go to school or work and sustain their livelihoods, many people either sent their children to, or migrated to, the rural areas in search of a more affordable environment (97). Such migration had implications on cohort follow-up and overall exposure to the MH intervention.

### ***Quantitative data collection and analysis***

A quantitative questionnaire informed by findings from the pilot intervention (20) and Hennegan's Menstrual Practice Needs Scale (MPNS-36) (93), was used to collect data on: 1) sociodemographic information; 2) menstruation and puberty knowledge; 3) menstrual history; 4) pain management; 5) practices and perceptions during menstruation; 6) washing practices; and 7) attitudes about menstruation. All questions were translated into Shona and back-translated into English with input from MT, NG, and PN. The survey was piloted with a

subset of 30 CHIEDZA female clients that took up the MH intervention and iteratively revised prior to cohort recruitment (94). The full questionnaire can be found in the supplementary materials.

The self-administered questionnaire was completed at baseline, six-month visit, and 12-month visit. To maximise participation, we reminded participants of upcoming visits via phone. We contacted participants up to three times to reschedule if participants didn't attend their scheduled visit and offered a home visit before considering the participant lost to follow-up (LTFU) if they did not attend within four weeks of their scheduled visit. If participants later visited CHIEDZA again, we opportunistically invited participants to complete the questionnaire.

For this paper, relevant questions were selected from the questionnaire prior to analysis to assess the effect of the intervention on MH knowledge, perceptions, and practices (for reusable pads and for the menstrual cup) over time (Table 1). The data were analysed using Stata version 16.1 (StatCorp, Texas, USA). Descriptive statistics were used to describe participants' self-reported sociodemographic characteristics, including age, highest level of education, religion, marital status, employment, school, source of income, household income, and household population at baseline, six-month visit, and 12-month visit. We investigated whether LTFU might potentially bias findings by comparing the sociodemographic characteristics of those present at each time-point.

**Table 1 Questionnaire questions selected to measure menstrual health outcomes in the study**

MH Outcome Measures	Questions	Binary Scale	
<b>MH knowledge</b>	Changes in the body during puberty happen because of hormones	0=No/Don't know	1=Yes
	Puberty continues throughout a girl's life	1=No	0=Yes/Don't know
	Menstruation in girls and women is normal	0=No/Don't know	1=Yes
	When a girl gets her first menstrual period, her body can carry a child	0=No/Don't know	1=Yes
	Menstrual blood is caused by the breakdown of the lining of the womb	0=No/Don't know	1=Yes
	It is normal to have irregular periods as a teenager	0=No/Don't know	1=Yes
	Menstruation continues throughout a girl's life	1=No/Don't know	0=Yes
	A period normally lasts 2 days or less	1=No/Don't know	0=Yes
	Period products that are inserted into the vagina (such as tampons and the menstrual cup) affect your virginity	1=No/Don't know	0=Yes
	<b>Highest possible score for MH knowledge</b>		<b>9</b>
<b>MH perceptions</b>	I feel dirty or impure during my menstrual period	0=Neutral/Agree/Strongly Agree	1=Disagree/Strongly Disagree
	I feel like I can talk to friends about menstruation	1=Agree/Strongly Agree	0=Neutral/Disagree/Strongly Disagree
	I feel like I can talk to my family members about menstruation	1=Agree/Strongly Agree	0=Neutral/Disagree/Strongly Disagree
	It is important that I keep my period secret for everyone	0=Neutral/Agree/Strongly Agree	1=Disagree/Strongly Disagree
	I worry that boys will tease me about my period	0=Neutral/Agree/Strongly Agree	1=Disagree/Strongly Disagree
	I am anxious about my next period	0=Neutral/Agree/Strongly Agree	1=Disagree/Strongly Disagree
	<b>Highest possible score for MH perceptions</b>		<b>6</b>



MH practices (reusable pads)	I had enough water to soak or wash my menstrual products	1=Agree/Strongly Agree	0=Neutral/Disagree/Strongly Disagree
	I was able to wash my menstrual products when I wanted to	1=Agree/Strongly Agree	0=Neutral/Disagree/Strongly Disagree
	I had enough soap to wash my menstrual products when I wanted to	1=Agree/Strongly Agree	0=Neutral/Disagree/Strongly Disagree
	I was able to dry my products when I wanted to	1=Agree/Strongly Agree	0=Neutral/Disagree/Strongly Disagree
	I was worried that someone would see me while I was washing my menstrual product	0=Neutral/Agree/Strongly Agree	1=Disagree/Strongly Disagree
	I was worried that my menstrual products would not dry when I needed them	0=Neutral/Agree/Strongly Agree	1=Disagree/Strongly Disagree
	I was worried that others would see my menstrual products while they were drying	0=Neutral/Agree/Strongly Agree	1=Disagree/Strongly Disagree
	<b>Highest possible score for MH practices (reusable pads)</b>	<b>7</b>	
MH practices (menstrual cups)	I was able to sterilize my menstrual cup when I wanted after my period	1=Agree/Strongly Agree	0=Neutral/Disagree/Strongly Disagree
	I was able to rinse my menstrual cup when I wanted	1=Agree/Strongly Agree	0=Neutral/Disagree/Strongly Disagree
	I had enough water to rinse my menstrual cup	1=Agree/Strongly Agree	0=Neutral/Disagree/Strongly Disagree
	I was worried that someone would see me while I was rinsing my menstrual cup	0=Neutral/Agree/Strongly Agree	1=Disagree/Strongly Disagree
	I was worried that someone would see me while I was sterilizing my menstrual cup	0=Neutral/Agree/Strongly Agree	1=Disagree/Strongly Disagree
	<b>Highest possible score for MH practices (menstrual cups)</b>	<b>5</b>	

At each time-point, and for each of the MH-related outcomes: MH knowledge, perceptions, practices for reusable pad use, and practices for menstrual cup use, we calculated the average score of relevant items and the proportion of participants who answered all relevant items either “correctly” or “positively”. We used repeated measures logistic regression to assess the pre-post change in the proportion of participants with correct/positive outcomes from baseline to six-month visit, and baseline to 12-month visit respectively. Similarly, we used repeated measures linear regression to assess the pre-post change in scores for continuous variables from baseline to six-month visit, and baseline to 12-month visit respectively. We investigated potential confounders by assessing the association between each sociodemographic variable with exposure (visit time-point) and each binary MH outcome measure. The variable was considered a potential confounder if association with both the outcome and exposure had a  $p < 0.05$ . If the crude odds ratio or regression coefficient changed by more than 10% on adjusting for the potential confounder, the variable was considered a confounder and was retained in the model.

### ***Qualitative data collection and analysis***

Following the 12-month visits, after exposure to the intervention, four focus group discussions (FGDs) were conducted with a total of 48 cohort participants in two of the intervention clusters. FGD participants were purposively selected to include a range of ages and MH product choices. 12-15 young women participated in each of four FGDs. In each of the two clusters, one FGD was conducted with 16-19 year olds, and one was conducted with 20–24 year olds.

Semi-structured topic guides were informed by findings from the MH pilot study and the preliminary analysis of the quantitative data. The topic guide explored participants' perspectives on the MH intervention, what they had learned and/or gained from the intervention, which MH products participants chose, if and how their experiences of managing menstruation had changed over time, how they felt about MH in general, and how COVID-19 had affected their lives and menstrual practices. All FGDs were conducted face-to-face by experienced female qualitative researchers (MT, TN, and PI) independent from the implementation team. FGDs were conducted in either Shona or English (as preferred by the participants) and took 60-75 minutes. Written informed consent was obtained before the FGDs were initiated and pseudonyms were used throughout for confidentiality and maintain anonymity. FGDs were audio recorded, transcribed verbatim, and then translated into English where necessary.

Analysis was guided by Braun and Clarke's approach to thematic analysis (99), using a mix of deductive and inductive themes (98). Initial deductive codes were based on the preliminary findings from the quantitative questionnaire, and included menstrual product choice and use, MH knowledge, attitudes around MH, and MH practices were based on preliminary findings from the quantitative questionnaire. Additional inductive codes were generated through transcript familiarisation, initial manual coding, and analytical discussions between MT and CMY, and adapted through the coding process. These inductive codes and included "sociocultural norms," "stigma and taboo," and "myths". Deductive and inductive codes were merged to develop a coding framework, which was used to code all transcripts (100). Verbatim quotes were captured.

Qualitative analysis explored explanations and description about topics from the quantitative analysis. All the data was used to provide in-depth understanding of and explanation on the effect of the MH intervention on MH knowledge, perceptions, and practices among cohort participants.

### ***Patient and public involvement***

This study included public involvement in the development of the MH intervention. The details of the co-development of CHIEDZA and the MH intervention nested within it have been previously described (35, 41). Briefly, we used FGDs and participatory workshops with young women aged 16-24 years old and other relevant stakeholders in the community including CHWs, local community-based organizations, and the Ministry of Health and Child Care (MoHCC) to investigate MH gaps in the community, develop the MH intervention, and inform the research questions for this study.

To identify the most relevant MH gaps and needs in our intervention communities, we worked with key stakeholders to inform a Theory of Change (ToC) for the MH intervention. The ToC articulated the critical pathways to improve key MH outcomes among young women in Zimbabwe and guided the development of the MH intervention components. The intervention was then piloted from April to June 2019 and feedback from both healthcare providers and clients were used to refine and inform the scaled-up implementation of the MH intervention.

No patients were involved in the research process, design of the study, the recruitment and conduct of the study, or the dissemination of study results.

## Results

### Participant characteristics

318 female clients were screened at two of the CHIEDZA clusters (Hatcliffe and Budiri) between December 2019 and February 2020. Of those screened, two were outside the eligible age range and 13 (4.1%) declined to participate due to time constraints. A total of 303 participants were therefore enrolled in the cohort study (Figure 1).

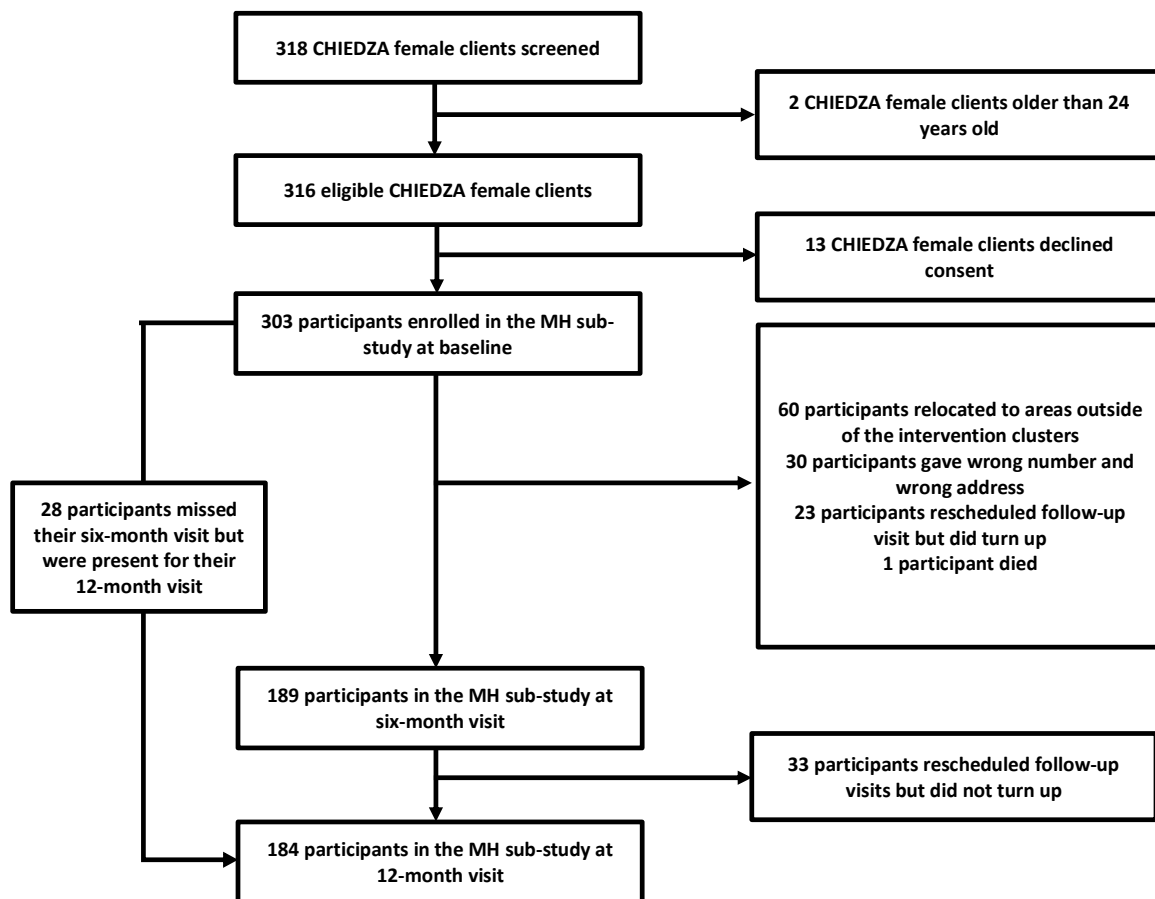


Figure 1 Screening, recruitment, and follow-up flow chart for MH cohort sub-study

Sociodemographic characteristics of participants at each timepoint are presented in Table 2. Of the 303 participants at baseline, half (51.2%) were aged 16–19 years old and half (51.8%) had completed O-level education (equivalent to the UK GCSE). One-third (35.0%) of participants were in school and 87.8% did not have a job. Half (51.2%) obtained money or income from a relative and 28.2% obtained money from a partner. 61.1% of participants had never married and all came from low- or moderate-income households. Of the 303 participants that were seen at baseline, 189 (62.4%) were seen at six-month visits, and 184 (60.7%) at 12-month visits. Overall, cohort participant characteristics were broadly similar at baseline, six-month visits, and 12-month visits.

**Table 2 Sociodemographic characteristics and menstrual health outcomes at each time point**

<b>Sociodemographic characteristics of MH Cohort Participants</b>						
	<b>BASELINE (N=303)</b>		<b>SIX-MONTH VISIT (N=189)</b>		<b>12-MONTH VISIT (N=184)</b>	
<b>Age</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
16 - 19	155	51.2%	84	54.3%	68	53.3%
20 -24	148	48.8%	105	45.7%	116	46.7%
<b>Highest level of education</b>						
Less than primary school or primary school completed	110	36.3%	66	34.9%	55	29.9%
O-levels completed	157	51.8%	90	47.6%	97	52.7%
More than O-levels completed	36	11.9%	33	17.5%	32	17.4%
<b>Currently in school</b>						
Yes	106	35.0%	72	38.1%	61	33.2%
No	197	65.0%	117	61.9%	123	66.8%
<b>Paying job</b>						
Yes	37	12.2%	20	10.6%	29	15.8%
No	266	87.8%	169	89.4%	155	84.2%
<b>Marital status</b>						
Never married	185	61.1%	126	66.7%	114	61.9%

Married, or living as if married	110	36.3%	61	32.3%	64	34.8%
Single (widowed or divorced)	8	2.6%	2	1.0%	6	3.3%
<b>Religion</b>						
Not religious	8	2.6%	4	2.1%	3	1.6%
Christian	251	82.8%	154	81.5%	157	85.3%
Other	44	14.5%	31	16.4%	24	13.1%
<b>Household population</b>						
Lives alone	10	3.3%	0	0.0%	3	1.6%
Lives with 1-3 other people	116	38.3%	58	30.7%	55	29.9%
Lives with 4-6 other people	147	48.5%	101	53.4%	93	50.5%
Lives with >6 other people	30	9.9%	30	15.9%	33	17.9%
<b>Total household income</b>						
Low-income	149	49.2%	93	49.2%	84	45.7%
Moderate-income	154	50.8%	96	50.8%	100	54.3%
<b>Source of income<sup>1</sup></b>						
I don't get money from anyone	59	19.6%	28	15.0%	35	19.4%
I get money from a relative	154	51.2%	105	56.5%	91	50.6%
I get money from my partner	85	28.2%	52	28.0%	52	28.9%
I get money from somewhere else	3	1.0%	1	0.5%	2	1.1%

1 missing data for "Source of income" sociodemographic characteristics at baseline (N=303), six-month visit (N=189), and 12-month visit (N=184)

### ***MH knowledge, perceptions, and practices***

For MH knowledge, perceptions, and MH practices for reusable pads, the mean scores and the proportion of participants with all correct or positive responses increased from baseline to six-month visit and decreased from six-month visit to 12-month visit (Table 3). For MH practices for menstrual cups, the mean score and proportion with all positive responses increased from baseline to six-month visit and from six-month visit to 12-month visit. For MH

knowledge and perceptions, there was strong evidence of an increase in mean scores from baseline to six-month visit with MH knowledge mean score reflecting the highest improvement (1.62; 95% CI:1.27-1.97) over time. There was also an increase in mean score from baseline to 12-month visit for MH perceptions.

**Table 3: MH outcome mean scores (M) and odds ratios (ORs) for the proportion answering all items correctly over time for participants at six-month visit vs baseline, and 12-month visit vs baseline respectively**

MH Outcome	BASELINE (N=303)		SIX-MONTH VISIT (N=189)				12-MONTH VISIT (N=186)					
	M	% with all correct/positive responses	M	% with all correct/positive responses	Absolute increase in mean score (95% CI)	aOR (95% CI)	p-value	M	% with all correct/positive responses	Absolute increase in mean score (95% CI)	aOR (95% CI)	p-value
Knowledge	5.81	5.3%	7.45	42.3%	1.62 (1.27 – 1.97)	12.14 (6.77 – 21.76)	<0.001	6.92	32.6%	1.08 (0.73 – 1.42)	7.80 (4.3 – 14.16)	<0.001
Perceptions	2.54	9.2%	3.03	21.2%	0.49 (0.23 – 0.75)	2.85 (1.59 – 5.09)	<0.001	2.90	19.0%	0.36 (0.10 – 0.62)	2.53 (1.40 – 4.55)	<0.005
Practices (reusable pads)	4.41	14.2%	5.58	40.6%	1.17 (0.82 – 1.52)	4.68 (2.28 – 9.58)	<0.001	5.53	34.4%	0.96 (0.60 – 1.30)	3.64 (1.77 – 7.48)	<0.001
Practices (menstrual cups)	3.08	21.1%	3.80	40.6%	0.55 (0.40 – 1.15)	39.9 (0.05 – 34638.94)	<0.3	4.00	48.5%	0.95 (0.36 – 1.53)	1200.42 (0.44 – 3297620.00)	<0.1

*\*MH knowledge and MH practices (reusable pads) ORs adjusted for age and household population, MH perceptions OR adjusted for level of education, and MH practices (menstrual cups) OR adjusted for age*

After adjusting for confounders (age, level of education, and household population), there was strong evidence of an increase in MH knowledge, perceptions, and practices over time



(Table 3). At six-month visit, participants were more likely to respond correctly or positively for all items for MH knowledge adjusted odds ratio (aOR)=12.14; 95%CI:6.8-21.8), MH perceptions (aOR=2.85; 95%CI:1.6-5.1), and practices for reusable pads (aOR=4.68; 95%CI:2.3-9.6) than at baseline. Similarly, there was strong evidence of an improved response on MH knowledge (aOR=7.8; 95%CI:4.3–14.2), MH perceptions (aOR=2.53; 95%CI:1.4– 4.6), and MH practices (reusable pads) (aOR=3.64; 95%CI:1.8–7.5) from baseline to 12-month visit. However, there was a slight decrease in odds of improved responses between six-month and 12-month visits for MH knowledge, perceptions, and practices for reusable pads.

Qualitative findings provided details and explanations to the increases in knowledge, perceptions, and practices. They explained how an unmet need for MH education, support, and products facilitated uptake of the MH intervention:

*“All I want to say is CHIEDZA has helped me so much. For me, I no longer have stress to include pads on my grocery list,”* (Hatcliffe, FGD, 20 – 24 years old).

### **MH knowledge**

Participants reported acquiring MH knowledge through the intervention. When asked questions about menstruation in the FGDs after the intervention, menstrual pain management, and how to use, wash, dry, and store the reusable menstrual products given to them through the MH intervention, almost all of the participants responded confidently and accurately. For example, when asked about use of the menstrual cup and “virginity” they responded:

*“They (the CHIEDZA healthcare providers) explained... They said that it’s not bad and it does not affect someone’s virginity. I believe that it doesn’t affect virginity,”*  
(Budiriro, FGD, 16 – 19 years old).

Their responses evidenced that participants had both retained the MH education from the intervention and gained additional MH knowledge on “best practices” based on their experiences using the products. When asked about washing and drying the reusable pads, participants responded:

*“Don’t wear [the pads] when damp... That’s when it smells bad. It must dry properly because it’s made of cotton...”* (Budiriro, FGD, 16 – 19 years old).

