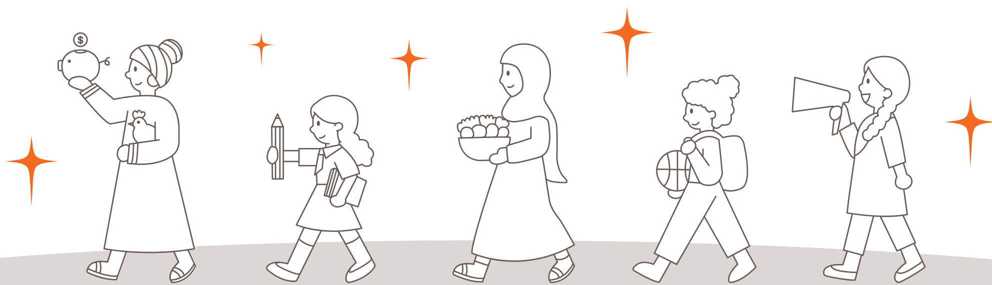
2022 Impact Evaluation Report

Basic for Girls Project in Zambia

World Vision Korea

Sep. 2022



World Vision

Evaluation team

Researcher in charge	Eun Mee KIM	Ewha Womans University
Researcher	Seung Yeun HONG	Yonsei University
Researcher	Yoo Kyung CHOI	Ewha Womans University
Researcher	So Eun KIM	Green Technology Center
Researcher	Jae Hwan KIM	World Vision Korea
Researcher	Yoon Ho CHO	World Vision Korea
Researcher	Soon Young CHOI	World Vision Korea
Researcher	Hae in PARK	World Vision Korea

- This report was produced through support provided by KOICA.

- The findings of this study reflect the opinions of the researchers and may be different from the views of World Vision Korea.

Contents

Executive Summary 04

1. Introduction 07

1.1 Background 07
1.2 World Vision's strategy 08
1.3 Overview of the B4G Impact Evaluation 09

2. Project Description 10

2.1 Contextual Background 10
2.2 Result Framework 11

3. Methods 14

3.1 Study Design 14
3.2 Sampling 15
3.3 Data Collection 16
3.3.1 Quantitative tools 16
3.3.2 Qualitative tools 16
3.3.3 Data collection process 17
3.3.4 Quality management 17
3.4 Analysis 18
3.5 Ethical Considerations 18

4. Findings 19

4.1 Overview of Study Population 19
4.2 Outcome 1. Improving Girls' MHM Knowledge, Attitudes, and Behaviors 20
4.3 Outcome 2. Increasing Girls' Self Efficacy 27
4.4 Outcome 3. Creating Supportive Environments - Free From SRGBV 29
4.5 Outcome 4. Increasing Stakeholders' Awareness of Gender Equality (Focusing on MHM and GBV) 30

5. Conclusion 37

6. Implications 41

Active interventions for changing cultural beliefs about menstruation 41
Intervention timing for early adolescents 42
Exploring the experiences of mothers and caregivers 43
ToC Suggestion 45

Reference 47
Appendix 1 51
Appendix 2 52

List of figures and tables

Figure 1. Socio-Ecological Model for MHM in schools 13
Figure 2. Result Framework for B4G project in Zambia 13
Figure 3. Modified ToC for further B4G project 46

Table 1. Distribution of the samples for baseline/endline surveys 15
Table 2. Socio-demographic characteristics of girls 19
Table 3. Girls' knowledge, attitudes, and behaviors regarding MHM 21
Table 4. Girls' school absences during menstruation pretest-posttest between control and experimental groups 23
Table 5. Girls' self-efficacy pretest-posttest result of change between two groups 28
Table 6. SRGBV environments pretest-posttest 29
Table 7. Stakeholders' (boys' and adults') awareness of gender equality focusing on MHM and GBV 31
Table 8. Socio-demographic characteristics of boys 51
Table 9. Socio-demographic characteristics of adults and teachers 52