While most of the conversation around MH knowledge revealed accurate information retention, some of the responses around menstrual cups and pain management highlighted how sociocultural norms and persistent myths overrode MH education in the intervention.

For example, when asked about menstrual pain, one participant said:

*“For me, when I was a girl, I didn’t experience period pain. It came after birth. I think I got it from my hospital bed. I think the bed I used was used by someone who had period pain,”* (Budiriro, FGD, 20 – 24 years old).

### ***MH perceptions***

After the intervention, participants reported feeling more confident about knowing how to manage their menstruation using the reusable menstrual products. Many participants also reported feeling “*proud*” and more positive about their menstruation. They described the MH intervention as reducing the shame they felt about menstruation. Some participants stated

that they were determined to defy sociocultural norms that framed menstruation as a shameful “personal secret” no one else should know about:

*“As for me, at our homestead there are boys but it’s that, I dry my things [reusable pads] outside on the washing line because those boys they know about menstruation. They will marry their wives and they will also go on their monthly periods, even their mothers who gave birth to them, they go on their periods, it’s not something new...”*  
(Budiriro, FGD, 16 – 19 years old).

Despite the MH education and support, however, some still faced stigma and expressed feeling shame and anxiety around menstruation. Fear of “smelling like fish” or leaking menstrual blood persisted and informed MH product choice and practices. This shame around menstruation prevented them from feeling comfortable and confident during menstruation and when using and/or washing their menstrual products of choice:

*“I thought it better to dry it [my pads] inside the house because people would want to know, what that is. They would also know about my period, when it started... so I will not feel alright,”* (Hatcliffe, FGD, 20 – 24 years old).

For some, longstanding sociocultural norms around menstruation overrode the positive menstrual perceptions gained through the intervention, and impacted MH practices, despite participants’ gained knowledge.

*“I stay with my aunt, my husband’s sister. So, when I got the cup, she asked me if she can use the cup... The cup is not meant for girls, girls should use pads,”* (Hatcliffe, FGD, 20 – 24 years old).

### **MH practices**

Participants were excited to have the opportunity to choose and use different types of menstrual products through the intervention. Product choice and menstrual practice was informed both by the knowledge gained through the intervention, as well as external sociocultural factors. Sociocultural beliefs around the menstrual cup causing the loss of “virginity” prevented many participants from using the cup, leading to low cup uptake. This was despite the issues of cup use and virginity being discussed during MH education sessions embedded in the MH intervention.

*“Youths, they fear, and I’m one of them. I never attempted to use it because of fear, I was afraid to lose virginity, but I heard that if you use it, it’s alright and you don’t feel anything, everything will be normal,”* (Budiro, FGD, 16 – 19 years old).

Since products were used away from the CHIEDZA intervention site, at home, the influence of sociocultural factors was strong.

*“For me, I remember when we got these products, I was excited. When I got home, I showed my mom and she just said, ‘I don’t like that thing [the cup]’. So, you even become afraid of a thing which your mom does not approve of,”* (Budiro, FGD, 20 – 24 years old).

While most participants chose not to use the menstrual cup, those that did, reported positive user experiences that encouraged them to continue cup use over time:

*“I was scared at first to use the cup but when I started using it [chuckles]... It is very rare to see my pads on the washing line,”* (Hatcliffe, FGD, 20 -24 years old).

Environmental factors such as location (at home versus at work or school) and access to soap, water, and/or facilities to safely wash and dry reusable products also informed MH practices. These factors linked to the aforementioned perceptions of shame and anxiety around menstrual blood, with cleanliness felt to be a priority.

*“There is a difference, if I’m at home and school, they are two different things. I don’t use period pants when I’m at school because it does not handle blood for long time and the thing is you will be coming in and out in classroom... My colleagues will become suspicious. So, if I’m home I use period pants and when I’m school I use reusable pads.”*

(Budiro, FGD, 16 – 19 years old).

*“When travelling I prefer disposable pads because you never know where you go, you might not have water to use, and these things they need privacy, because when washing or drying them everyone there would be curious to know about it.”*

(Budiro, FGD, 20 -24 years old).

For some, menstrual flow also informed MH practices, including using more than one menstrual product at a time.

*“I can say first three days will be using a combination period pants and reusable pad.*

*But last day will just use period pant.”* (Budiro, FGD, 16 – 19 years old).

Additional quotes from the FGDs are highlighted in Table 4.

**Table 4 Summary of quotes from focus group discussion participants**

MAIN THEMES	QUOTES FROM THE FOCUS GROUP DISCUSSIONS
MH KNOWLEDGE	<i>“When I clean them [reusable pads], I fetch water in a bucket, go to the bathroom, wash using green bar soap, rinse and put them on the washing line to dry, then put them in a bag and then in my drawer,”</i> (Hatcliffe, FGD, 20 – 24).

	<p><i>“If you give birth, period pain goes away,” (Hatcliffe, FGD, 20 – 24).</i></p> <p><i>“Don’t wash them using detergents like washing powder, you should use green bar the dry them in sunlight for it to dry then you can you it again,” (Hatcliffe, FGD, 16 – 19 years old).</i></p> <p><i>“They (CHIEDZA staff) explained, they said that the cup is not bad, and it does not affect someone’s virginity... I believe that it doesn’t affect virginity,” (Budiro, FGD, 16 – 19 years old).</i></p> <p><i>“We were told to boil the cup. It was said to destroy germs plus I think it can soften the hardness of it,” (Budiro, FGD, 20 -24 years old).</i></p>
MH PERCEPTIONS	<p><i>“When I hear about CHIEDZA, I feel happy because I think of the products they provide for the girls in my community,” (Hatcliffe, FGD, 16 – 19 years old).</i></p> <p><i>“I have difficulties when drying, at our homestead there are boys, so I dry my products inside our house...” (Budiro, FGD, 16 – 19 years old).</i></p> <p><i>“As for my mom, she said ‘don’t use that thing... Just wash other pads that you have.’ She didn’t want too much [more than that],” (Budiro, FGD, 16 -19 years old).</i></p> <p><i>“The disadvantages are people are not liking the cup especially girls they say that it makes then lose their virginity and some when they wear it, they feel like they are having sexual intercourse when walking of the tail,” (Hatcliffe, FGD, 20 - 24 years old).</i></p> <p><i>“I stay with my aunt, my husband’s sister. So, when I got the cup, she asked me if she can use the cup... The cup is not meant for girls, girls should use pads.” (Hatcliffe, FGD, 20 – 24 years old).</i></p>
MH PRACTICES	<p><i>“I can say girls with 16 - 19years are the ones who like reusable pads whilst the 20-24 they need cup,” (Budiro, FGD, 16 – 19 years old).</i></p> <p><i>“On my first days I use reusables then on my last days I used period pants because the blood flow will be minimal...” (Hatcliffe, FGD, 16 – 19 years old).</i></p> <p><i>“[I wear] period pant first day of period because I will be having a light flow but other days, I will be using pads,” (Budiro, FGD, 16 – 19 years old).</i></p> <p><i>“When travelling I prefer disposable pads because you never know where you go, you might not have water to use, and these things they need privacy, because when drying them everyone there would be curious to know about it,” (Budiro, FGD, 20 – 24 years old).</i></p>

	<i>“Whenever I feel period pain, I take a pill,”</i> (Budiriro, FGD, 20 – 24 years old).
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## ***Discussion***

This study provides evidence of improvements in key MH outcomes of knowledge, perceptions, and practices, through an intervention providing young women with MH products, education, and support in a community-based setting in urban Zimbabwe. The MH intervention led to knowledge acquisition on menstruation, menstrual pain management, and menstrual product use; increased confidence in menstrual management; and improved menstrual health practices. Sociocultural and environmental factors, such as myths and taboos around menstruation, cultural beliefs, and access to WASH facilities at home, school, or work, also informed the MH outcomes, but were outside the intervention’s scope, and may have attenuated the positive effects of the intervention over time.

Our baseline findings add to evidence highlighting poor MH knowledge, perceptions, and practices, among young women in LMICs (5, 22). With MH shrouded in secrecy and taboo, we supplement evidence that young women often reach menarche with limited information, and sometimes misinformation, compounded by a lack of access to MH pain relief and products of choice, leading to poor experiences of managing menstruation (12, 20, 119). We therefore emphasise the need for comprehensive MH interventions and provide evidence of an intervention to improve key MH outcomes.

The MH outcomes – knowledge, perceptions, and practices – were closely connected, highlighting the importance of integrated interventions targeting all three. Increased MH knowledge led to better MH practices and perceptions and better MH practices and perceptions led to better MH experiences overall. The value of offering choices of MH product enhanced MH experiences as young women could choose the product that best suited their circumstance and led to increased experiential knowledge on how to use, wash, dry, and store different products in young women’s own specific environments. When encouraged to, participants were able to share their positive menstrual experiences and transfer that gained knowledge to others: changes in MH practices and perceptions thereby enabled MH information exchange and support (120). This process of acquiring and transferring MH knowledge and sharing menstrual experiences is often absent in most communities, without much needed MH discussion, correct information dissemination, and MH-related healthcare seeking behaviours (121-123).

The study highlights the influence of both the internal intervention components as well as external community social norms and access to WASH facilities at work, home, or school, as they interacted to inform young women’s menstrual experiences and MH outcome measures (93). This understanding of the multifaceted nature of MH is consistent with the growing understanding that MH plays a key role in the lived experiences of women across the globe. Comprehensive MH interventions must thus address biological, personal, interpersonal, environmental, and societal MH-related gaps and barriers (118).

The decrease in all three outcomes from six-month to 12-month visits albeit small, underscores the need for interventions that address social norms which can otherwise



impede long-term MH improvements. Previous studies have similarly had limited impact on social norms around menstruation. In a study looking at the effect of a community-based MH intervention for adolescent girls in India (124), results showed a significant improvement in MH practices, but only a marginal decline in the social and religious restrictions that informed attitudes towards menstruation. While there may be additional factors that informed the 12-month visit dip in MH knowledge, perceptions and practices in our study, our results suggest the need for MH interventions that include community members and prioritise community sensitisation and education around MH-related issues if there are to be acceptable, effective, and sustainable over time.

This is one of the first MH studies to assess the effectiveness of a comprehensive community-based MH intervention that provided both MH “hardware”, through menstrual products, and “software”, through MH education, for young women in a community-based setting (116). Unlike most MH interventions, our study offered participants a choice of MH products and analgesics and used a mixed-methods approach to assess the effectiveness of this comprehensive MH intervention and the factors that informed MH product choice and patterns of use over time. Unusually, our study looks comprehensively at knowledge, perceptions, and practices together, and uses a validated measurement tool (MPNS-36) that has been used in other LMICs such as Uganda (93, 125).

In terms of limitations, there was substantial LTFU which may have led to bias. However, a comparison of participant sociodemographic characteristics at each visit showed no difference between those retained in the study and those LTFU. Qualitative data may have been prone to recall bias due to being collected retrospectively, and social desirability bias,

due to the sensitive nature of the discussions. While observed differences before and after the study were assumed to be due to the intervention, with the lack of a control group, other external factors, such as natural growth, ageing or maturity, or other environmental changes may have influenced MH outcomes (126). While this was further explored qualitatively, temporal bias may be present. The relatively small number of participants solely from low-income urban settings in Harare, Zimbabwe, may not be generalisable.

## ***Conclusion***

Overall, the study results showed that the comprehensive MH intervention was effective in improving MH knowledge levels, perceptions, and practices among young women. Provision of a combination of comprehensive MH education, analgesics, a choice of MH products, and support over time were key to intervention effectiveness and success. While exposure and access to the youth-friendly service provision of MH education and resources facilitated improvements in MH outcome measures, these were mediated by external and contextual factors such as sociocultural norms and environmental conditions. It is important that MH gaps and barriers are tackled using a holistic approach that frames MH as a health and human rights issue and engages with both individuals and the wider communities in which they operate (68).

## **Declarations**

### ***Consent for publication***

All authors read and approved the final manuscript.

### ***Competing interests***

No competing interests.

***Acknowledgements***

The authors would like to thank all the participants in the study.



## RESEARCH PAPER COVER SHEET

Please note that a cover sheet must be completed for each research paper included within a thesis.

### SECTION A – Student Details

Student ID Number	1805265	Title	MISS
First Name(s)	MANDIKUDZA		
Surname/Family Name	TEMBO		
Thesis Title	Acceptability, uptake, and effectiveness of a menstrual health intervention among young women in Zimbabwe		
Primary Supervisor	Constance Mackworth-Young		

If the Research Paper has previously been published please complete Section B, if not please move to Section C.

### SECTION B – Paper already published

Where was the work published?	BMC: Health Services Research		
When was the work published?	30 March 2022		
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
Have you retained the copyright for the work?*	No	Was the work subject to academic peer review?	Yes

\*If yes, please attach evidence of retention. If no, or if the work is being included in its published format, please attach evidence of permission from the copyright holder (publisher or other author) to include this work.

### SECTION C – Prepared for publication, but not yet published

Where is the work intended to be published?	
Please list the paper's authors in the intended authorship order:	
Stage of publication	Choose an item.

**SECTION D – Multi-authored work**

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I designed the menstrual health intervention, analysed and interpreted the data regarding intervention acceptability, and drafted the manuscript
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**SECTION E**

<b>Student Signature</b>	
<b>Date</b>	15/09/22

<b>Supervisor Signature</b>	
<b>Date</b>	26/09/22

## **Paper 4 Overview**

In Chapter 6, I summarize the findings from a prospective cohort study investigating the effect of the MH intervention on MH knowledge, practices, and perceptions over time. The findings from chapter 6 demonstrated the effectiveness of the intervention on these key MH indicators, and this paper (Chapter 7) investigates its acceptability.

In this paper (Chapter 7), I use qualitative FGDs with all the CHIEDZA healthcare provider teams and female CHIEDZA clients across all CHIEDZA intervention sites to investigate the acceptability of the MH intervention (informed by the pilot findings highlighted in Chapter 4; Paper 1) embedded within CHIEDZA. Guided by Sekhon's thematic framework of acceptability (TFA) that looks at seven key constructs of acceptability (affective attitudes, burden, ethicality, intervention coherence, opportunity costs, perceived effectiveness, and self-efficacy) (40), the findings described in this paper highlight the acceptability of the MH intervention from the perspectives of both the CHIEDZA healthcare service providers and the CHIEDZA female clients.

This paper fulfills research Objective 4:

Objective 4 - To investigate the acceptability of the MH intervention in a community-based SRH intervention programme

To note, the term "MHH" is used in this paper as this was the predominant terminology used in the literature at the time of publication.

# Paper 4: Integration of a menstrual health intervention in a community-based sexual and reproductive health service for young people in Zimbabwe: A qualitative acceptability study

Tembo et al. *BMC Health Services Research* (2022) 22:421  
<https://doi.org/10.1186/s12913-022-07818-5>


BMC Health Services Research

RESEARCH

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## Integration of a menstrual health intervention in a community-based sexual and reproductive health service for young people in Zimbabwe: a qualitative acceptability study

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### Abstract

**Background:** Despite being fundamental to the health and well-being of women, menstrual health is often overlooked as a health priority and access to menstrual health education, products, and support is limited. Consequently, many young women are unprepared for menarche and face challenges in accessing menstrual health products and support and in managing menstruation in a healthy and dignified way. In this paper, we examine the acceptability of a comprehensive menstrual health and hygiene (MHH) intervention integrated within a community-based sexual and reproductive health (SRH) service for young people aged 16–24 years in Zimbabwe called CHIEDZA.

**Methods:** We conducted focus group discussions, that included participatory drawings, with CHIEDZA healthcare service providers ( $N = 3$ ) and with young women who had attended CHIEDZA ( $N = 6$ ) between June to August 2020. Translated transcripts were read for familiarisation and thematic analysis was used to explore acceptability. We applied Sekhon's thematic framework of acceptability that looks at seven key constructs (affective attitudes, burden, ethicality, intervention coherence, opportunity costs, perceived effectiveness, and self-efficacy). Data from FGDs and meeting minutes taken during the study time period were used to triangulate a comprehensive understanding of MHH intervention acceptability.

**Results:** The MHH intervention was acceptable to participants as it addressed the severe prevailing lack of access to menstrual health education, products, and support in the communities, and facilitated access to other SRH services on site. In addition to the constructs defined by Sekhon's thematic framework, acceptability was also informed by external contextual factors such as sociocultural norms and the economic environment. Providers highlighted the increased burden in their workload due to demand for MHH products, and how sociocultural beliefs around insertable menstrual products compromising virginity can negatively affect acceptability among young people and community members.

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**Conclusions:** MHH interventions are acceptable to young women in community-based settings in Zimbabwe as there is great unmet need for comprehensive MHH support. The integration of MHH in SRH services can serve as a facilitator to female engagement with SRH services. However, it is important to note that contextual external factors can affect the implementation and acceptability of integrated SRH and MHH services within communities.

**Trial registration:** Registry: Clinicaltrials.gov, Registration Number: NCT03719521, Registration Date: October 25, 2018.

**Keywords:** Menstrual health, Acceptability, Community-based interventions, Youth, Service delivery, Service integration

## Background

Menstrual health and hygiene (MHH) is integral to women's reproductive health and overall well-being and encompasses access to knowledge, materials, and facilities to manage menstruation with privacy and dignity. MHH also involves the broader psychological, environmental, and socio-political factors that inform how menstruation is managed [1, 2]. Globally, many women face challenges in managing their menstruation as MHH-related issues continue to be shrouded in secrecy and taboo and overlooked as a health priority [3]. As a result, many girls and women, particularly those in low- to middle-income countries (LMICs), lack access to MHH knowledge, products, and support, and experience anxiety, shame, and stigma as they approach menarche and throughout their reproductive years [4–7]. In LMICs such as Zimbabwe, many girls and young women are forced to either use inadequate alternatives such as tissue paper or old cloth to manage their menstruation and/or to miss school or work entirely during this time [8–10]. It is therefore critical that MHH is prioritised and addressed as a core component of women's lives to empower women and to achieve global gender equality in accordance with the 2030 Agenda of Sustainable Development Goals [2, 11].

There is a growing body of literature looking at MHH interventions. However, programs, research, and policy continue to address MHH as a stand-alone issue and most interventions have focused on school-going girls [9, 12, 13]. A systematic review of MHH interventions in LMICs reports that sustainable and effective MHH interventions need to be comprehensive, contextually specific, and designed to address long-standing myths and misconceptions about menstruation and menstrual product use [14]. Another study adds peer support, health provider training, and education reinforcement over time as major drivers for menstrual product acceptance and MHH intervention success [15]. While there is an understanding of what works for MHH interventions and product uptake amongst girls in school, there is limited literature looking at the menstrual experiences of out-of-school young women and/

or how MHH interventions inform their experiences of menstruation [9, 10, 14].

More recently, there has been a growing consensus that MHH and sexual and reproductive health (SRH) are intrinsically linked [13]. MHH is an important aspect of puberty and an access point for essential SRH information, services, and support structures that facilitate body autonomy from a young age, address reproductive health needs such as contraception and/or disease treatment, and improve women's health outcomes over time [13, 16]. There is an opportunity to harness the intersections between MHH and SRH by using an integrated approach but there are limited data on the implementation or acceptability of interventions or services that integrate MHH and SRH [13, 16].

The aim of this study was to investigate the acceptability of a comprehensive MHH intervention integrated within a community-based SRH service in Zimbabwe.

## Methods

### Study design setting and participants

The MHH intervention is embedded within the ongoing CHIEDZA trial in Zimbabwe (clinical trials.gov: NCT03719521). CHIEDZA is a two-arm, cluster randomized community-based trial investigating the impact of the provision of HIV services integrated with a comprehensive package of SRH services (including the MHH intervention, condoms, STI management, and contraception counselling and products) for young women and men aged 16–24 years on population-level HIV virological outcomes [17]. The two-year trial is being conducted in 24 clusters (geographically demarcated areas that include a community centre and a primary health care clinic) in three provinces across Zimbabwe (Harare, Bulawayo, and Mashonaland East). In each province, eight clusters were randomised 1:1 to either receive existing routine health services (control arm) or to receive a comprehensive package of integrated HIV (including HIV testing and linkage to care and anti-retroviral therapy initiation and retention in care) and SRH services in a youth-friendly environment that included indoor and outdoor entertainment and friendly and non-judgemental delivery staff



(intervention arm). All residents aged 16–24 years in the intervention clusters are eligible to access CHIEDZA services which are provided free-of-charge and available once a week, every week for the duration of the trial. The CHIEDZA services are delivered by three teams of trained CHIEDZA healthcare service providers (one team per province), each comprising two youth workers, two nurses, four community health workers (CHWs), and one counsellor. Prior to implementation, all CHIEDZA healthcare service provider teams went through a two-week training that included MHH training addressing 1) the taboo, myths, and stigma around menstruation; 2) how to use, wash, and dry the menstrual cup and how to address the issue of menstrual cup use and “virginity”; and 3) how to use, wash, dry, and store reusable pads. Teams were also provided with MHH education pamphlets (Additional Files 1 and 2) and reusable pads and menstrual cups for their own use. All training materials and the structured Manual of Operations informing the MHH intervention and CHIEDZA service delivery can be found on the CHIEDZA website [17].

In this paper, we describe a qualitative study that included members of the CHIEDZA healthcare service teams and female clients accessing CHIEDZA services across the 12 intervention clusters, conducted one year (midway) into implementation.

### The menstrual health and hygiene intervention

Formative work that included stakeholder engagement, participatory workshops, focus group discussions (FGDs), and in-depth interviews (IDIs) with CHWs, young women (aged 16–24 years old), and other key stakeholders such as the Ministry of Health and Child Care guided the development and design of the MHH intervention. Within CHIEDZA, the MHH intervention was designed to address access to pain medication, access to MHH education, support, and products, and to facilitate the de-stigmatization and taboo around menstruation. The details of the formative work will be published elsewhere.

The MHH intervention was piloted from April–July 2019 in the four intervention clusters in Harare as CHIEDZA had a phased roll-out plan for intervention clusters that started with Harare province [18]. Key results from the pilot study highlighted that 1) sociocultural factors were a barrier to menstrual cup uptake; 2) environmental factors were a barrier to reusable pads uptake; 3) education for community members including caregivers and partners is key to intervention acceptability; and 4) there was a great need for MHH products and education in the community [18]. These results were used to refine and scale-up the MHH intervention across the 12 CHIEDZA intervention clusters. The MHH

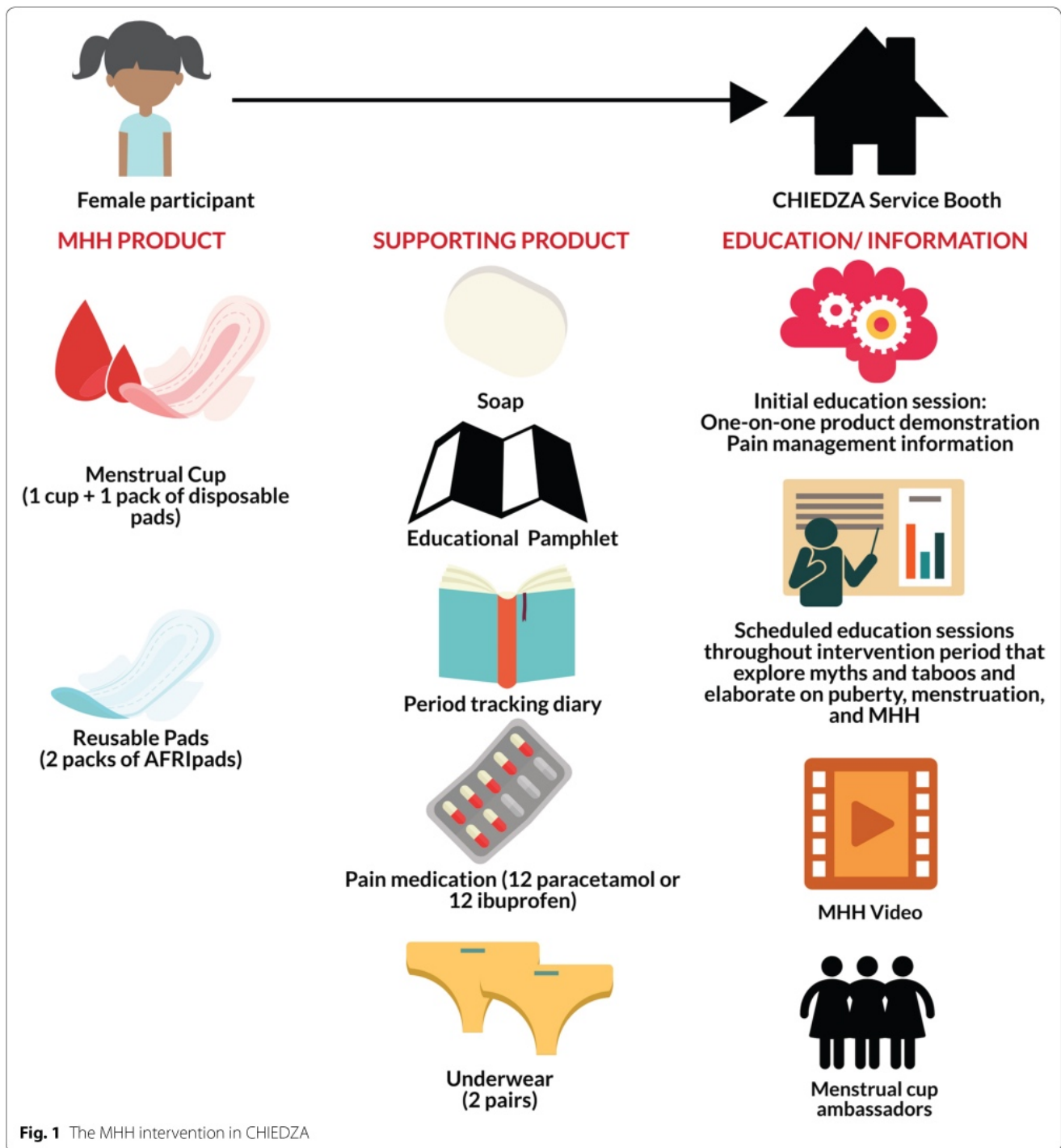
intervention was offered to all female CHIEDZA clients and included comprehensive MHH education and support, a simple period tracking diary, pain medication (a choice between paracetamol or ibuprofen), two pairs of underwear, soap, and a choice between reusable pads (AFRIPads that can be used for up to two years) and the menstrual cup (the Butterfly Cup that can be used for up to ten years). CHIEDZA healthcare service provider teams were also joined by trained menstrual cup ambassadors to facilitate menstrual cup sensitization and promotion onsite and to provide ongoing support for new menstrual cup users (Fig. 1).

### Impact of COVID-19 on the CHIEDZA trial

By February 2020, COVID-19 was officially considered a global pandemic [19]. In response, the Zimbabwean government announced a national lockdown that commenced on March 30<sup>th</sup>, 2020 [20]. All CHIEDZA services were stopped at this time and recommenced on May 18<sup>th</sup>, 2020 in an adapted form in compliance with national COVID-19 restriction guidelines. Adaptions included: 1) mask-wearing by all providers and participants; 2) social-distancing at the CHIEDZA site; 3) removal of all social activities to discourage social gathering on site; 4) limitations on the number of participants screened and registered at any one time; and 5) limited service hours to allow for CHIEDZA intervention team members and participants to get home before the nationally stipulated curfew. These changes in the implementation of CHIEDZA across the three provinces are important to note as they removed key aspects of the youth-friendly intervention, including social spaces and activities such as pool, music, darts, and outdoor sports, that made CHIEDZA different from the standard health services and attractive to young people, especially young men in the communities.

### Study procedures

This qualitative study was conducted from June to August 2020 using FGDs and participatory drawings that explored how the participants viewed or perceived CHIEDZA and the MHH intervention within it. FGDs were carried out with both the CHIEDZA providers and the female participants. Semi-structured topic guides were informed by findings from the MHH intervention pilot [18] and Sekhon's Theoretical Framework of Acceptability (TFA) that looks at seven key constructs of acceptability (affective attitude, burden, ethicality, intervention coherence, opportunity costs, perceived effectiveness, and self-efficacy) (Fig. 2) [21]. All FGDs were conducted face-to-face by NG, PNd, PNz, and three experienced female research assistants (RAs) independent from the implementation team, in either Shona, Ndebele, or English (as preferred by the participants) and



took 60–75 min. Written informed consent was obtained before the FGDs were initiated and pseudonyms were used throughout to facilitate confidentiality and maintain anonymity.

**FGDs with the CHIEDZA healthcare service provider teams** Approximately one year into the two-year CHIEDZA study, one FGD was conducted with each of the three provincial CHIEDZA healthcare service provider teams. All CHIEDZA healthcare providers were asked to participate in the FGDs and were interviewed in their respective teams as this how they operated and implemented



### Acceptability

A multi-faceted construct that reflects the extent to which people delivering or receiving a healthcare intervention consider it to be appropriate, based on anticipated or experiential cognitive and emotional responses to the intervention.

<p><b>Affective Attitude</b> How an individual feels about the intervention</p>	<p><b>Burden</b> The perceived amount of effort that is required to participate in the intervention</p>	<p><b>Ethicality</b> The extent to which the intervention has good fit with an individual's value system</p>	<p><b>Intervention Coherence</b> The extent to which the participant understands the intervention and how it works</p>	<p><b>Opportunity Costs</b> The extent to which benefits, profits, or values must be given up to engage in the intervention</p>	<p><b>Perceived Effectiveness</b> The extent to which the intervention is perceived as likely to achieve its purpose</p>	<p><b>Self-efficacy</b> The participant's confidence that they can perform the behaviour(s) required to participate in the intervention</p>
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**Prospective acceptability**  
Prior to participating in the intervention

**Concurrent acceptability**  
Whilst participating in the intervention

**Retrospective acceptability**  
After participating in the intervention



Constructs of Acceptability	Adapted FGD topic guide questions for intervention team members	Adapted FGD topic guide questions for female CHIEDZA clients
<b>AFFECTIVE ATTITUDES</b>	How the intervention team members felt about the MHH intervention during training and during implementation	What the participants heard about the MHH intervention before coming to CHIEDZA and how they felt about the MHH intervention once they had arrived at CHIEDZA site
<b>BURDEN</b>	The perceived amount of effort team members felt was required for intervention implementation	The perceived amount of effort required to participate the MHH intervention
<b>ETHICALITY</b>	How the intervention aligned (or not) with their individual values and if any personal adjustments had to be made to these in order to implement the intervention	How and why value systems of the participants themselves and the participants' communities affected and informed their participation in the MHH intervention
<b>INTERVENTION COHERENCE</b>	The extent to which the intervention team members understood the aims and objectives of the MHH intervention and how to implement the intervention	The extent to which the participants understood the purpose of MHH intervention and how it works
<b>OPPORTUNITY COSTS</b>	The extent to which the intervention team members felt they had to give up personal benefits or profits in order to deliver the MHH intervention	The extent to which the participants felt they had to give up personal benefits or profits to participate in the MHH intervention
<b>PERCEIVED EFFECTIVENESS</b>	The extent to which the intervention team members felt the MHH intervention was likely to be successful in addressing the MHH needs among CHIEDZA clients	The extent to which the participants felt that the MHH intervention was likely to be successful and achieve its purpose
<b>SELF-EFFICACY</b>	The extent to which the intervention team members felt that they could implement the MHH intervention as intended and the extent to which they felt that female CHIEDZA clients would be able to implement the information, knowledge and practices informed by MHH intervention	The extent to which the participants felt they could implement the information, knowledge, and practices informed by the MHH intervention and adequately manage their menstruation after visiting CHIEDZA

Fig. 2 Representation of how Sekhon's theoretical framework of acceptability (TFA) informed acceptability FGD topic guides

the MHH intervention in the field. One FGD had seven participants with two CHWs missing and the other two FGDs had eight participants with one nurse missing in each FGD. FGDs took place off-site, outside of CHIEDZA operating hours, and in a quiet private area to ensure confidentiality. The topic guide for the intervention team FGD explored how they perceived and experienced the MHH intervention before implementation (during training for CHIEDZA) and during implementation (Fig. 2).

**FGDs and participatory drawings with the participants**

Approximately one year into the CHIEDZA study, participants were approached over a two-week period by female RAs, informed about the MHH intervention study, and asked if they were willing to be contacted via telephone to participate in the FGDs. Six FGDs were carried out with female CHIEDZA clients. Participants were purposively sampled to include 12–15 young women for each of the two FGDs per province. In each province, one FGD was among 16–19 year olds and the other one was among 20–24 year olds. Participants were purposively selected to reflect the MHH intervention uptake and MHH product choice distribution observed amongst study participants and included a range of those who did, and did not, take up the MHH intervention, and those who chose the menstrual cup or reusable pads respectively. Only the RAs were privy to participant product choice and FGD topic guide questions were kept general to prevent stigma and bias during the discussions.

The topic guide explored what participants had heard about and how they perceived the MHH intervention before coming to CHIEDZA, while at CHIEDZA, and after leaving CHIEDZA (Fig. 2). FGDs included and started with a participatory-drawing element. Done individually, in the shared FGD space, participants were asked to draw and describe CHIEDZA to further explore and understand how participants perceived CHIEDZA and the MHH intervention within it.

**Observations and note-taking from CHIEDZA intervention team meetings**

To gain a deeper understanding of operational issues and the context in which the MHH intervention was being conducted, observations of the weekly interventional team meetings attended by both healthcare service providers and research team members were carried out from March 2019 to December 2020.

**Data management and analysis**

FGDs were audio recorded, transcribed verbatim and then translated into English for a hybrid approach of inductive and deductive thematic analysis [22]. Initial deductive coding was based on seven constructs of the

**Table 1** FGD Participant Demographics (CHIEDZA healthcare service providers)

CHIEDZA healthcare service providers N = 23		
<b>Age Category</b>	n (%)	
	18 – 25	3 (13.0)
	25 – 50	18 (78.3)
	> 50	2 (8.7)
<b>Sex</b>	Male	9 (39.1)
	Female	14 (60.9)
<b>Province</b>	Harare	8 (34.8)
	Bulawayo	7 (30.4)
	Mashonaland East	8 (34.8)

**Table 2** FGD Participant Demographics (female CHIEDZA clients)

Female CHIEDZA clients N = 84		
<b>Age Category</b>	n (%)	
	16—19	46 (54.8)
	20—24	38 (45.2)
<b>MHH product choice</b>	Reusable Pads	60 (71.4)
	Menstrual Cup	22 (26.2)
	Did not uptake MHH product	2 (2.4)
<b>Province</b>	Harare	30 (35.7)
	Bulawayo	28 (33.3)
	Mashonaland East	26 (31.0)

TFA, and inductive coding was used to explore other themes that were not covered by the TFA. Transcripts were read through for familiarization and coded manually by MT [23]. A senior social scientist (JR) also coded some of the initial transcripts and compared notes with MT to ensure coding consistency, comparability, and to facilitate collaborative thematic analyses throughout [24]. Transcripts were then imported to NVivo 12 software and MT organized the data into pre-defined key themes outlined by the constructs of the TFA. Coded transcripts were then discussed with and reviewed by the senior social scientist and additional themes and sub-themes were generated [25]. Data analysis of the FGDs followed Braun and Clarke’s (2006) guide to conducting a thematic analysis [23]. Themes and sub-themes were continually reviewed and refined to capture emerging new codes. Quotes were captured to highlight thematic areas and increase our understanding of the context. Thematic and visual analyses of participatory drawings, through in-depth discussions between the RAs, MT and JR, were used to reveal the more nuanced feelings and perceptions held by participants [26]. Researchers physically laid out



drawings side-by-side, grouped drawings according to shared themes, and investigated and discussed emerging themes to understand the data produced by the FGD participants.

In addition to the FGDs, MT attended, collected, and reviewed detailed meeting minutes of the weekly CHIEDZA intervention team meetings [27].

Data from the FGDs, participatory drawings, and meeting minutes were triangulated to generate a comprehensive understanding of the acceptability of CHIEDZA and the MHH intervention within it among CHIEDZA healthcare service providers and clients.

## Results

Overall, 23 CHIEDZA healthcare service providers (Table 1) and 84 female CHIEDZA clients (Table 2) took part in the FGDs and shared their views and perspectives on CHIEDZA and the MHH intervention. Our findings highlight how the seven constructs of the TFA inform acceptability from the perspectives of both the providers and female CHIEDZA clients. In addition to the constructs defined by TFA, external context, including sociocultural beliefs and the economic environment, also informed the acceptability of this intervention among interview participants. In this section we detail how various constructs informed MHH intervention acceptability among both the CHIEDZA healthcare service providers and the female participants in the FGDs.

### Affective attitudes

Many of the female participants were “very happy” about the MHH intervention and appreciated the opportunity to access free menstrual health education and products. Participant drawings also reflected CHIEDZA as a fun space, with friendly “smiling” staff, where young women could access menstrual pads and other health services. Some of the participants described CHIEDZA as a “safe space” for MHH-related discussion and the MHH intervention as a great initiative for young women as it addressed their unmet need for menstrual support:

*“When I heard about CHIEDZA, I felt happy because of the products [menstrual cups/reusable pads/analgesics] they provide for girls in my community...” (Bulawayo, FGD, 16 – 19 years old).*

Similarly, many of the CHIEDZA healthcare service providers were “very happy” about the MHH intervention. Most team members expressed feeling “proud” about being able to deliver an intervention that would improve menstrual experiences for young women in the community:

*“The MHH intervention is so appreciated in these*

*communities, a person who previously took menstrual products will just come to say thank you. So, you see that people are very appreciative and thankful” (Harare, FGD, CHW).*

### Burden

None of the participants reported that being a part of the CHIEDZA and MHH intervention within CHIEDZA was a burden and stated:

*“CHIEDZA does not force us to come every Wednesday we actually love coming here and we are not forced at all” (Bulawayo, FGD, 16 – 19 years old).*

In contrast, some service providers reported that while the MHH intervention was liked by the clients and “a hook” in bringing young women to CHIEDZA, implementing the intervention required additional effort and time. According to the team members, many clients required extensive menstrual health related support over time, especially those that chose to take up the menstrual cup:

*“It’s just that we get [WhatsApp] messages and calls from clients outside CHIEDZA times when we are now at home. For example, they can ask you about cups and challenges that they are facing then you have to explain to them or ask them to come back to the site” (Bulawayo, FGD, Nurse).*

### Ethicality

Several members of the CHIEDZA service provider team felt that dissemination of the menstrual cup did not align with their individual value systems. Informed by strong sociocultural beliefs, many providers were uncomfortable “promoting” the menstrual cup as they feared it would affect “young women’s virginity” and encourage sexual promiscuity:

*“I fear it will break her virginity or arouse her sensual feelings leading to her wanting to engage in sexual activities” (Bulawayo, FGD, CHW).*

Ethicality among some FGD participants was also informed by sociocultural norms and negative feedback from community members:

*“There are some who have a problem with it, they say we are teaching their kids to insert things inside their private parts” (Bulawayo, FGD, CHW).*

*“Some were complaining about the cup as they were saying giving young people menstrual cups it means they are teaching them that virginity is not important. They were really criticizing CHIEDZA and the*

*cup...” (Harare, FGD, 16 – 19 years old).*

Despite extensive MHH training and menstrual cup sensitization, many of the service providers continued to feel conflicted about the menstrual cup. In contrast, other members mentioned that, over time, their value system shifted to being in favour of the menstrual cup. Their understanding of virginity changed and their appreciation of how the menstrual cup works grew.

*“Maybe it’s because of my training where I feel like I understand my anatomy better, I would like to believe the cup is working well for me and it does not arouse me...” (Bulawayo, FGD, Nurse).*

Others also noted that while providing insertable menstrual products did not align with their values and beliefs around virginity, they “put [their] personal views aside” when working as CHIEDZA implementors:

*“...at first it was difficult to talk about the issue of the menstrual cup but now because I am using it and I have enough information, I can” (Harare, FGD, CHW).*

In addition to ethical concerns around distribution of the menstrual cup, some of the intervention members mentioned feeling that CHIEDZA did not meet the needs young men in the community and that the popularity of the free menstrual products, particularly the reusable pads and the analgesics, made CHIEDZA unfairly female-focused:

*“This MHH intervention is giving us problems because boys ask us [about] how this benefits them. This program makes young men feel their needs are not prioritized since it is a pads program... Consider the plight of boys” (Bulawayo, FGD, CHW).*

Despite these value conflicts, all the female participants and CHIEDZA healthcare service providers agreed that the MHH intervention was still an important and much needed component of CHIEDZA.