Abbreviations and acronyms

ASRHR	Adolescent Sexual and Reproductive Health and Rights
B4G	Basic for Girls
CSE	Comprehensive Sexuality Education
FGD	Focus Group Discussion
GBV	Gender Based Violence
GESI	Gender Equality and Social Inclusion
IDI	In-Depth Interview
MHM	Menstrual Hygiene Management
MHH	Menstrual Health and Hygiene
PTA	Parents-Teachers Associations
SDGs	Sustainable Development Goals
SEM	Socio-Ecological Model
SRGBV	School-Related Gender-Based Violence
ToC	Theory of Change
ToT	Training/Trainers of Trainers
WASH	Water, Sanitation, and Hygiene
WVZ	World Vision Zambia

Executive Summary

The World Vision B4G (Basic for Girls) project was designed to provide education about female menstrual issues, as well as more general sexual and reproductive health focusing on early adolescent girls. The B4G Theory of Change (ToC) states that after receiving the intervention, girls acquire an understanding of menstrual hygiene management (MHM) and gender knowledge, allowing them to feel safer and more confident and helping them mitigate potentially harmful situations. Its key objectives are to strengthen the rights of girls, promote gender norms, and improve MHM knowledge and practices. While the project focuses on early adolescent girls, efforts were made to also involve boys, parents, and teachers, with the aim of creating a supportive environment for girls.

To assess the impact of B4G in Zambia, which was conducted from 2019 to 2021, the impact evaluation gathers information on the health and social outcomes of girls who attended the B4G project. The evaluation tests the B4G ToC as to whether early adolescent girls participating in B4G acquired intended outcome. A mixed-methods approach was used to collect qualitative and quantitative data from girls, boys, and adults in six treatment schools at baseline (prior to engaging in the project) and endline, and from girls that did not receive training in six comparison schools.

A total of 98 girl, 101 boy, and 73 adult survey respondents were matched in the treatment group, and 66 girls, 72 boys, and 62 adults were matched in the control group across baseline and endline, supplemented by qualitative research in the treatment group.

The key findings as follows:

Target	Domain	Impact
Girls	Knowledge of MHM	A small positive impact, not statistically significant
	Attitude toward menstruation	A large positive impact, statistically significant
	Attitude toward negative cultural beliefs	A small positive impact, not statistically significant
	MHM practices	A large positive impact, statistically significant
	Empowerment	A small positive impact, not statistically significant
	Gender norms	A moderate positive impact, statistically significant

School Environments	SRGBV free in the schools	A large positive impact, statistically significant
	Feel safe in/around their schools	A small positive impact, not statistically significant
Boys	Attitude toward menstruation	A moderate positive impact, statistically significant
	Attitude toward negative cultural beliefs	A negative impact
	Gender norms	A moderate positive impact, statistically significant
Adults	Attitude toward menstruation	A moderate positive impact, statistically significant
	Attitude toward negative cultural beliefs	Caregivers: Negative impact Teachers: A large positive impact, statistically significant

Reflecting on the findings, the following implications can be drawn for B4G project and their future work.

Active interventions for changing cultural beliefs about menstruation

Individuals in their early adolescence will encounter many cultural beliefs for the first time and ponder whether or not to follow them. Early adolescence is thus a critical period for challenging negative cultural norms regarding menstruation before they are formed or solidified. The girls participating in the study tended to raise many questions about the cultural beliefs that restricted their physical activities and normal behaviors. However, most female caregivers surveyed showed strong beliefs and support for negative cultural norms. Any opportunity for changes in attitudes and behaviors among girls will be constrained by the degree to which caregivers support problematic cultural norms. Negative cultural norms surrounding menstruation should be actively addressed before they solidify.

Intervention content should be designed with appropriate targeting in terms of age, gender, and level of education, and with consideration of how different groups are involved with the belief being challenged. Moreover, effective interventions to modify cultural beliefs on menstruation in these communities should be based on formative research to reflect the local context.