### Intervention Coherence

A majority of the participants and CHIEDZA healthcare service providers appeared to have a comprehensive understanding of the MHH intervention purpose and how it worked within CHIEDZA:

*“I think MHH has been used as a program for promoting health and hygiene... We are doing sexual and reproductive health thus it plays an important role in reproductive health” (Bulawayo, FGD, CHW).*

Additionally, participants reflected a clear understanding of the different MHH intervention components, such as MHH product use and management:

*“I was also taught how to manage and take care of the reusable pads. I was told that reusable pads need to be washed thoroughly with a lot of water and soap... I was told not to use the pads while they are still wet, pads need to be dry for me to use them” (Harare, FGD, 20 -24 years old).*

### Perceived effectiveness

Almost all the female CHIEDZA participants and CHIEDZA healthcare service providers reported that the MHH intervention had effectively improved the menstrual experiences of young women in the communities. Both groups noted that the scarcity and high prices of menstrual products and analgesics in the community meant that many young women could not afford menstrual products to manage their menstruation outside of CHIEDZA and that menstruation was a “burden”. Due to these external conditions, many participants gave examples of how the MHH intervention in CHIEDZA had positively impacted their menstrual management and general well-being:

*“Nowadays pads are very expensive... Some girls could have been forced to go and sleep with men so as to get money to buy pads” (Bulawayo, FGD, 16 – 19 years old).*

*“The pills help us a lot especially for those with severe period pains, after taking the medication we can attend school and the boys don’t even realise that we are on our periods as we will be acting all normal” (Bulawayo, FGD, 20 – 24 years old).*

Other participants noted how the presence of MHH intervention within CHIEDZA also facilitated exposure and access to other SRH services on site:

*“What I really like about this intervention is there is also HIV testing so that you know your status. I have realised that when you come here for pads, you can actually get an HIV test” (Harare, FGD, 16 – 19 years old).*

Most of the CHIEDZA participants and CHIEDZA healthcare service providers reported that the MHH intervention was effective at reducing stigma and taboo around periods, improving MHH knowledge, and improving menstruation management among young women in the community.



### Opportunity costs

Study participants highlighted some of the costs or negative implications that came with participating in or implementing the MHH intervention. CHIEDZA healthcare service providers noted that elements of the MHH intervention, at times, overshadowed and/or interfered with the implementation of the other SRH services. Team members said that MHH intervention implementation was overly time-consuming, especially given the limited service hours due to COVID-19 related restrictions. Others reported that the overwhelming need for analgesics and menstrual health education and products in the community often resulted in: 1) more work in screening ineligible young women coming to CHIEDZA seeking menstrual health assistance; and 2) CHIEDZA being framed as an MHH service which at times impacted on take up of other services, especially in the event of stock-outs of MHH materials:

*“This week we didn’t have pads and some [participants] come to the screening area and if they hear from other clients that pads are out of stock they will literally say ‘we will come back next time when the pads are available...’It shows that, for sure, menstrual products are a need and that’s why it [the MHH intervention] is being called a ‘mini CHIEDZA’” (Harare, FGD, Nurse).*

A few participants mentioned the time spent at the site in order to participate in the MHH intervention as a burden. Here, participants noted annoyance at intervention delivery being “very slow” as there was nothing else to do but wait while “the queue was taking long to move [along].” This burden of time spent at a CHIEDZA was exacerbated by the COVID-19 restrictions; the adaptations to CHIEDZA meant limited operating hours, slower processing of clients due to social-distancing, and a lack of youth-friendly activities to participate in while clients waited for services.

### Self-efficacy

Many participants left CHIEDZA “feeling empowered” and confident that they would be able to adequately manage their menstruation. However, some participants reported facing difficulties managing their menstruation at home due to environmental factors such as lack of water to wash reusable pads and sociocultural factors such as a lack of support from caregivers or parents for those that chose to take up the menstrual cup. This lack of community support and its impact on participant confidence was echoed by the CHIEDZA healthcare service providers:

*“I will liken educating clients about the cup as one*

*preaching a sermon, and then you feel like this word is for me, but on your way home you meet a friend who then diverts you from what was preached... When a client goes home with [a cup] she will hear another set of information and will be convinced to not use the cup based on the advice at home” (Harare, FGD, CHW).*

### Discussion

Overall, the MHH intervention was acceptable among female CHIEDZA clients and among both male and female intervention service providers in all three provinces. The intervention was well-received by female clients, providing young women with access to much needed pain medication and menstrual products and support, and both young men and women with MHH education that debunked harmful myths and taboos around menstruation. CHIEDZA healthcare service providers supported the intervention as it addressed an unmet MHH product and education need in the communities and attracted several female clients to CHIEDZA. These findings support similar qualitative work assessing the effectiveness and acceptability of a comprehensive MH intervention program in Uganda [28].

For most participants, the MHH intervention acceptability was heavily informed by MHH product accessibility and acceptability. Our findings add to the limited literature looking at menstrual experiences among girls in Sub-Saharan Africa (SSA) and highlights that access to comfortable and effective menstrual products is important to young women and integral to their well-being as it prevents use of ineffective alternatives and harmful practices such as transactional sex to buy MHH products [29, 30]. In contrast to other studies that look at MHH product acceptability in school-going girls [15, 31], our study highlights findings from a community-based MHH intervention where there are challenges to changing or overcoming the sociocultural barriers around “virginity” and the use of insertable menstrual products such as the menstrual cup. Despite the MHH training for the CHIEDZA healthcare service providers and the menstrual cup sensitization and support for female CHIEDZA clients, long-standing internal value systems around the concept of “virginity” and negative feedback from female clients’ caregivers and other community members once they leave the CHIEDZA sites resulted in participants opting for reusable pads as opposed to the menstrual cup. While there is limited literature looking at product choice in a community-based setting, our results are similar to those found in a study looking at the acceptability of menstrual products among women and girls in Malawi [32]. Given these findings, it is critical that MHH interventions are



context-specific and adaptable to the needs and preferences of the community. Acceptable MHH interventions should not only prioritise MHH education and product dissemination, but more so informed menstrual product choice.

The MHH intervention tended to overshadow other SRH services offered by CHIEDZA and, in some instances, caused provider fatigue due to the high unmet need, which was exacerbated by the socioeconomic consequences of COVID-19 in the country [20]. Additionally, the temporary cessation of social activities within CHIEDZA, because of the COVID-19 restrictions, seemingly led to CHIEDZA becoming synonymous with MHH in the communities. In this context, MHH became the sole “hook” to encourage young people to visit CHIEDZA. This subsequently negatively affected male engagement and exacerbated a perception by both potential and current male clients of CHIEDZA as a female-only service. These findings build on existing evidence highlighting poor male engagement with SRH services and the need for health systems to consider men’s perceptions of health services and how this informs health-seeking behaviours [33].

Models of integrated SRH provision are designed to improve health outcomes through increased access to quality care however, these positive outcomes can come with some unintended consequences [7, 34]. A systematic review of the effects of integrated care, highlighted that many models of integration tend to focus on enhancing access to multiple services at one point or on ensuring quality service but often fail to address staff thinking and/or innovative ways of how staff work in or deliver novel intervention models [34]. For the CHIEDZA healthcare service providers, the MHH intervention was perceived to be “a hook” or add-on service to attract female clients to CHIEDZA and expose them to other SRH services such as HIV testing. Given this understanding, some team members perceived MHH-related work as “extra work” that impeded their primary duties as SRH providers. Similar findings among health care providers in Kenya demonstrate that perceptions of burden inform provider acceptability and successful integration models must also consider and address perceptions of staff about their roles and tasks, especially in settings where healthcare is often delivered through vertical programmes [35].

Our study highlights that intervention acceptability is a multi-factored measure that goes beyond just intervention uptake. A strength of this study was the assessment of acceptability from the perspectives of both the intervention clients and providers and the consideration of how contextual factors within these intervention communities informed how the intervention was implemented, perceived, and experienced. Additionally, by

applying a TFA that considers both prospective and retrospective evaluations of an intervention from those that deliver and receive the intervention, our study allowed for a robust assessment of acceptability of this MHH intervention overall [21].

Importantly, Sekhon’s TFA was based on how individual value systems informed acceptability. However, our study revealed that acceptability was also informed by external factors. For example, both participants and the CHIEDZA service providers expressed how sociocultural beliefs around virginity and the insertable menstrual cup negatively informed how the intervention was perceived and received by participants and people in the community. Similar studies in the SSA region corroborate our findings and report that menstrual cup acceptability in communities is often hindered by beliefs that cup use results in the loss of virginity due to the breaking of the hymen or encourages sexual behaviour as the insertion is incorrectly thought to cause arousal [1, 18, 36]. Thus, theoretical frameworks assessing acceptability must consider how context within intervention communities affect acceptability overall, especially in community-based settings.

To our knowledge, this is the first study to investigate MHH intervention acceptability in a community-based setting in an LMIC. Using a theoretical framework of acceptability, this study provided an in-depth understanding of how both individual, community, and contextual external factors inform intervention acceptability. Our study was also conducted in a community-based setting allowing for a much needed analysis of MHH intervention acceptability outside of a school-based setting and among non-school-going women in an LMIC [37]. Our findings evidence that, when implemented outside of a school-based setting, MHH interventions should consider how external factors inform acceptability over time. Our findings also add to the guidance gap on effective and acceptable models for integrated SRH services [7, 34].

The study faced some limitations. Firstly, the qualitative data may be subject to recall bias where respondents were asked about their pre-intervention thoughts and opinions upto 12 months later and to social-desirability bias where respondents, particularly CHIEDZA service provider team members may have felt obliged to report positively on the MHH intervention and CHIEDZA. That said, our RAs were well trained to firstly disassociate themselves from the implementation team and secondly to probe for all opinions both positive and negative. Secondly, study participants did not include male CHIEDZA clients thus we do not have full understanding of intervention acceptability from the male client perspective. Thirdly, we only conducted one FGD at one time-point for each of the CHIEDZA service provider teams. While



we triangulated data from the FGDs with data from the weekly CHIEDZA meetings, the small number of FGDs may have limited the depth of our findings.

## Conclusion

Overall, the study results showed that the MHH intervention itself and its integration within an SRH community-based service were acceptable among both intervention implementors and young women in communities across Zimbabwe. In an environment where there is a global push for the integration of MHH and SRH and uptake of SRH services is especially low amongst men [33], our findings add to the increasing evidence base for integrated services and provide crucial insight into some of the contextual factors policy-makers and implementors should consider and pre-emptively prepare for when designing and implementing acceptable integrated SRH services in community-based settings. Acceptable MHH interventions need to be comprehensive and need to consider the contextual factors that inform access to and informed choice of menstrual products [18, 28, 38, 39]. The integration of MHH and SRH can lead to increased female engagement with SRH services overall, however, services should consider how to meaningfully engage males and community members to ensure acceptability and effectiveness over time.

## Abbreviations

CHW: Community Health Worker; FGD: Focus Group Discussion; IDI: In-Depth Interview; LMIC: Low- and Middle-Income Countries; MHH: Menstrual Health and Hygiene; NGO: Non-Governmental Organisation; RA: Research assistant; SDGs: Sustainable Development Goals; SRH: Sexual and Reproductive Health; SSA: Sub-Saharan Africa; TFA: Sekhon's Theoretic Framework of Acceptability; UNICEF: United Nations Children's Fund; WASH: Water Sanitation and Health; WHO: World Health Organization.

## Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12913-022-07818-5>.

**Additional file 1.** MHH education pamphlet for MHH intervention within CHIEDZA (front side)

**Additional file 2.** MHH education pamphlet for MHH intervention within CHIEDZA (back side)

## Acknowledgements

The authors would like to thank all the participants in the study.

## Authors' contributions

MT designed the MHH intervention, analysed and interpreted the data regarding intervention acceptability, and drafted the manuscript. JR analysed the qualitative data and was a major contributor in writing the manuscript. HW and SF assisted in analysing the qualitative data collected and contributed to the writing of the manuscript. NG, PNd, and PNz collected qualitative data from participants. RAF, CDC, CVM, CMY, and ED contributed to the coordination of the study and critical revisions of the manuscript. RAF is the Principal

Investigator of the CHIEDZA Trial. All authors read and approved the final manuscript.

## Funding

Swiss Agency for Development and Cooperation funding, the Wellcome Trust through a Senior Fellowship to RAF (206316/Z/17/Z), and the Fogarty International Center of the National Institutes of Health under Award Number D43 TW009539.

## Availability of data and materials

The datasets used and/or analysed during the current study are not publicly available for ethical reasons, as they contain information that could compromise the privacy and consent of the research participants. Data may be made available from the corresponding author on reasonable request.

## Declarations

### Ethics approval and consent to participate

This study was approved by the Medical Research Council of Zimbabwe [MRCZ/A/2387], the London School of Hygiene and Tropical Medicine ethics committee [16124/RR/11602] and the Biomedical research and Training Institute Institutional Review Board (MRCZ/A/2387). All methods were carried out in accordance with relevant guidelines and regulations. Our study did not include participants under 16 years old and written informed consent was obtained from all participants aged 16 years old or above before the FGDs were initiated. Pseudonyms were used during the FGDs and in subsequent use of the quotations to facilitate confidentiality and maintain anonymity. All recordings were downloaded on to a password-secured laptop for processing purposes and deleted once the data analyses were completed.

### Consent for publication

Not applicable.

### Competing interests

No competing interests.

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Received: 13 September 2021 Accepted: 21 March 2022

Published online: 30 March 2022

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Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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## **Chapter 8: Discussion**

In this chapter, I synthesis the key findings from this thesis, including a summary of findings from each paper aligned with the thesis objectives, and the overarching findings from the thesis as a whole. Additionally, I provide recommendations from the research, critically reflect on the strengths and limitations of the study, and describe the dissemination of the findings, before concluding the thesis.

### ***Synthesis of findings***

The aim of this thesis is to investigate MH product choice and the acceptability and effectiveness of a comprehensive MH intervention integrated within a community-based SRH program among women aged 16-24 years.

The following studies were conducted:

1. An investigation of the knowledge levels, perceptions, and practices around MH among women aged 16 – 24 years in Zimbabwe and the design and pilot of a complex MH intervention within CHIEDZA
2. An assessment of MH product choice, continued use or discontinuation of products, and patterns of use over time within the MH intervention
3. An investigation into the effect of the MH intervention on MH knowledge, practices, and perceptions over time
4. An evaluation of the acceptability of the MH intervention integrated within a community-based SRH intervention

Table 4 summarizes the objectives and aligns them to the relevant papers, highlighting the main findings.

**Table 4 Summary of main findings from the papers included in this thesis**

<b>OBJECTIVE</b>	<b>PAPER TITLE</b>	<b>JOURNAL AND DATE</b>	<b>METHODS</b>	<b>MAIN FINDINGS</b>
1	<i>Menstrual product choice and uptake among young women in Zimbabwe: a pilot study</i>	Published in BMC Pilot and Feasibility Studies, 2020	Quantitative and qualitative data analysis	<p>There is unmet need for multicomponent and context-specific MH interventions in community-based settings amongst young women in Zimbabwe.</p> <p>MH stigma persists and informs feelings of shame, embarrassment, and isolation among young women in Zimbabwe</p>
2	<i>High menstrual health service uptake when given menstrual product choice within an integrated sexual and reproductive health intervention for young people in Zimbabwe</i>	To be submitted to BMC Reproductive Health, 2022	Quantitative analysis	<p>Multicomponent SRH interventions that integrate MH services could be an achievable pathway to increase female engagement with SRH services and introduce women, especially younger women, to critical family planning and HIV testing information and facilities.</p> <p>MH services need to provide a choice of products as preference and use is informed by contextual factors that</p>

				can shift across over time
3	<i>Menstrual health intervention improves menstrual health knowledge, perceptions, and practices among young women in Zimbabwe</i>	Submitted to BMJ Open, 2022	Quantitative and qualitative data analysis	<p>The MH intervention was effective in improving MH knowledge levels, perceptions, and practices among young women over time.</p> <p>Interventions need to address the social norms that act as a barrier to MH if improvements are to be maintained over time. Exposure to external factors outside of the intervention may attenuate improvements in MH outcomes over time.</p> <p>MH knowledge, perceptions, and practices are interconnected and should be addressed holistically in MH interventions</p>
4	<i>Integration of menstrual health intervention in a community-based sexual and reproductive health service for young people in Zimbabwe: a qualitative acceptability study</i>	Published in BMC Health Services Research, 2022	Qualitative analysis	<p>Intervention acceptability goes beyond measures of uptake. Researchers need to use comprehensive frameworks to fully investigate acceptability before, during, and after intervention implementation and from the perspectives</p>



				<p>of both those that deliver and receive the intervention.</p> <p>MH integration within SRH services is acceptable. However, these MH interventions need to be adequately staffed to avoid additional work burden and need to include community engagement to ensure acceptability and sustainability over time. It is also critical that providers are sensitized on MH and MH product use as longstanding myths and taboos around MH inform how they deliver interventions.</p>
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Across the four research papers in this thesis, the core findings are as follows:

***Addressing young women’s health needs using an integrated menstrual health and sexual and reproductive health service model***

This thesis highlights the large unmet need for MH products, analgesics, and education and support among young women in Zimbabwe (Papers 1-4). Prior to the MH intervention, many young women had limited MH-related information and lacked knowledge of or access to reusable MH products such as the reusable pads or the menstrual cup. Moreover, participants, healthcare providers, and community members noted that several young women were staying home from school during menstruation due to a lack of MH products or

MH-related pain management and/or engaging in risky behaviour such as transactional sex to purchase needed MH products. This finding aligns with findings from the systematic review looking at the experiences of menstruating girls and women in LMICs (50). Innovative MH interventions were needed to holistically address these needs and mitigate the far-reaching negative physical and mental health outcomes of young women. The MH intervention, integrated within a youth-friendly community-based SRH intervention, provided young women a unique and much needed opportunity to address their MH and SRH issues in a safe and supportive environment conducive to open and honest dialogue about key health topics often shrouded in secrecy, taboo, and shame.

Providing integrated MH and SRH services in a community-setting, where they work and live, reduced barriers and facilitated easy access to crucial services for young women (Paper 4). Young women were able to walk to a community centre and talk through menstrual practices and longstanding MH-related myths with each other and trained healthcare professionals and this allowed most to find support and gain key MH information that then guided and improved their MH practices and MH product choices over time (Paper 3). Young women also had an opportunity to share their experiences of MH product use and impart knowledge gained through experience with their peers in a safe space (Paper 3).

With almost all female participants taking up the MH intervention during the implementation period, this research provides crucial quantitative findings supporting MH intervention implementation and MH and SRH integration (Paper 2). The MH intervention was not only popular in itself, it was also a key “pull” factor for female engagement with the SRH service as a whole (Paper 4). Framing and placing the MH intervention as part of the other SRH

services offered in CHIEDZA allowed for young women and healthcare providers to engage in important discussions around body autonomy and sexual health and practices. In the conservative, and often religious, communities across Zimbabwe, the provision of MH services proved to be an acceptable and effective pathway to other SRH services such as HIV testing and FP. Given the global push to achieve the SGDs by 2030 and the UNAIDS 95-95-95 targets, this research strongly suggests one strategy to increase uptake of essential SRH services young women is to provide integrated MH and SRH services in a community-based setting.

### ***The importance of multicomponent menstrual health interventions, which include choice***

This thesis highlights that MH interventions need to be multicomponent, context-specific, and offer choice to holistically address the many factors that inform menstrual experiences and physical, mental, and social well-being (Papers 1-4). Guided by the ToC for the MH intervention detailed in paper 1, this research sought to address the lack of access to MH products, analgesics, and education to improve MH knowledge, perceptions, practices over time. Uniquely, the MH intervention allowed young women to choose a product of their choice and findings suggest a strong preference for reusable pads that is heavily informed sociocultural norms and environmental factors (Paper 2). For many young women, particularly younger women, the use of insertable MH products such as the menstrual cup contradicted longstanding beliefs around “virginity” and the importance of preserving the hymen and keeping it intact before marriage (Paper 1 and 2). This particular barrier to insertable menstrual cups due to “virginity” contradicts the majority of the literature that reports high menstrual cup uptake and acceptability in LMICs (113) and forms the basis of



two key findings in the research work: 1) MH interventions need to provide a choice of MH products and 2) sustainable and effective interventions need to consider factors outside of the intervention setting as these external context-specific factors play a pivotal role in driving decision making and behaviour (38). MH product choice contributes to safety and dignity and being able to use what works best given context and circumstance should be a right afforded to all.

Apart from choice, another key aspect of the MH intervention in this research was the access to analgesics and MH education on site. The research findings showed an unmet need for interventions that address both physical and psychosocial MH needs, including managing menstrual pain. To date, there is little research looking at MH-related pain among young women in LMICs (54). However, from other studies including a Uganda study among school-going girls (56), we know that menstrual pain contributes to school absenteeism. A systematic review of studies in high income countries (HICs) also highlights menstrual pain as being commonly associated with negative experiences of menstruation (19). This thesis adds to this evidence, as pain management was one of the most popular services for female clients (Paper 4). This not only reflects the prevalence of menstrual pain among young women, but also the acceptance of analgesics as a form of pain management. That said, there is also some evidence from this thesis and other studies (56, 127, 128) that other non-analgesic methods such as exercise or heat are also effectively used to manage pain. Thus, to ensure that MH needs are comprehensively addressed, this research strongly suggests that interventions include a pain management component (through either the provision of analgesics or education on other pain management methods) and that more investment and research be committed to MH pain management overall.

### ***Destigmatizing menstrual health and shifting social norms requires community buy-in***

Implemented in a community-based setting, this thesis calls attention to the importance of community engagement activities in intervention design and delivery. Findings from the pilot (Paper 1) and investigations into MH intervention acceptability (Paper 4) and the effect of the MH intervention on MH knowledge, perceptions, and practices (Paper 3) all report on the limitations of not involving community members such as caregivers, older siblings, and partners in the MH intervention. For example, as highlighted in paper 4, while the provision of MH hardware and software in the form of MH products and information facilitated informed product choice, product use over time was often determined by how young women's choices were perceived or received by their immediate community i.e., their friends and family. Another example, evidenced in paper 3, is how noted improvements in MH knowledge, perceptions, and practices were reduced over time as mistruths, taboo, and stigma around MH were daily reinforced in the environments in which these young women lived in.

To further understand the importance and influence of community on MH, MH needs to be understood through an intersectional lens that considers how factors such as stigma and social norms inform the menstrual experiences of girls and women (129). Stigma is a complex social construct that informs system of processes that are used to reduce power and devalue people (130). This study shows that there is a clear stigmatization of MH that generates feelings of shame among menstruating girls and women and focuses on keeping menstrual experiences an embarrassing secret and keeping menstrual management a task that should

be completed within the limitations set by society's sociocultural norms. Here, over time, shame often quells gained positive perspectives on menstruation and the sociocultural reverence of "virginity" overrides any of the benefits that come from using insertable products such as the menstrual cup.

Importantly, the research findings also provide evidence that suggests possible pathways to destigmatizing MH through interventions. In paper 1, leaning on the principles of BCD theory (38), the pilot findings show that the novel introduction of access to a MH education and support and a choice of MH products through the MH intervention provided the disruption to the current environment needed to shift, or at least question, the stigma, taboo, and harmful practices around MH for young women. This is also evident in the improvements in MH perceptions and practices reported in paper 3. And in paper 4, findings highlight how opening the MH education sessions to young women's family members improved MH acceptability overall. While this research would have benefitted from a larger community engagement component, as the intervention was nested within CHIEDZA, it was limited to intervention components targeting youth and was restricted to operate within the boundaries of the CHIEDZA sites.

To summarise, MH interventions are needed to address gaps in MH pain management, product provision, education and support, and pain management. However, to be acceptable, effective, and sustainable over time, these MH interventions need to be incorporated in SRH service provision and be comprehensive and multicomponent, including analgesics, a choice of products, and community engagement to ensure community buy-in.

## ***Recommendations***

Given the key findings of this research, the following is a list of recommendations for policy makers and researchers:

1. MH interventions should be multicomponent and provide: a choice of MH products, education and support, and pain management
2. Community engagement is key to any sustainable and meaningful change to MH and the menstrual experiences of girls and women
3. MH services are an acceptable pathway to accessing other SRH services for young women. MH should be an integral component of SRH service provision at both community and primary care levels

## ***Strengths and Limitations***

Strengths and limitations specific to each objective are presented within each paper. There are several strengths and limitations related to the thesis, which are presented below.

### ***Strengths***

This study had several key novel elements and methodological strengths. A key strength is the use of participatory methods, such as FGDs and participatory workshops, during the formative stages of this study. Engaging and working with the young women in the early stages of intervention development facilitated the co-development of an acceptable MH intervention informed by the needs expressed by the young women in our communities (131-

133). Also, to my knowledge, this is the first large study to investigate MH product choice, and the acceptability and effectiveness of a multicomponent MH intervention integrated within a community-based SRH program for young women in an LMIC (16, 116). This study is also one of the first studies to offer a choice of reusable MH products (menstrual cup, reusable pads, and period pants) and access to pain management. We also used a large dataset from female clients from diverse environments across Zimbabwe for our analysis to increase generalisability.

Another strength is the quantitative and qualitative methods used to fulfil the research objectives. Robust quantitative approaches were used to assess the factors that informed MH practices and MH product choice and use over time and qualitative FGDs and IDIs were used to gain a deeper understanding of the quantitative results. The use of a theoretical framework of acceptability (40) in the study also provided an in-depth understanding of how both individual, community, and contextual external factors inform intervention acceptability from the perspectives of the healthcare provider and the CHIEDZA clients.

Our study also addresses the research gap in the development and use of standardised MH measuring tool as we used a validated measurement tool (MPNS-36) to comprehensively assess MH knowledge, perceptions, and practices over time (93, 125).

### ***Limitations***

**Generalizability:** The cohort participants were recruited in two randomly selected intervention clusters (Hatcliffe and Budiro) within one province (Harare) of Zimbabwe. Therefore, there may have been some bias as participants in the cohort study came from

similar backgrounds and have similar characteristics making the results of this portion of the study less generalizable to participants from other parts of Zimbabwe

**Selection bias:** For the cohort, a maximum of 15 new participants were recruited per randomly selected site per day when CHIEDZA sites opened (usually between 11am – noon). This may have led to selection bias as participants who typically came to CHIEDZA sites later in the day due to work or school schedules or other factors were less likely to be recruited for the cohort study. This may have also affected overall generalizability. To mitigate, where possible, we did recruit some participants later in day.

**Social desirability bias:** Due to the sensitive nature of the discussions around menstruation and MH, research participants may have answered questions (in the FGDs, IDIs, or quantitative questionnaires) in a manner that was viewed favourably by other participants and/or the research intervention team members thus resulting in social desirability bias. The study tried to mitigate this by implementing self-reporting quantitative questionnaires to collect data and by extensively training FGD and IDI facilitators to ask non-leading questions that ensured truthful answers and reinforced the notion that there were no “right” or “wrong” responses.

**Recall bias:** Over a period of 12 months, cohort participants were asked to recollect information on past experiences or instances regarding MH product use, and MH practices and perceptions in the FGDs, IDIs, and quantitative questionnaires which may have resulted in inaccuracies or the omission of details. We tried to limit this bias by, where possible,

collecting data prospectively and by analysing data using mixed-methods that triangulated data from the FGDs, questionnaires, and period tracking diaries (134).

**No comparison group and temporal changes:** The cohort did not include an MH intervention comparison group thus limiting how much of the measured change can be attributed to the intervention as opposed to age or other factors. The before-after study design for the cohort was structured to measure the effect of the MH intervention on the MH knowledge levels, perceptions, and practices among female participants in the cohort pre- and post-intervention exposure. Observed differences are assumed to be due the intervention however, measured changes over time may be due to other external factors such as natural growth, ageing or maturity, or other environmental changes and not necessarily due to the intervention (126). Observed changes were also explored qualitatively in Paper 3 and 4 to better understand if and how the MH intervention informed changes in MH knowledge, perceptions, and practices over time. Additionally, dose-responses by comparing measurable outcomes for participants and their engagement with MH activities within CHIEDZA will be collected and analysed as part of the process evaluation for the CHIEDZA study as a whole.

**Loss to follow-up (LTFU):** There was substantial LTFU within the cohort study which may have led to bias. However, for all cohort data analysis, a comparison of participant sociodemographic characteristics at each visit showed no difference between those retained in the study and those LTFU.

## ***Dissemination***

The findings from this thesis have been disseminated to colleagues at The Health Research Unit Zimbabwe (THRU ZIM), BRTI, LSHTM, and other researchers and policy makers at national and international conferences and workshops. I have disseminated findings to the public through international podcasts, video interviews, online platforms such as The Bleed Read ([www.thebleedread.com](http://www.thebleedread.com)), and through presentations at events hosted by local community-based organizations (CBOs) and non-governmental organizations (NGOs).

**Research workshops and seminars:** In March 2022, I presented my study findings at the Wellcome Trust Bloomsbury Centre for Global Health Research Scientific Meeting, to colleagues and staff from LSHTM, THRU ZIM, BRTI, and other relevant stakeholders. The presentation focused on the findings around the acceptability and effectiveness of integrated MH and SRH service provision. The presentation also highlighted the facilitators and barriers to MH product choices.

I also plan on presenting findings during a PhD seminar on November 14<sup>th</sup> and at the scheduled CHIEDZA Unblinding meeting from 28<sup>th</sup>- 30<sup>th</sup> of November 2022.

I have also presented my findings to colleagues at various LSHTM events. These included poster and oral presentations at the following:

1. PHP Virtual Research Poster Day (2022) (Appendix F)
2. MARCH Centre Careers Event (2021)
3. Research Degrees Poster Day (2020) (Appendix G)
4. MARCH Menstrual Hygiene Day Live Chat (2021)



**Researcher – academic presentations:** I presented oral and poster presentations throughout the course of my PhD research at the following academic conferences and meetings:

2. Institute of Continuing Health Education and University of Zimbabwe Annual Medical Research Day: Harare 2019 (Best Poster Award)
3. African Coalition for Menstrual Health and Hygiene (2019 and 2021) – Oral Presentation
4. Research Council of Zimbabwe International Symposium: Harare 2019
5. NIHR Global Health Research Group Menstrual Health Workshop: Harare 2019
6. Wellcome Trust Bloomsbury Centre for Global Health Research Scientific Meeting: Harare 2021
7. Menstruation in Media: Aberdeen 2021
8. Institute of Continuing Health Education and University of Zimbabwe Annual Medical Research Day: Harare 2022 (Best Provincial Research Award)
9. The Global Period Poverty Forum: Brisbane 2022

**Public Engagement:** I presented my thesis findings at MH workshops organized by implementing partners and CBOs carrying out MH outreach in Harare, Zimbabwe:

1. Zimbabwean Menstrual Health and Hygiene Symposium: Harare 2020
2. Kunashe Foundation Menstrual Health Workshop: Harare 2021
3. AFRIPads Menstrual Health Conference: Harare 2022
4. AFRIPads Menstrual Health Conference: Lilongwe 2022
5. Terre des Hommes International Federation Knowledge Club: Harare 2022

I also shared my research experiences and findings on my website ([www.thebleedread.com](http://www.thebleedread.com)), in articles, and on several podcasts.

#### **Articles:**

1. Menstrual health in Zimbabwe  
(<https://www.mhm-solutions.org/post/interview-mandi-tempo>)
2. Menstrual Hygiene Day 2022  
(<https://www.psieurope.org/post/menstrual-health-day-a-q-a-with-mandi-tempo-researching-at-the-intersection-of-menstrual-health-mh-and-sexual-and-reproductive-health-and-rights-srhr>)
3. My Period is Awesome Advocates  
(<https://www.myperiodisawesome.com/blog/mpia4activists-the-bleed-read-by-mandi-tempo>)
4. Education can make a difference  
(<https://www.thelily.com/just-one-educational-session-about-menstrual-hygiene-can-make-a-difference-for-young-women-new-study-shows/>)

#### **Podcasts:**

1. Researching menstrual health in Zimbabwe  
(<http://linktr.ee/HandMeUp>)
2. Why periods are so bloody important  
(<https://podcasts.ginandtopic.com/1735676/8830503-bombay-cucumber-gin-fizz-menstrual-health>)

3. Zimbabwe's menstrual health disparities

(<https://www.youtube.com/watch?v=WCSgNmNAD9A>)

4. UTANO Public Health Chats: with Mandi Tembo

(<https://open.spotify.com/episode/1JsaQxwITGH843krIafdHv?si=666faeffd70b49ed>)

#### **Videos:**

1. The CHIEDZA Study (Extended Version)

(<https://www.youtube.com/watch?v=BmTNqBFDB-8>)

2. The CHIEDZA Study (Short Version)

(<https://www.youtube.com/watch?v=dQfmvsTilzA&t=59s>)

3. CHIEDZA study celebrates Menstrual Hygiene Day

(<https://www.youtube.com/watch?v=u2ZGYaN4dok>)

4. What informs product choice for girls and women in Africa

(<https://www.youtube.com/watch?v=veoe407JVTE&t=2308s>)

Lastly, through my advocacy work I managed to:

1. Secure and distribute a donation of one million disposable pads to young women and female healthcare providers in the CHIEDZA intervention communities (2020-21)
2. Secure and distribute a donation of 100 packs of reusable pads from AFRIPads and Population Services Zimbabwe to refugee women at Tongogara Refugee Camp in Zimbabwe (2021)
3. Host a menstrual health art exhibition funded by UNFPA's Spotlight Initiative during the 16 Days of Activism (2021)

4. Create and disseminate instructional videos on the use and maintenance of the menstrual cup and reusable pads (available on The Bleed Read website) (2022)
5. Organize and host a virtual showing of The Vagina Monologues (2020)

### ***Future work***

The focus for future work will be to address some of the MH research gaps identified by the thesis findings using innovative and participatory methods. This research work has shown an unmet need for MH products and support for women, and for comprehensive interventions that address both physical and psychosocial MH needs, including managing menstrual pain and disorders, at community and primary healthcare levels (20, 42). The research also highlighted the importance of integrating MH services into SRH overall (42). Given this context, funded by the Reckitt Global Hygiene Institute Fellowship, I will conduct a three-year postgraduate fellowship aimed at improving MH care for women in Zimbabwe by co-developing and piloting a setting-specific evidence-based MH resource and training package to improve MH-seeking behaviours, quality of care and the overall well-being and QoL for women in Zimbabwe. This will be a three-year fellowship from January 2023 – December 2025.

I also plan on using some of the quantitative data from this research to publish two additional manuscripts on 1) the revalidation of Hennegan's MPNS-36 measuring tool and 2) MH pain prevalence and management methods. For the former, I have drafted a manuscript to be shared with co-authors for comments. The latter could be an opportunity to collaborate with an MSc student from LSHTM as part of their MSc research work. I will also continue my public

engagement work in MH in Zimbabwe and across the region through The Bleed Read and my leadership roles in the African Coalition for Menstrual Hygiene Management (ACMHM), LSHTM's MARCH Centre, and THRU ZIM.

## ***Conclusion***

This thesis provides robust evidence supporting the implementation of comprehensive MH interventions integrated into SRH service provision in community-settings. MH interventions are critically needed to address severe gaps in MH product provision and MH education among young women in the community and are highly acceptable. Key to acceptability is MH product choice and community engagement. This research also adds to the evidence highlighting the effectiveness of MH interventions on improving MH knowledge, perceptions, and practices over time. However, these changes take time and can be limited by longstanding myths and sociocultural norms. For MH interventions to be truly sustainable and effective over time, MH interventions need to be 1) context-specific, 2) provide a choice of MH products, analgesics, MH education and support over time and, 3) inclusive, engaging young men, caregivers, partners, and other key stakeholders in the community.

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## Appendices

### **Appendix A: Ethical approval certificates**

Telephone: 791792/791193/792747  
Telefax: (263) - 4 - 790715  
E-mail: mrcz@mrcz.org.zw  
Website: www.mrcz.org.zw



Medical Research Council of Zimbabwe  
Josiah Tongogara / Mazoe Street  
P. O. Box CY 573  
Causeway  
Harare

**REF: MRCZ/A/2387**

**04 April 2019**

**Prof. R. Ferrand**  
Biomedical Research and Training Institute  
10 Seagrave Road  
Avondale  
Harare

**RE: - Community based interventions to improve HIV outcomes in youth: A cluster randomised trial in Zimbabwe (CHIEDZA) Version 2.0, dated 07 March 2019**

We refer to your correspondence dated 07 March, 2019 on the above mentioned subject.

Please be advised that the MRCZ has **reviewed** and **approved** your application to:

- Remove a separate pilot intervention site
- Provide STI screening
- Include an STI-sub study
- Store left over urine samples
- Modify the approved MHM sub-study

As such, the following research documents have been approved:

- Urine Storage Consent (English, Shona and Ndebele) Version 2.0, dated 07 March 2019
- MHM Sub-Study (English, Shona and Ndebele) Version 2.0, dated 07 March 2019
- STI Sub-Study (English and Shona) Version 2.0, dated 07 March 2019

Yours Faithfully

.....  
**MRCZ SECRETARIAT  
FOR CHAIRPERSON  
MEDICAL RESEARCH COUNCIL OF ZIMBABWE**

PROMOTING THE ETHICAL CONDUCT OF HEALTH RESEARCH

Professor Rashida Ferrand  
LSHTM

25 April 2019

Dear Professor Rashida

Study Title: Community based interventions to improve HIV outcomes in youth: a cluster randomised trial in Zimbabwe (CHIEDZA)

LSHTM Ethics Ref: 16124 - 1

Thank you for your application for the above amendment to the existing ethically approved study and submitting revised documentation. The amendment application has been considered by the Interventions Committee.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above amendment to research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

Approval is dependent on local ethical approval for the amendment having been received, where relevant.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document Type	File Name	Date	Version
Other	CHIEDZA_MHM substudy_ENGLISH	07/03/2019	2.0
Other	CHIEDZA_URINE STORAGE_ENGLISH	07/03/2019	2.0
Other	Chiedza Protocol v2.0_TRACKED changes	07/03/2019	2

After ethical review

The Chief Investigator (CI) or delegate is responsible for informing the ethics committee of any subsequent changes to the application. These must be submitted to the Committee for review using an Amendment form. Amendments must not be initiated before receipt of written favourable opinion from the committee.

The CI or delegate is also required to notify the ethics committee of any protocol violations and/or Suspected Unexpected Serious Adverse Reactions (SUSARs) which occur during the project by submitting a Serious Adverse Event form.

An annual report should be submitted to the committee using an Annual Report form on the anniversary of the approval of the study during the lifetime of the study.

At the end of the study, the CI or delegate must notify the committee using an End of Study form.

All aforementioned forms are available on the ethics online applications website and can only be submitted to the committee via the website at: <http://leo.lshtm.ac.uk>

Additional information is available at: [www.lshtm.ac.uk/ethics](http://www.lshtm.ac.uk/ethics)

Yours sincerely,



Professor John DH Porter  
Chair

[ethics@lshtm.ac.uk](mailto:ethics@lshtm.ac.uk)  
<http://www.lshtm.ac.uk/ethics/>



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Improving health worldwide



## Appendix B: Informed Consent Form

LONDON  
SCHOOL of  
HYGIENE  
& TROPICAL  
MEDICINE



### Community based interventions to improve HIV outcomes in youth: a cluster randomised trial in Zimbabwe (CHIEDZA)

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#### MENSTRUAL HYGIENE MANAGEMENT (MHM) SUB-STUDY

**Principal Investigator:** Professor Rashida Ferrand [MB BS, FRCP, MSc, PhD]

**Phone:** +263 (0)4 745583

#### What you should know about this research study:

We give you this consent so that you may read about the purpose, risks, and benefits of this research study.

We cannot promise that this research will benefit you. The main goal of research studies is to gain knowledge that may help other people in the future.

You have the right to refuse to take part, or agree to take part now and change your mind later.

Please review this consent form carefully. Ask any questions before you make a decision.

Your participation is voluntary.

#### PURPOSE

We are doing a study to understand how young women deal with their periods. At the CHIEDZA service, you may have had information on how to deal with your periods and you may have been given period pants, reusable pads, or a menstrual cup with one pack of disposable pads. We want to find out what you know about periods and how you feel when you are on your period. We also want to know whether the information and the products make it easier for you to deal with your periods and whether or not you like the products. Lastly, also want to find out if the products cause you any problems. We are inviting you to take part because you have attended the CHIEDZA service. The research team is made up of scientists from the Biomedical Research and Training Institute (BRTI) and the London School of Hygiene and Tropical Medicine. The study is supported by the Ministry of Health in Zimbabwe.

#### PROCEDURES AND DURATION

If you decide to participate in this study, we will ask some questions about your health. We will also ask you some personal questions about your feelings, experiences and behaviours during your period, hygiene, and about any problems you might have with your periods. Some of these questions may be embarrassing so you can complete these on your own using a tablet. The

interviewer will not be able to see your answers on the tablet. The questions will take about 15 minutes.

We will ask you to keep a diary to record your feelings and behaviors during your periods and to track your periods and any discomfort or pain you may experience during your period and in your vaginal area over a one year period. After 3 months and after 12 months, we may ask you to hand in your diary so that we can gather information about your period, vaginal health and your well-being.

You will be asked to return every 3 months for a visit over a one year period. If you cannot make it to the CHIEDZA centre for a follow-up visit, we may ask if we can visit you at your home. At the 6 month and 12 month visit, we will ask you to answer some questions about your period using a tablet and we will also check your diary to make sure you are using it correctly.

We may ask you to take part in group discussions with other participants to talk about your experiences using the period management products and materials. We will audio record these discussions and take notes but your name will not be recorded. We may quote what you say when reporting results but no one will be able to link what you say back to you.

#### **RISKS AND DISCOMFORTS**

You may find it embarrassing or uncomfortable to answer some personal questions. We will try to make it as easy as possible for you by letting you complete the questions by yourself and the study team member will not be able to see your responses.

#### **BENEFITS AND/OR COMPENSATION**

Taking part in this study will cost you nothing. The study will help us understand the challenges young women face during their periods and what they need and want in terms of period products, education, and support. We will not pay you to take part in the study. However, if you are asked to take part in the group talks you will be reimbursed for travelling costs up to a value of US\$5.

#### **CONFIDENTIALITY**

If you agree to participate in this study by signing this document, all information obtained will be stored using a unique study number, in safe paper and computer files. No one will be able to access the information about you except for the study team and no one will be able to identify you from the information and samples collected. Data without your name but only a number may be made available to other researchers. Under some circumstances, the Medical Research Council of Zimbabwe may review research records to check for any problems.

#### **VOLUNTARY PARTICIPATION**

Participation in this study is voluntary. If you decide not to participate, your decision will not affect your future relations with CHIEDZA or any associated clinics, hospitals, and its personnel. The services you receive at the CHIEDZA site will not be affected if you decide not to participate in the study. If you decide to participate, you are free to withdraw your consent and discontinue participation at any time without penalty. Please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

## SIGNATURE PAGE

### Community based interventions to improve HIV outcomes in youth: a cluster randomised trial in Zimbabwe (CHIEDZA)

#### MENSTRUAL HYGIENE MANAGEMENT (MHM) SUB-STUDY

Protocol Version 2.0 dated 07 March 2019

#### OFFER TO ANSWER QUESTION

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over. If you have any questions, please contact Mandikudza Tembo on 0772676417.

#### AUTHORIZATION

You are making a decision whether or not to take part in this study. Your signature shows that you have read and understood the information provided above, have had all your questions answered, and have decided to take part.

- I have read the information sheet concerning this study [or have understood the verbal explanation] and I understand what will be required of me what will happen to me if I take part in it.
- I understand that at any time, I may withdraw from this study without giving a reason and without affecting my normal care and management.

I agree to take part in this study	YES/NO
I agree to be contacted if I do not attend scheduled study visits	YES/NO
I agree to take part in group discussions if asked	YES/NO
I agree to take part in an interview if asked	YES/NO
I agree to being visited at home for a scheduled study visit	YES/NO
I agree to be contacted again for a follow-up interview	YES/NO

---

*Name of Participant (print)*

---

*Signature of Participant*  
*Date*

---

*Name of Staff obtaining consent*  
*Date*

---

*Signature of Staff*

---

*Name of Witness (if required)*  
*Date*

---

??/??/20??  
*Signature of Witness*

YOU WILL BE OFFERED A COPY OF THIS CONSENT FORM TO KEEP

If you have any questions concerning this study or consent form beyond those answered by the investigator, including questions about the research, your rights as a research participant or research-related injuries; or if you feel that you have been treated unfairly and would like to talk to someone other than a member of the research team, please feel free to contact the Medical Research Council of Zimbabwe (MRCZ) on telephone (04)791792 or (04)791193 and cell phone lines 0784 956 128. The MRCZ Offices are located at the National Institute of Health Research premises at Corner Josiah Tongogara and Mazowe Avenue in Harare.

## Appendix C: Quantitative Survey

<b>MH STUDY ADMINISTRATION</b> <b>This section is to be filled out by the attending staff member</b>			
<b>A00</b>	<i>STAFFNO</i>	Staff Initials	□□□
<b>A01</b>	<i>STUDYN O</i>	Study Participant Cohort Number	□□□□□□
<b>A02</b>	<i>DOB</i>	Date of Birth (dd/mm/yyyy)	□□/□□/□□□□
<b>A03</b>	<i>AGE</i>		□□
<b>A04</b>	<i>DATE</i>	Date of visit (dd/mm/yyyy)	□□/□□/20□□
<b>A05</b>	<i>VISIT</i>	Type of visit	Initial <input type="checkbox"/> 6m <input type="checkbox"/> 12m <input type="checkbox"/>
<p>This questionnaire is to be filled out by participants in the menstrual health study</p> <p>The purpose of this questionnaire is to collect information about you and how you feel and behave during your period.</p> <p>There are 9 parts to this questionnaire. It should not take more than 30 minutes of your time. Please read the questions carefully and fill in the questionnaire as honestly as possible.</p> <p>Thank you for your participation.</p>			
<b>PART I: SOCIODEMOGRAPHIC INFORMATION</b> <b>These questions are to help understand more about your life</b>			
<b>A06</b>	<i>EDU</i>	Highest Level of Education	Please tick your highest level of education: No Formal School Education <input type="checkbox"/> Incomplete Primary School <input type="checkbox"/> Complete Primary School <input type="checkbox"/> Incomplete High School Education <input type="checkbox"/> Complete High School Education (O'Levels) <input type="checkbox"/> Complete High School Education (A'Levels) <input type="checkbox"/> Incomplete Tertiary Education <input type="checkbox"/>

			Complete University <input type="checkbox"/>
<b>A07</b>	<i>JOB</i>	Do you have a paying job?	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>A08</b>	<i>MONEY</i>	If you do not work, where do you get your money	I do not get money from anyone <input type="checkbox"/> I get money from a relative in the household (mother/father/brother/sister etc.) <input type="checkbox"/> I get money from a relative outside the household <input type="checkbox"/> I get money from my partner <input type="checkbox"/> Other <input type="checkbox"/> If you chose "Other", please list here: _____
<b>A09</b>	<i>MSTAT</i>	Marital Status	Single (Never Married) <input type="checkbox"/> Married, or living as if you are married <input type="checkbox"/> Widowed <input type="checkbox"/> Divorced/Separated <input type="checkbox"/>
<b>A10</b>	<i>RES</i>	Residence	Urban <input type="checkbox"/> Peri-Urban <input type="checkbox"/> Rural <input type="checkbox"/>
<b>A11</b>	<i>RELGN</i>	Religion	Not Religious <input type="checkbox"/> Traditional <input type="checkbox"/> Christian (Pentecostal) <input type="checkbox"/> Christian (Protestant) <input type="checkbox"/> Roman Catholic <input type="checkbox"/> Other <input type="checkbox"/>

			If you chose "Other", please list here: _____
<b>A12</b>	<i>HH</i>	Please tick any items your household has:	<p>Please tick all that apply:</p> <p>Television <input type="checkbox"/></p> <p>Radio <input type="checkbox"/></p> <p>Mobile Phone <input type="checkbox"/></p> <p>Electricity <input type="checkbox"/></p> <p>Water source inside the house <input type="checkbox"/></p> <p>Latrine inside the house <input type="checkbox"/></p>
<b>A13</b>	<i>INC</i>	How many people live in your household with you:	<p>None (I live alone) <input type="checkbox"/></p> <p>1 – 3 other people <input type="checkbox"/></p> <p>4 – 6 other people <input type="checkbox"/></p> <p>More than 6 people <input type="checkbox"/></p>
<b>PART II: GENERAL QUESTIONS ABOUT YOURSELF</b> These questions are about you and why you came to the CHIEDZA site			
<b>A14</b>	<i>CHIEDZA 1</i>	What brought you to CHIEDZA today?	<p>Please tick all that apply:</p> <p>STI Treatment <input type="checkbox"/></p> <p>Menstrual Hygiene Management <input type="checkbox"/></p> <p>HIV Testing <input type="checkbox"/></p> <p>HIV Treatment <input type="checkbox"/></p> <p>Condoms <input type="checkbox"/></p> <p>Family Planning <input type="checkbox"/></p> <p>Counselling <input type="checkbox"/></p>

			Other <input type="checkbox"/>  If you chose "Other", please list here: _____
<b>A15</b>	<i>CHIEDZA</i> 2	Would you come to CHIEDZA if you could not receive MH products and information?	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>PART III: PERIOD and PUBERTY KNOWLEDGE</b>			
These questions are about your understanding of puberty and periods			
<b>QUESTIONS ABOUT PUBERTY AND MENSTRUATION</b>			
<b>A16</b>	<i>KNW1</i>	Changes in the body during puberty happen because of hormones	Yes <input type="checkbox"/> No <input type="checkbox"/> I don't know <input type="checkbox"/>
<b>A17</b>	<i>KNW2</i>	Puberty continues throughout a girl's life	Yes <input type="checkbox"/> No <input type="checkbox"/> I don't know <input type="checkbox"/>
<b>A18</b>	<i>KNW2</i>	Menstruation in girls and women is normal	Yes <input type="checkbox"/> No <input type="checkbox"/> I don't know <input type="checkbox"/>
<b>A19</b>	<i>KNW3</i>	When a girl gets her first menstrual period, her body is able to carry a child	Yes <input type="checkbox"/> No <input type="checkbox"/> I don't know <input type="checkbox"/>
<b>A20</b>	<i>KNW4</i>	Menstrual blood is caused by the breakdown of the lining of the womb	Yes <input type="checkbox"/> No <input type="checkbox"/> I don't know <input type="checkbox"/>
<b>A21</b>	<i>KNW5</i>	It is normal to have irregular periods as a teenager	Yes <input type="checkbox"/> No <input type="checkbox"/> I don't know <input type="checkbox"/>
<b>A22</b>	<i>KNW6</i>	Menstruation continues throughout a girl's life	Yes <input type="checkbox"/> No <input type="checkbox"/> I don't know <input type="checkbox"/>
<b>A23</b>	<i>KNW7</i>	A period normally lasts 2 days or less	Yes <input type="checkbox"/> No <input type="checkbox"/> I don't know <input type="checkbox"/>
<b>A24</b>	<i>KNW8</i>	Period products that are inserted into the vagina	Yes <input type="checkbox"/> No <input type="checkbox"/> I don't know <input type="checkbox"/>



		(such as tampons and the menstrual cup) affect your virginity	
<b>PART IV: QUESTIONS ABOUT YOUR PERIOD HISTORY</b>			
The following questions are about you and your menstrual periods			
The following questions are about your period history			
<b>A25</b>	<i>MENAR CHE</i>	How old were you when you first started your periods?	Age <input type="checkbox"/> <input type="checkbox"/> I don't remember <input type="checkbox"/>
<b>A26</b>	<i>TAUGH T</i>	Who first told you or taught you about periods	No one told me about periods <input type="checkbox"/> My mother <input type="checkbox"/> My father <input type="checkbox"/> My female/male friend <input type="checkbox"/> My teacher <input type="checkbox"/> Other <input type="checkbox"/>  If you chose "Other", please list here: _____
<b>A27</b>	<i>INFO1</i>	Do you feel you had enough information and education to manage your period when you got your first period?	Yes <input type="checkbox"/> Somewhat <input type="checkbox"/> Not Really <input type="checkbox"/> Definitely No <input type="checkbox"/>
<b>A28</b>	<i>INFO2</i>	What did you think was happening when you got your first period?	Curse <input type="checkbox"/> Disease <input type="checkbox"/> Injury <input type="checkbox"/> Normal function for young women <input type="checkbox"/> I did not know what was happening <input type="checkbox"/>

			Other <input type="checkbox"/>
			If you chose "Other", please list here: _____
<b>A29</b>	<i>DAYS</i>	On average, how many days do you usually bleed for during your periods?	1 – 3 days <input type="checkbox"/> 4 – 7 days <input type="checkbox"/> More than 7 days <input type="checkbox"/>
<b>A30</b>	<i>RCNTD AYS</i>	How many days did you bleed during your most recent period?	<input type="checkbox"/> <input type="checkbox"/> I Do Not Remember <input type="checkbox"/>
<b>PART V: QUESTIONS ABOUT PAIN MANAGEMENT</b> The following questions are about menstruation-related pain			
<b>A31</b>	<i>PAINK NW1</i>	Painkillers can be used to relieve menstrual pain	Yes <input type="checkbox"/> No <input type="checkbox"/> I don't know <input type="checkbox"/>
<b>A32</b>	<i>PAINK NW2</i>	Painkillers can cause problems having children (barrenness)	Yes <input type="checkbox"/> No <input type="checkbox"/> I don't know <input type="checkbox"/>
<b>A33</b>	<i>PAINK NW3</i>	Exercising, stretching, or putting a warm towel or bottle on your stomach can relieve menstrual pain	Yes <input type="checkbox"/> No <input type="checkbox"/> I don't know <input type="checkbox"/>
During my last (most recent) menstrual period...			
<b>A34</b>	<i>PAIN1</i>	I experienced period-related pain in my lower back and/or abdomen	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>A35</b>	<i>PAIN2</i>	I missed work or school due to period-related pain	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>PART VI: QUESTIONS ABOUT PRACTICES AND PERCEPTIONS DURING MENSTRUATION</b> The following questions are about how you manage your menstruation			
The following questions are about your last (most recent) period			

<p><b>A36</b></p>	<p><i>PRDCT</i></p>	<p>During your most recent period, what material(s) did you mostly use to collect or absorb your period blood?</p>	<p>Please tick all that apply:</p> <p>Cloth/Rags/Fabric <input type="checkbox"/></p> <p>Reusable Pads <input type="checkbox"/></p> <p>Disposable Pads <input type="checkbox"/></p> <p>Menstrual Cup <input type="checkbox"/></p> <p>Period Pants <input type="checkbox"/></p> <p>Other <input type="checkbox"/></p> <p>Not Applicable <input type="checkbox"/></p> <p>If you chose "Other", please list here: _____</p>
<p><b>A37</b></p>	<p><i>HPRDCT</i></p>	<p>During your most recent period, what material(s) did you mostly use to collect or absorb your period blood when at home?</p>	<p>Please tick all that apply:</p> <p>Cloth/Rags/Fabric <input type="checkbox"/></p> <p>Reusable Pads <input type="checkbox"/></p> <p>Disposable Pads <input type="checkbox"/></p> <p>Menstrual Cup <input type="checkbox"/></p> <p>Period Pants <input type="checkbox"/></p> <p>Other <input type="checkbox"/></p> <p>Not Applicable <input type="checkbox"/></p> <p>If you chose "Other", please list here: _____</p>
<p><b>A38</b></p>	<p><i>SWPRDCT</i></p>	<p>During your most recent period, what material(s) did you mostly use to collect or absorb your period blood when at school/work?</p>	<p>Please tick all that apply:</p> <p>Cloth/Rags/Fabric <input type="checkbox"/></p> <p>Reusable Pads <input type="checkbox"/></p> <p>Disposable Pads <input type="checkbox"/></p> <p>Menstrual Cup <input type="checkbox"/></p> <p>Period Pants <input type="checkbox"/></p>

			Other <input type="checkbox"/> Not Applicable <input type="checkbox"/> If you chose "Other", please list here: _____
During my last (most recent) menstrual period...			
<b>A39</b>	<i>PRDCT</i> 1	My menstrual products were comfortable	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A40</b>	<i>PRDCT</i> 2	I had enough of my menstrual products to change them as often as I wanted to	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A41</b>	<i>PRDCT</i> 3	Before I used them, I was satisfied with the cleanliness of my menstrual products	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A42</b>	<i>PRDCT</i> 4	I could get more of my menstrual materials when I needed to	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A43</b>	<i>PRDCT</i> 5	I was worried that my menstrual products would allow blood to pass through my outer garments	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A44</b>	<i>PRDCT</i> 6	I was worried that my menstrual products would	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/>

		move from place while I was wearing them	Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A45</b>	<i>PRDCT</i> 7	I worried about how I would get more of my menstrual material if I ran out	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A46</b>	<i>PRDCT</i> 8	I felt comfortable carrying spare menstrual products with me outside my home	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A47</b>	<i>PRDCT</i> 9	I felt comfortable carrying menstrual products to the place where I changed them	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A48</b>	<i>PRDCT</i> 10	I felt comfortable storing my menstrual products until my next period	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A49</b>	<i>PRDCT</i> 11	I was able to wash my hands <u>when</u> I wanted to	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>If participant ticks "Disposable Pads" or "Cloth/Rags/Fabric"</b>			
During my last (most recent) period...			
<b>B1</b>	<i>DIS1</i>	I was able to immediately dispose of my used menstrual material	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/>

			Strongly Agree <input type="checkbox"/>
<b>B2</b>	<i>DIS2</i>	I was able to dispose of my used menstrual material in the way I wanted to	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>B3</b>	<i>DIS3</i>	I worried about where to dispose of my used menstrual materials	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>B4</b>	<i>DIS4</i>	I was concerned that others would see my menstrual materials in the place I disposed them	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>If participant ticks "Cloth/Rags/Fabric", "Period Pants" and/or "Reusable Pads":</b>			
During my last (most recent) period...			
<b>C1</b>	<i>REUS1</i>	I had enough water to soak or wash my menstrual products	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>C2</b>	<i>REUS2</i>	I had access to a basin or dish to soak or wash my menstrual products whenever I needed	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>C3</b>	<i>REUS3</i>	I was able to wash my menstrual products <u>when</u> I wanted to	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>

<b>C4</b>	<i>REUS4</i>	I had enough soap to wash my menstrual products	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>C5</b>	<i>REUS5</i>	I was able to dry my products <u>when</u> I wanted to	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>C6</b>	<i>REUS6</i>	I was worried that someone would see me while I was washing my menstrual products	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>C7</b>	<i>REUS7</i>	I was worried that my menstrual products would not be dry when I needed them	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>C8</b>	<i>REUS8</i>	I was worried that others would see my menstrual products while they were drying	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>C9</b>	<i>REUS9</i>	How often did you change your menstrual products during the heaviest day of your most recent period?	Once a day (within a 24hr period) <input type="checkbox"/> Twice a day (within a 24hr period) <input type="checkbox"/> Three times a day (within a 24hr period) <input type="checkbox"/> More than three times a day (within a 24hr period) <input type="checkbox"/>
<b>C10</b>	<i>REUS10</i>	At home, where did you most often change your menstrual products during your most recent period?	In a toilet inside the building <input type="checkbox"/> In a toilet outside the building <input type="checkbox"/> In a private room <input type="checkbox"/> Outside (in the field/by the river) <input type="checkbox"/>

			<p style="text-align: right;">Other <input type="checkbox"/></p> <p>If you chose "Other", please explain: _____</p>
<b>C11</b>	<i>REUS11</i>	At school/work, where did you most often change your menstrual products during your most recent period?	<p style="text-align: right;">In a toilet inside the building <input type="checkbox"/></p> <p style="text-align: right;">In a toilet inside the building <input type="checkbox"/></p> <p style="text-align: right;">In a toilet outside the building <input type="checkbox"/></p> <p style="text-align: right;">In a private room <input type="checkbox"/></p> <p style="text-align: right;">Outside (in the field/by the river) <input type="checkbox"/></p> <p style="text-align: right;">Other <input type="checkbox"/></p> <p style="text-align: right;">Not applicable <input type="checkbox"/></p> <p>If you chose "Other", please explain: _____</p>
<b>C12</b>	<i>REUS12</i>	Where did you wash your menstrual products during your last period?	<p style="text-align: right;">In the bathroom <input type="checkbox"/></p> <p style="text-align: right;">At a private well or tap in the house <input type="checkbox"/></p> <p style="text-align: right;">At a public well or tap outside the house <input type="checkbox"/></p> <p style="text-align: right;">In a pond or river <input type="checkbox"/></p> <p style="text-align: right;">Did not wash your menstrual products <input type="checkbox"/></p> <p style="text-align: right;">Other <input type="checkbox"/></p> <p>If you chose "Other", please explain: _____</p>
<b>C13</b>	<i>REUS13</i>	What did you use to wash your products with during your most recent period?	<p style="text-align: right;">With water only <input type="checkbox"/></p> <p style="text-align: right;">With soap and water <input type="checkbox"/></p> <p style="text-align: right;">Did not wash my menstrual products <input type="checkbox"/></p> <p style="text-align: right;">Other <input type="checkbox"/></p> <p>If you chose "Other", please explain: _____</p>
<b>C14</b>	<i>REUS14</i>	Where did you dry your menstrual products during your most recent period?	<p style="text-align: right;">Outside in the sun <input type="checkbox"/></p> <p style="text-align: right;">Outside in the sun, under a cloth <input type="checkbox"/></p> <p style="text-align: right;">Inside in the house in an open space <input type="checkbox"/></p>



			<p>Inside the house in a closed space <input type="checkbox"/></p> <p>Did not dry my reusable pad, period pants, or cloth/rags/fabric <input type="checkbox"/></p> <p>Other <input type="checkbox"/></p> <p>If you chose "Other", please explain: _____</p>
<b>C15</b>	<i>REUS15</i>	Did you ever wear your menstrual product when it was damp (not yet dry) during your most recent period?	<p>Yes <input type="checkbox"/> (No <input type="checkbox"/></p> <p>Do Not Remember <input type="checkbox"/></p>
<b>C16</b>	<i>REUS16</i>	Where did you store your menstrual products after your most recent period?	<p>In a cupboard <input type="checkbox"/></p> <p>In the toilet <input type="checkbox"/></p> <p>In an open space <input type="checkbox"/></p> <p>In a hidden place <input type="checkbox"/></p> <p>Did not store <input type="checkbox"/></p> <p>Other <input type="checkbox"/></p> <p>If you chose "Other", please explain: _____</p>
<b>If participant ticks "Menstrual Cup":</b>			
During my last (most recent) period...			
<b>D1</b>	<i>MC1</i>	I was able to sterilize my menstrual cup <u>when</u> I wanted after my period	<p>Strongly Disagree <input type="checkbox"/></p> <p>Disagree <input type="checkbox"/></p> <p>Agree <input type="checkbox"/></p> <p>Strongly Agree <input type="checkbox"/></p>
<b>D2</b>	<i>MC2</i>	I was able to rinse my menstrual cup <u>when</u> I wanted	<p>Strongly Disagree <input type="checkbox"/></p> <p>Disagree <input type="checkbox"/></p> <p>Agree <input type="checkbox"/></p> <p>Strongly Agree <input type="checkbox"/></p>

<b>D3</b>	<i>MC3</i>	I had enough water to rinse my menstrual cup	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>D4</b>	<i>MC4</i>	I was worried that someone would see me while I was rinsing my menstrual cup	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>D5</b>	<i>MC5</i>	I was worried that someone would see me while I was sterilizing my menstrual cup	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>D6</b>	<i>MC6</i>	How long did it take you to get comfortable and relaxed using your menstrual cup?	1 Period <input type="checkbox"/> 2 Periods <input type="checkbox"/> 3 Periods <input type="checkbox"/> 4 or More Periods <input type="checkbox"/> Still Not Comfortable or Relaxed <input type="checkbox"/>
<b>D7</b>	<i>MC7</i>	What is difficult about using your menstrual cup?	Tick All that Apply: Could not get the cup in <input type="checkbox"/> Too much pain and discomfort <input type="checkbox"/> Difficult to clean <input type="checkbox"/> Difficult to remove <input type="checkbox"/> Other <input type="checkbox"/> If you chose "Other", please explain: _____
<b>D8</b>	<i>MC8</i>	How often did you empty and re-insert your menstrual cup during the heaviest day of your most recent period?	Once a day (within a 24hr period) <input type="checkbox"/> Twice a day (within a 24hr period) <input type="checkbox"/> Three times a day (within a 24hr period) <input type="checkbox"/> More than three times a day (within a 24hr period) <input type="checkbox"/>

<b>D9</b>	<i>MC9</i>	At home, where did you most often empty and re-insert your menstrual cup when you needed to during your most recent period?	<p>In a toilet inside the building <input type="checkbox"/></p> <p>In a toilet outside the building <input type="checkbox"/></p> <p>Outside (in the field/by the river) <input type="checkbox"/></p> <p>Other <input type="checkbox"/></p> <p>If you chose "Other", please explain: _____</p>
<b>D10</b>	<i>MC10</i>	At school/work, where did you most often empty and re-insert your menstrual cup when you needed to during your most recent period?	<p>In a toilet inside the building <input type="checkbox"/></p> <p>In a toilet outside the building <input type="checkbox"/></p> <p>Outside (in the field/by the river) <input type="checkbox"/></p> <p>Not Applicable <input type="checkbox"/></p> <p>Other <input type="checkbox"/></p> <p>If you chose "Other", please explain: _____</p>
<b>D11</b>	<i>MC11</i>	Where did you rinse your menstrual cup during your last period?	<p>In a private bathroom <input type="checkbox"/></p> <p>In a public bathroom <input type="checkbox"/></p> <p>At a private well or tap in the house <input type="checkbox"/></p> <p>At a public well or tap outside the house <input type="checkbox"/></p> <p>In a pond or river <input type="checkbox"/></p> <p>Did not rinse my menstrual cup <input type="checkbox"/></p> <p>Other <input type="checkbox"/></p> <p>If you chose "Other", please explain: _____</p>
<b>D12</b>	<i>MC12</i>	What did you rinse your menstrual cup with during your most recent period?	<p>With water only <input type="checkbox"/></p> <p>With soap and water <input type="checkbox"/></p> <p>Did not rinse my menstrual cup <input type="checkbox"/></p> <p>Other <input type="checkbox"/></p> <p>If you chose "Other", please explain: _____</p>

<b>D13</b>	<i>MC13</i>	During your most recent period, how did you sterilise your menstrual cup?	Boiled cup for 3 min <input type="checkbox"/> Washed with boiling water <input type="checkbox"/> Soaked in vinegar and water solution <input type="checkbox"/> Other <input type="checkbox"/> If you chose "Other", please explain: _____
<b>D14</b>	<i>MC14</i>	Did you store your menstrual cup in an aerated bag between periods?	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>D15</b>	<i>MC15</i>	During your most recent period, did you ever use a reusable or disposable pad along with the menstrual cup?	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>PART V: QUESTIONS ABOUT YOUR WASHING PRACTICES</b>			
The following questions are about how you wash your body and your vagina during your last (most recent) period			
<b>A50</b>	<i>WASH1</i>	What type of washing did you do when you were on your most recent period?	External genital wash only <input type="checkbox"/> Full body wash <input type="checkbox"/> I did not wash myself <input type="checkbox"/> Other <input type="checkbox"/> If you chose "Other", please explain: _____
<b>A51</b>	<i>WASH2</i>	On average, how many times did you wash your body during your most recent period?	Less than once a day <input type="checkbox"/> Once a day <input type="checkbox"/> Twice a day <input type="checkbox"/> Three times a day or more <input type="checkbox"/>
<b>A52</b>	<i>WASH3</i>	What did you use to wash yourself during your most recent period?	Water only <input type="checkbox"/> Soap and water <input type="checkbox"/> Not Applicable <input type="checkbox"/> Other <input type="checkbox"/> If you chose "Other", please explain: _____
<b>PART VII: QUESTIONS ABOUT YOUR ATTITUDES ABOUT MENSTRUATION</b>			
These questions are about how feel about menstruation			

<b>A53</b>	<i>ATTITU DE1</i>	I feel dirty or impure during my menstrual period	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neutral <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A54</b>	<i>ATTITU DE2</i>	I feel like I can talk to friends about menstruation	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neutral <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A55</b>	<i>ATTITU DE3</i>	I feel like I can talk to my family members about menstruation	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neutral <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A56</b>	<i>ATTITU DE4</i>	I feel proud that I have my periods	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neutral <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A57</b>		It is important that I keep my period a secret from everyone	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neutral <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A58</b>	<i>ATTITU DE5</i>	I worry that boys will tease me about my period	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neutral <input type="checkbox"/>

			<p>Agree <input type="checkbox"/></p> <p>Strongly Agree <input type="checkbox"/></p>
<b>A59</b>	<i>ATTITU DE6</i>	I am anxious about my next period	<p>Strongly Disagree <input type="checkbox"/></p> <p>Disagree <input type="checkbox"/></p> <p>Neutral <input type="checkbox"/></p> <p>Agree <input type="checkbox"/></p> <p>Strongly Agree <input type="checkbox"/></p>
<b>PART VIII: PARTICIPATION</b>			
<b>The following questions are about how your period may affect your everyday activities</b>			
<b>A60</b>	<i>PRTCPT N1</i>	In the last 3 months, have you missed work/school because of your period?	<p>Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p><b>If "No", skip next question</b></p>
<b>A61</b>	<i>PRTCPT N2</i>	Why did you miss work/school?	<p>Please tick all that apply:</p> <p>Pain <input type="checkbox"/></p> <p>Nothing To Use To Manage My Period <input type="checkbox"/></p> <p>No place to change or wash <input type="checkbox"/></p> <p>Ashamed or embarrassed <input type="checkbox"/></p> <p>Scared I will leak <input type="checkbox"/></p> <p>Told to go home/Not allowed <input type="checkbox"/></p>
<b>A62</b>	<i>PRTCPT N3</i>	In the last 3 months, have you missed social events or community/religious happenings because of your period?	<p>Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p><b>If "No", skip next question</b></p>
<b>A63</b>	<i>PRTCPT N4</i>	Why did you miss the social events or social/religious happenings?	<p>Please tick all that apply:</p> <p>Pain <input type="checkbox"/></p> <p>Nothing To Use To Manage My Period <input type="checkbox"/></p> <p>No place to change or wash <input type="checkbox"/></p> <p>Ashamed or embarrassed <input type="checkbox"/></p>

			Scared I will leak <input type="checkbox"/> Told to go home/Not allowed <input type="checkbox"/>
<b>A64</b>	<i>PRTCPT N5</i>	In the last 3 months, what everyday activities have you missed out on because of your period?	Please tick all that apply: Household activities (washing clothes, dishes, etc) <input type="checkbox"/> Sports (athletics, running, swimming, etc) <input type="checkbox"/> Income-generating activities <input type="checkbox"/> Religious activities <input type="checkbox"/> Socialising with friends and family <input type="checkbox"/> School <input type="checkbox"/>
<b>PART IX: FACTORS AT HOME</b>			
The following questions are about the surroundings in which you manage your period at home			
At home during my last (most recent) period...			
<b>A65</b>	<i>FHOME 1</i>	I was able to change my menstrual products <u>when</u> I wanted to	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A66</b>	<i>FHOME 2</i>	I was satisfied with the place I used to change my menstrual products	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A67</b>	<i>FHOME 3</i>	I had a clean place to change my menstrual products	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A68</b>	<i>FHOME 4</i>	I was worried I would not be able to change my menstrual products <u>when</u> I needed to	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A69</b>	<i>FHOME 5</i>	I was worried someone would	Strongly Disagree <input type="checkbox"/>

		see me while I was changing my menstrual products	Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A70</b>	<i>FHOME</i> 6	I was worried someone would harm me while I was changing my menstrual products	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A71</b>	<i>FHOME</i> 7	I was worried something else would harm me while I was changing my menstrual products	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/>
<b>A72</b>	<i>FHOME</i> 8	Do you have access to a clean water source at your home	Yes <input type="checkbox"/> No <input type="checkbox"/> <b>If "No", skip next question</b>
<b>A73</b>	<i>FHOME</i> 9	Where is your clean water source located?	Please tick all that apply: Inside the toilet <input type="checkbox"/> Outside the toilet but inside the home <input type="checkbox"/> Outside the house but inside the yard of my home <input type="checkbox"/> In a public space <input type="checkbox"/>
<b>A74</b>	<i>FHOME</i> 10	Do you have access to a toilet at home	Yes <input type="checkbox"/> No <input type="checkbox"/> <b>If "No", skip next question</b>
<b>A75</b>	<i>FHOME</i> 11	Where is your toilet located?	Inside the house <input type="checkbox"/> Outside the house but inside the yard <input type="checkbox"/> In a public space <input type="checkbox"/>
<b>A76</b>	<i>FHOM1</i> 2	Does your toilet have a door and a working lock on the inside (for privacy)?	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>PART IX: FACTORS AT SCHOOL/WORK</b>			
The following questions are about how you manage your period at school/work			

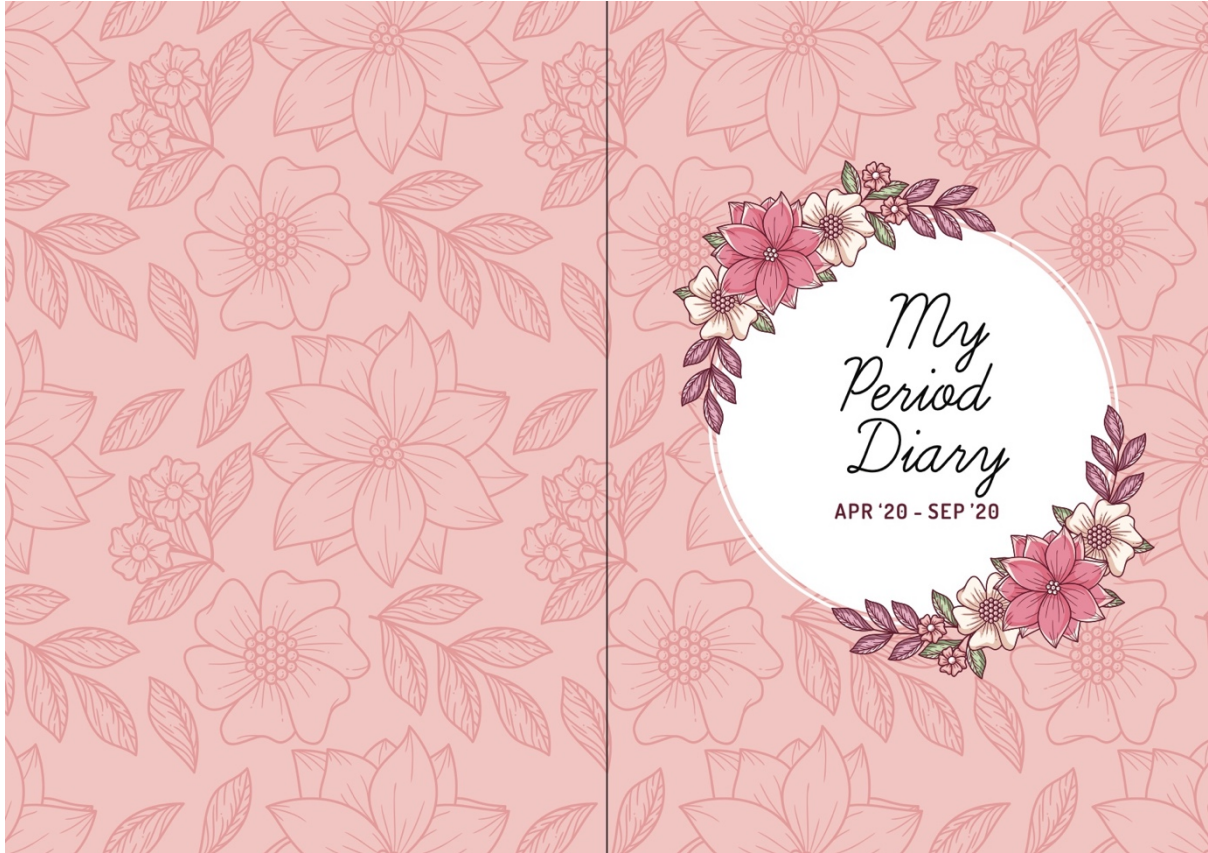


At school/work during my last period...			
<b>A77</b>	<i>FSW1</i>	I was able to change my menstrual products <u>when</u> I wanted to	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Not Applicable <input type="checkbox"/>
<b>A78</b>	<i>FSW2</i>	I was satisfied with the place I used to change my menstrual products	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Not Applicable <input type="checkbox"/>
<b>A79</b>	<i>FSW3</i>	I had a clean place to change my menstrual materials	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Not Applicable <input type="checkbox"/>
<b>A80</b>	<i>FSW4</i>	I was worried I would not be able to change my menstrual material <u>when</u> I needed to	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Not Applicable <input type="checkbox"/>
<b>A81</b>	<i>FSW5</i>	I was worried someone would see me while I was changing my menstrual products	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Not Applicable <input type="checkbox"/>
<b>A82</b>	<i>FSW6</i>	I was worried someone would	Strongly Disagree <input type="checkbox"/>

		harm me while I was changing my menstrual products	Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Not Applicable <input type="checkbox"/>
<b>A83</b>	<i>FSW7</i>	I was worried something else would harm me while I was changing my menstrual products	Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Not Applicable <input type="checkbox"/>
<b>A84</b>	<i>FSW8</i>	Do you have access to a toilet at school/work?	Yes <input type="checkbox"/> No <input type="checkbox"/> Not Applicable <input type="checkbox"/> <b>If "No" or "Not Applicable", skip next 2 questions</b>
<b>A85</b>	<i>FSW9</i>	Where is your toilet located?	Inside the building <input type="checkbox"/> Outside the building but inside the school/work yard <input type="checkbox"/> In a public area, outside the school/work yard <input type="checkbox"/>
<b>A88</b>	<i>FSW12</i>	Does your toilet have a door and a working lock on the inside (for privacy)?	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>A86</b>	<i>FSW10</i>	Do you have access to water at school/work?	Yes <input type="checkbox"/> No <input type="checkbox"/> Not Applicable <input type="checkbox"/> <b>If "No" or "Not Applicable", skip next question</b>
<b>A87</b>	<i>FSW11</i>	Where is your water source located?	Please tick all that apply: Inside the toilet <input type="checkbox"/> Outside the toilet but inside the school/work building <input type="checkbox"/> Outside the building but inside the school/work yard <input type="checkbox"/> In a public area, outside the school/work yard <input type="checkbox"/>

**THANK YOU FOR YOUR TIME AND YOUR ANSWERS!**

# Appendix D: Period tracking diary



## Period Tracking Diary

### Summary

All of the MAE sub-study participants will be given a period tracking diary at enrolment and will be asked to fill out the diary during their periods. Participants will then be asked to hand in their period tracking diaries at their follow-up visits 3 months into the sub-study and 12 months into the sub-study.

The period tracking diary entries will be used to evaluate MHM product choice, product use patterns, to track participants' behaviours, pain, and pain management during menstruation. The period tracking diary will also assess school or work absenteeism during participants' menstrual cycles.

### Outcomes (using Period Tracking Diary)

1. Choice of MHM product
2. Proportion with consistent MHM product use over time
3. MHM product patterns of use
4. Proportion with improved MHM pain management over time
5. Patterns of absenteeism from work or school due to menstruation

#### Important Notes

1. For each question draw a tick in the box for the answer that applies  
2. For the questions asking:

a. Did you go to school/work today?

Answer as follows:  
Full day = Yes, for the whole day.  
Half day = Yes for half a day or less than a full day.  
No = Did not attend school/work at all even though it was open  
Holiday = No, because it was a public holiday or weekend when you do not study

b. Are you on your period today?

Answer as follows:  
No = I am not having my periods  
Light = Light blood flow or spotting  
Moderate = Medium or average blood flow  
Heavy = heavy blood flow

**04**  
2020 April

Day	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30																														
<b>ABOUT BLEEDING</b>																															
Are you bleeding today?	No																														
	Light																														
	Moderate																														
	Heavy																														
<b>PRODUCT CHOICE (TICK THOSE THAT APPLY)</b>																															
Period Pads	<input type="checkbox"/>																														
Reusable Pads	<input type="checkbox"/>																														
Menstrual Cup	<input type="checkbox"/>																														
Disposable Pads	<input type="checkbox"/>																														
Clush	<input type="checkbox"/>																														
Cotton	<input type="checkbox"/>																														
Other	Specify _____																														
Other	Specify _____																														
<b>ABOUT PAIN</b>																															
Are you in pain?	Yes																														
	No																														
Did you take any pain medication today?	Yes																														
	No																														
<b>SCHOOL OR WORK ATTENDANCE</b>																															
Did you go to school/work today?	No																														
	Full Day																														
	Half Day																														
	Holiday																														
<b>THOUGHTS AND FEELINGS</b>																															
Any other thoughts?																															

**Important Notes**

- For each question draw a tick in the box for the answer that applies.
- For the questions asking:

**a. Did you go to school/work today?**

Answer as follows:  
 Full day = Yes, for the whole day.  
 Half day = Yes for half a day or less than a full day.  
 No = Did not attend school/work at all even though it was open.  
 Holiday = No, because it was a public holiday or weekend when you do not study.

**b. Are you on your period today?**

Answer as follows:  
 No = I am not having my periods.  
 Light = light blood flow or spotting.  
 Moderate = Medium or average blood flow.  
 Heavy = heavy blood flow.

06

**05**  
2020 May

Day	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31																														
<b>ABOUT BLEEDING</b>																															
Are you bleeding today?	No																														
	Light																														
	Moderate																														
	Heavy																														
<b>PRODUCT CHOICE (TICK THOSE THAT APPLY)</b>																															
Period Pads	<input type="checkbox"/>																														
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Disposable Pads	<input type="checkbox"/>																														
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Cotton	<input type="checkbox"/>																														
Other	Specify _____																														
Other	Specify _____																														
<b>ABOUT PAIN</b>																															
Are you in pain?	Yes																														
	No																														
Did you take any pain medication today?	Yes																														
	No																														
<b>SCHOOL OR WORK ATTENDANCE</b>																															
Did you go to school/work today?	No																														
	Full Day																														
	Half Day																														
	Holiday																														
<b>THOUGHTS AND FEELINGS</b>																															
Any other thoughts?																															

**Important Notes**

- For each question draw a tick in the box for the answer that applies.
- For the questions asking:

**a. Did you go to school/work today?**

Answer as follows:  
 Full day = Yes, for the whole day.  
 Half day = Yes for half a day or less than a full day.  
 No = Did not attend school/work at all even though it was open.  
 Holiday = No, because it was a public holiday or weekend when you do not study.

**b. Are you on your period today?**

Answer as follows:  
 No = I am not having my periods.  
 Light = light blood flow or spotting.  
 Moderate = Medium or average blood flow.  
 Heavy = heavy blood flow.

07

**08**  
2020 August

Day	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31																														
<b>ABOUT BLEEDING</b>																															
Are you bleeding today?	No																														
	Light																														
	Moderate																														
	Heavy																														
<b>PRODUCT CHOICE (TICK THOSE THAT APPLY)</b>																															
Period Pads	<input type="checkbox"/>																														
Reusable Pads	<input type="checkbox"/>																														
Menstrual Cup	<input type="checkbox"/>																														
Disposable Pads	<input type="checkbox"/>																														
Clush	<input type="checkbox"/>																														
Cotton	<input type="checkbox"/>																														
Other	Specify _____																														
Other	Specify _____																														
<b>ABOUT PAIN</b>																															
Are you in pain?	Yes																														
	No																														
Did you take any pain medication today?	Yes																														
	No																														
<b>SCHOOL OR WORK ATTENDANCE</b>																															
Did you go to school/work today?	No																														
	Full Day																														
	Half Day																														
	Holiday																														
<b>THOUGHTS AND FEELINGS</b>																															
Any other thoughts?																															

**Important Notes**

- For each question draw a tick in the box for the answer that applies.
- For the questions asking:

**a. Did you go to school/work today?**

Answer as follows:  
 Full day = Yes, for the whole day.  
 Half day = Yes for half a day or less than a full day.  
 No = Did not attend school/work at all even though it was open.  
 Holiday = No, because it was a public holiday or weekend when you do not study.

**b. Are you on your period today?**

Answer as follows:  
 No = I am not having my periods.  
 Light = light blood flow or spotting.  
 Moderate = Medium or average blood flow.  
 Heavy = heavy blood flow.

10

**MAE Study Research Assistant**

Participants should skip this page.

Research assistant must complete this page before giving the period tracking diary to the study participant.

The research assistant must complete this page after the study participant has submitted all important study forms. The MAE study forms include the consent form, the quantitative questionnaire, the locator form, and the scheduled visit form.

The research assistant should complete the fields below:

1. Participant has given consent to participate in the study? YES  NO

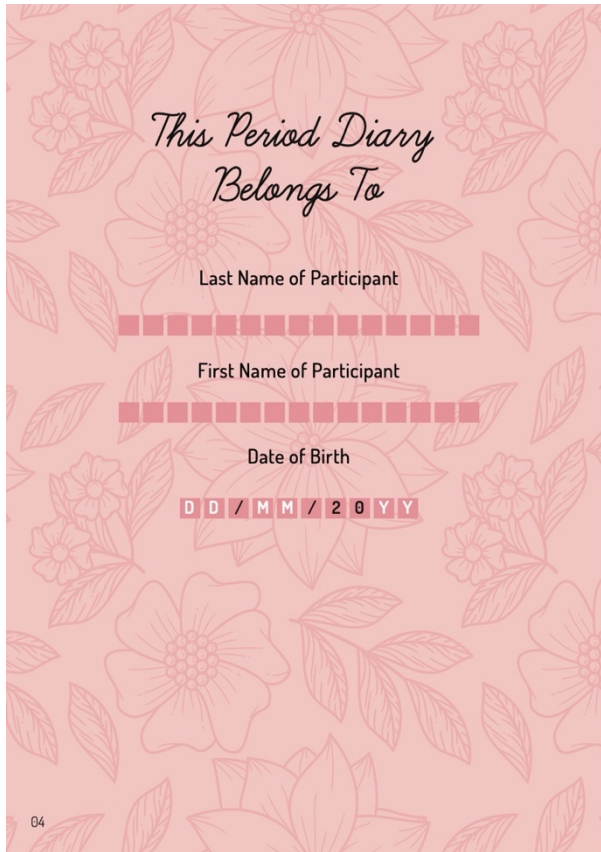
2. What is the estimated date of menarche (first period)? \*If only year known, enter 99/99 for day/month. If only month and year known, enter 99 for day.

Date of menarche onset:   /

3. Approximate age at menarche:

4. MAE Sub-Study Cohort Number

03



07 2020 July

Day 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

**ABOUT BLEEDING**

Are you bleeding today?

No

Light

Moderate

Heavy

**PRODUCT CHOICE (TICK THOSE THAT APPLY)**

Period Pads

Reusable Pads

Menstrual Cup

Disposable Pads

Clush

Cotton

Other Specify

Other Specify

**ABOUT PAIN**

Are you in pain?

Yes

No

Did you take any pain medication today?

Yes

No

**SCHOOL OR WORK ATTENDANCE**

Did you go to school or work today?

No

Full Day

Half Day

Holiday

**THOUGHTS AND FEELINGS**

Any other thoughts?

**Important Notes**

- For each question draw a tick in the box for the answer that applies.
- For the questions asking:

**a. Did you go to school/work today?**

Answer as follows:  
 Full day = Yes, for the whole day.  
 Half day = Yes for half a day or less than a full day.  
 No = Did not attend school/work at all even though it was open.  
 Holiday = No, because it was a public holiday or weekend when you do not study.

**b. Are you on your period today?**

Answer as follows:  
 No = I am not having my periods.  
 Light = light blood flow or spotting.  
 Moderate = Medium or average blood flow.  
 Heavy = heavy blood flow.

09

06 2020 June

Day 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

**ABOUT BLEEDING**

Are you bleeding today?

No

Light

Moderate

Heavy

**PRODUCT CHOICE (TICK THOSE THAT APPLY)**

Period Pads

Reusable Pads

Menstrual Cup

Disposable Pads

Clush

Cotton

Other Specify

Other Specify

**ABOUT PAIN**

Are you in pain?

Yes

No

Did you take any pain medication today?

Yes

No

**SCHOOL OR WORK ATTENDANCE**

Did you go to school or work today?

No

Full Day

Half Day

Holiday

**THOUGHTS AND FEELINGS**

Any other thoughts?

**Important Notes**

- For each question draw a tick in the box for the answer that applies.
- For the questions asking:

**a. Did you go to school/work today?**

Answer as follows:  
 Full day = Yes, for the whole day.  
 Half day = Yes for half a day or less than a full day.  
 No = Did not attend school/work at all even though it was open.  
 Holiday = No, because it was a public holiday or weekend when you do not study.

**b. Are you on your period today?**

Answer as follows:  
 No = I am not having my periods.  
 Light = light blood flow or spotting.  
 Moderate = Medium or average blood flow.  
 Heavy = heavy blood flow.

08

**How to Fill Out Your Period Tracking Diary**

Before you complete anything, please ensure that you have signed the consent form to participate in the MAE sub-study. Only female participants that have given consent can participate in this sub-study.

- Complete all fields on the cover page of the diary before leaving the study site. You should consult the study staff if any entries or questions are unclear.
- Do not complete the next page as this will only be completed by the research assistant.
- Your diary entries should be done on a day- to-day basis.

05



## Appendix E: Menstrual health intervention pamphlet

Here are some easy steps to follow so you can track your period using a simple calendar, diary, or piece of paper:

**To measure the length of your period**

**Step 1:** Mark down the first day that you bleed.

**Step 2:** Mark down the last day that you bleed.

**Step 3:** Repeat steps 1 and 2 for 3 months.

**Step 4:** Add the number of days you bleed for month 1, 2, and 3 and divide by 3 to calculate the average length of your period.

**To measure your period cycle**

**Step 1:** Write down the first day that you bleed.

**Step 2:** Write down the first day of your NEXT period.

**Step 3:** Count the number of days in-between the first days of your period for the two months.

**Step 4:** Estimate the first day of your next period (3rd month) by counting the same number of days between the first day of the 1st month and the first day of the 2nd month



### Pain Management

If you have menstrual cramps, take some pain medication such as ibuprofen or paracetamol. For the best results, try to take these medications the day before your period is due to start or just as soon as bleeding or cramping starts.

If you do not want to or cannot use medication, heat can also help. Place a hot towel or hot water bottle on your lower back or tummy. You can also do some light stretches or other forms of exercise to relieve the pain.

Everything you need to know about...

# YOUR PERIOD!

**Chiedza Ukukhanya**  
Health For Our Future

[www.chiedza.co.zw](http://www.chiedza.co.zw)  
Harare: 0779 620 908  
Mashonaland East: 0716 318 730  
Bulawayo: 0716 318 734

Outer side of pamphlet

## UNDERSTANDING YOUR PERIOD

### •What is a period?

Menstruation, or a period, is a very natural process that physically mature females go through every month. During menstruation, a female will typically bleed through her vagina for about 3 to 7 days.

### •How do periods happen?

Every month, a sexually mature female's ovary releases an egg cell that travels towards the uterus through the fallopian tube. The uterus prepares for a possible pregnancy by developing a uterine lining made of tissue and blood vessels. This lining is called the endometrium.

If the egg is not fertilized and pregnancy does not occur, the uterine lining is shed and it exits the body through the vagina as a mixture of blood and tissue over a course of 3 to 7 days. This cycle is called a menstrual cycle and is generally 25 to 35 days long. The cycle starts over again with an egg that begins to mature in one of the ovaries.

## PRODUCTS & SERVICES

### Period Products

You can choose one of the following reusable products:

- The Menstrual Cup
- Reusable Pads
- Period Pants

### Period Services

- Menstrual Health education
- Pain management education
- Pain management medication (Paracetamol and/or Ibuprofen)

## PERIOD PANTS

### •How to use them

You should aim to change your period pants 2-3 times a day. When you feel the need to change your period pants, remove them and rinse with cold water.

After rinsing, wash them separately or with the rest of your laundry. If you are not at home when you change your underwear, fold the used period pants and place in a waterproof bag or plastic bag and wash when you get home. When washing your pants, it is very important that you use cold water and that you do not use bleach or fabric softener.

To dry the period pants, simply hang them to dry under the sun and then store away with the rest of your underwear.

Never wear your period pants when they are not completely dry.

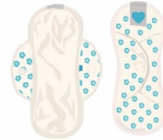


You can use your period pants for up to 2 years or until you feel they do not absorb enough anymore.

## REUSABLE SANITARY PAD

### •How to use one

Wash the pad before first use with cold water and soap. Dry the pads in the sun. You should aim to change your pad 2-3 times a day. Once used, fold the used pad following the 'easy fold & carry' instructions. The blood will be 'packed' inside the leakproof fabric and others will not be able to smell the pad. The plastic bag serves as extra protection.



Once used, rewash and reuse. Compare it to washing knickers and wearing them again.

The project will only replace the reusable pads every 12 months, unless damaged or lost. You need to bring in the reusable pads to show that they are damaged.

## MENSTRUAL CUP

### •How to use one

Fold the cup as you insert it into your vagina. When removing, remember to squeeze the bottom part of the cup until you feel or hear the suction release. Then, gently rock the cup from side to side while pulling down. Make sure that you do not pull the cup out by the stem alone! It is important to relax.

When you have removed your cup, empty it into the toilet, and rinse it with water. If you do not have access to water, you can wipe it with some tissue or simply reinsert it directly after emptying it. Every month, make sure you boil your cup for 3-5min at the end of your period.



The project will only provide the cup once. It will only be replaced if it is lost or damaged.

## MANAGING YOUR MENSTRUAL HEALTH

### •Taking care of your body

#### •Tracking your period

This is an easy way to predict how long you will bleed for during your period and when you will next start your period.

This can help you prepare for your upcoming period every month and also alert you if you have missed your period (which may be a sign that you may be pregnant).

Inner side of pamphlet

# Appendix F: Public Health and Policy Virtual Research Poster Day (2022)

## Integration of a menstrual health intervention in a community-based sexual and reproductive health service for young people in Zimbabwe: A qualitative acceptability study

Mandikudza Tembo<sup>1,2,5</sup>, Jenny Renju<sup>1</sup>, Helen A Weiss<sup>1</sup>, Ethel Dauya<sup>2</sup>, Nancy Gweshe<sup>2</sup>, Precious Ndlovu<sup>2</sup>, Portia Nzombe<sup>2</sup>, Chido Dziva Chikwari<sup>2,3</sup>, Constanca Vimbayi Mavodza<sup>2,4</sup>, Constance R.S. Mackworth-Young<sup>2,3</sup>, Rashida A.Ferrand<sup>2,3</sup>, Suzanna C. Francis<sup>1</sup>



<sup>1</sup> MRC International Statistics & Epidemiology Group, London School of Hygiene and Tropical Medicine, United Kingdom; <sup>2</sup> Biomedical Research and Training Institute, Harare, Zimbabwe; <sup>3</sup> Clinical Research Department, London School of Hygiene and Tropical Medicine, United Kingdom; <sup>4</sup> Department of Public Health, Environment and Society, Faculty of Public Health and Policy, London School of Hygiene and Tropical Medicine, London, United Kingdom; <sup>5</sup> Department of Global Health and Development, Faculty of Public Health and Policy, London School of Hygiene and Tropical Medicine, London, United Kingdom

### Introduction

- Menstrual health and hygiene (MHH) is integral to women's reproductive health and overall well-being
- MHH encompasses access to knowledge, materials, and facilities to manage menstruation with privacy and dignity. MHH also involves the broader psychological, environmental, and socio-political factors that inform how menstruation is managed<sup>1</sup>
- MHH can be an access point for SRH services for young women through integrated services, but data are limited on implementation and acceptability of integrated MHH and SRH services<sup>2</sup>

### Methods

- Setting and Design:** Nested qualitative study in 12 CHIEDZA intervention clusters in three provinces (Harare, Bulawayo, and Mashonaland East)
- Methods:** Focus group discussions, that included participatory drawings, with CHIEDZA healthcare providers (N=3) and young women who attended CHIEDZA (N=6) between June – August 2020 were used to explore intervention acceptability.
- Analysis:** Thematic analysis was used to explore MHH intervention acceptability. We applied Sekhon's thematic framework of acceptability that looks at seven key constructs (affective attitudes, burden, ethicality, intervention coherence, opportunity costs, perceived effectiveness, and self-efficacy). Data from FGDs and meeting minutes taken during the study time period were used to triangulate a comprehensive understanding of MHH intervention acceptability.

### PhD Aim

To investigate the acceptability and effectiveness of an MHH intervention among women aged 16-24 years old within a community-based SRH intervention trial in Zimbabwe (known as CHIEDZA)

### Results

- 23 CHIEDZA healthcare service providers and 84 female CHIEDZA clients took part in the FGDs and shared their views and perspectives on CHIEDZA and the MHH intervention.
- Acceptability was heavily informed by MHH product accessibility and acceptability. External factors such as sociocultural norms and the economic environment also informed the acceptability of this intervention.

Table 1. Summary of Select Qualitative Findings

	Factors that informed acceptability	Exemplary Quote
<b>Affective Attitudes</b>	<ul style="list-style-type: none"> <li>Female clients and CHIEDZA providers were "very happy" about the intervention</li> </ul>	<p>"When I heard about CHIEDZA, I felt happy because of the products [menstrual cups/reusable pads/analgesics] they provide..." - (Harare, 16 – 19 years old)</p>
<b>Ethicality</b>	<ul style="list-style-type: none"> <li>Provision of the menstrual cup did not align with sociocultural norms and resulted in negative feedback from community</li> <li>Female CHIEDZA clients and providers not always comfortable using or talking about the menstrual cup</li> </ul>	<p>"There are some who have a problem with it, they say we are teaching their kids to insert things inside their private parts" - (Bulawayo, CHIEDZA healthcare service provider)</p>
<b>Intervention Coherence &amp; Perceived Effectiveness</b>	<ul style="list-style-type: none"> <li>Most CHIEDZA participants and providers had good understanding of the MHH intervention</li> <li>Intervention reported to have improved MH knowledge levels and practices in the communities</li> <li>MHH intervention used as an acceptable "pathway" to facilitate female engagement with other SRH services</li> </ul>	<p>"I think MHH has been used as a program for promoting health and hygiene... We are doing sexual and reproductive health thus it plays an important role in reproductive health" - (Bulawayo, CHIEDZA healthcare service provider)</p>
<b>Burden</b>	<ul style="list-style-type: none"> <li>Increased workload for CHIEDZA providers</li> </ul>	<p>"It's just that we get [WhatsApp] messages and calls from clients outside CHIEDZA times... they can ask you about cups and challenges that they are facing then you have to explain to them" - (Bulawayo, CHIEDZA healthcare service provider)</p>

### Conclusions

- MHH is an acceptable SRH pathway and can increase female engagement with SRH services
- Acceptable MHH interventions need to be comprehensive and include a choice of MHH products, pain management, and education
- Integrated services should consider how to meaningfully engage males and community members to ensure acceptability over time.



### References

1. WHO. *Menstrual Health and Hygiene*. <https://www.who.int/publications/m/item/menstrual-health-and-hygiene>. Geneva: World Health Organization; 2018.   
 2. WHO. *Menstrual Health and Hygiene*. <https://www.who.int/publications/m/item/menstrual-health-and-hygiene>. Geneva: World Health Organization; 2018.

Improving health worldwide





# Appendix G: Annual Medical Research Day Poster (2020)

## Menstrual product choice and uptake of a menstrual health management intervention among young women aged 16 – 24 years old within a community-based sexual and reproductive health intervention in Zimbabwe

Mandikudza Tembo<sup>1,2\*</sup>, Tendai Losi<sup>2</sup>, Suzanna Francis<sup>1</sup>, Helen Weiss<sup>1</sup>

<sup>1</sup>London School of Hygiene and Tropical Medicine; <sup>2</sup>Biomedical Research and Training Institute



### Introduction

- Adequate MHM is defined as having access to clean absorbents, sufficient washing, drying, storage and wrapping of reusable absorbents; adequate frequency of absorbent change; and basic understanding of menstruation and how to manage it with dignity and without fear<sup>1</sup>
- Several studies have reported high proportions of women with inadequate MHM in LMICs, preventing women from going to school or participating in income generating activities, and may lead to stigma and discrimination<sup>1,2</sup>
- Sustainable and cost-effective options for menstrual products include re-usable pads, period pants, and the menstrual cup. However, there are few data on the acceptability, uptake, and use of these products in LMICs.
- We investigated menstrual product choice and the uptake of an MHM intervention among young women in Zimbabwe in this pilot study

### Objective

- To investigate menstrual product choice and the uptake of an MHM intervention among women aged 16-24 years old within a community-based sexual and reproductive health (SRH) intervention in Zimbabwe

### Methods

- Setting and Design:** Nested cohort study within 4 intervention clusters in Harare (Tafara, Budiriro, Hatcliffe, and Warren Park)
- Participants:** Young women aged 16-24 years in CHIEDZA intervention and CHIEDZA intervention team members
- MHM Intervention:** Free access to information and education on menstruation and MHM, a choice of MHM products between reusable pads and the menstrual cup, an MHM information pamphlet, two pairs of underwear, analgesics, and a simple period tracking diary.
- Methods:**
  - Descriptive statistics, using a biometric data collection system, evaluated MHM intervention uptake and MHM product choice over time.
  - Focus group discussions (FGDs) and in-depth interviews (IDIs) were used to explore facilitators and barriers to intervention uptake and the factors that inform MHM choice over time



Figure 1. Menstrual Products in MHM Intervention

Table 1. Baseline Characteristics and MHM Intervention Uptake

Participant Characteristics (Female) and MHM Intervention Uptake		
	Total (n=2439)	Percentage (%)
MHM Uptake	1867	77
Age Group		
≤19 yrs	904	48
>19	963	52

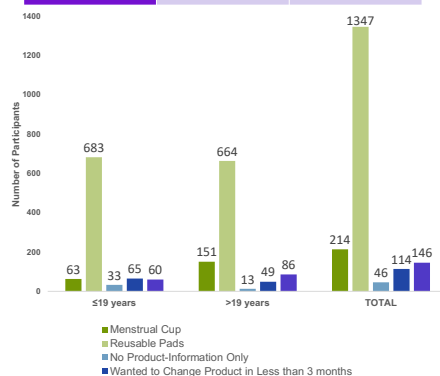


Figure 2. MHM Product Choice Over Time Among 16 - 24 Year Old Women in CHIEDZA by Age

### Results

- MHM intervention uptake was 83.8% of all females that came to CHIEDZA taking up MHM services.
- Of those that took up MHM services, 72.1% took up reusable pads, 11.5% took up the menstrual cup, and 2.5% took MHM information only.
- Thematic analysis of the 3 FGDs and 8 IDIs showed:
  - High MHM intervention uptake was informed by an **unmet need for menstrual products and information** among young women in the community
  - Preference** for reusable pads as opposed to the menstrual cup was due to **cultural and traditional barriers** around cup insertion in the body and the possibility of breaking the hymen.
  - Low menstrual cup uptake was also informed by a **lack of sufficient information and support** about the new menstrual product
  - Lack of **acceptability** of the menstrual cup among intervention team members influenced menstrual product choice among participants

#### Relevant Quotes:

"When I went into the booth I was not told about the cup. I am hearing about the cup right now as we are discussing here. I don't know about the cup." – Female (20-24 years old)

"I was told about the cup but I was scared with its appearance, it looked too big to me. When they showed me I thought it was something else. I was so scared and I said all this big thing" – Female (16-24 years old)

### Conclusions

- MHM interventions are acceptable in community-based SRH programs.
- High uptake of menstrual health education and products
- High intervention uptake may indicate that the integration of MHM interventions in SRH programs may act as a "pull" factor and contribute to increased female engagement in SRH services.
- In Harare, there is a preference for reusable pads over menstrual cups due to persisting cultural and traditional beliefs and barriers.
- Uptake of MHM interventions is informed by the intervention team members, participants and the community in which the intervention is being implemented.

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