Intervention timing for early adolescents

Most of the girls involved in the study did not have adequate information before

menarche and thus faced this milestone unprepared and fearful. The average age of menarche of the girls participating in the study was 12.2 years, and the average age at which they started participating in the project was 12.5 years. Participation thus began very shortly after menarche for many study participants. Considering the findings of the study, it is recommended that the timing of the intervention be brought forward by at least one semester so that more girls have the benefit of experiencing the project before reaching menarche. Future projects may consider advancing the education timing for girls even further to provide more stable experiences and allow them to be better prepared for menstruation.

Exploring the experiences of mothers and caregivers

The role of female caregivers is pivotal if girls are to learn correct MHM behaviors. Results of the study showed that the experiences and knowledge of female caregivers had a pronounced effect on girls' attitudes and practices. Any active interventions made by female caregivers were typically based on their own experiences. Their interventions were boosted as a result of the B4G project, as hygiene-related behaviors such as choosing the type of sanitary pad and the frequency of replacement were improved to a greater degree than for those in the control group. In other words, female caregivers actively sought solutions based on their own experiences, and it was shown that the impact of the intervention could be maximized if there was synergy between caregiver experience and the information provided by the B4G project.

Synthesizing the result, this study finally suggests the modified ToC for further B4G projects in figure 3(p.46).

1. Introduction

1.1 Background

As a transitional stage between puberty and adulthood, adolescence is the most critical period of human development. Early adolescence (ages 10–13 years) is also a transitional period, during which preventive management and health behaviors are acquired that shape future health conditions such as nutrition, sexual health, and reproductive health.[1–3] However, research has demonstrated that adolescent girls in low- and middle-income countries are not properly educated on menstrual hygiene and management, and their psychological and physical well-being is threatened due to these unsupportive conditions. [4–8]

At the individual level, lack of access to clean menstrual materials, inadequate knowledge about menstruation and its management, poor hygiene practices, fear of blood, and concerns about odor are significant challenges that adolescent girls face in managing their menstruation.[5,6,9–11] From an environmental and societal perspective, the adolescent menstruation experience is affected by teasing and harassment from boys in school, societal myths and stigmas surrounding menstruation, discriminatory social norms, and cultural taboos.[2,4,5,11,12] Those factors increase the vulnerability of female adolescents in retaining their dignity and basic rights, such as education, health, and social participation.[11,13,14]

In developing countries, menstrual hygiene issues worsen when girls attend school.[7,15,16] A growing body of evidence shows that girls face challenges managing their menstruation, particularly in school, due to lack of WASH facilities, inadequate guidance prior to their menarche, and a gender-discriminatory environment.[5,6,17–21] This generates various negative effects on girls, impacting their school attendance and academic achievement and undermining their self-esteem and health outcomes.[4,6,7,16,19,21-26] In addressing menstruation issues for girls in low- and middle-income countries, previous literature establishes that having access to menstrual products and access to water are the primary issues.[27]

However, a product-oriented approach is not enough to secure girls' health and basic rights. While hygiene and access to products are important, it is vital to address issues of social stigma and create gender-equal environments.[11,12,28] Previous studies argue that girls and women suffer from a myriad of health, gender equality, and empowerment challenges

not only because of poor access to menstrual products or facilities but also because of the stigma of menstruation, which prevents them from following the right hygiene practices.[4,11,12,28,29] Therefore, product-centered solutions often fail to address this larger and more pervasive issue of social and cultural stigma.[28] Recently, the importance of intervention strategies that include gender and cultural issues are being emphasized.

1.2 World Vision's strategy

World Vision's Strategic Direction for Child and Youth Participation team incorporated a gender-transformative approach into their participation programs in 2015.[30] A gender-transformative approach attempts to transform rigid social norms and relationships through critical reflection about individual attitudes, institutional practices, and broader social norms that create and reinforce gender inequalities and vulnerabilities.[31] Accordingly, World Vision International defined its Gender Equality and Social Inclusion (GESI) approach to provide guidance on how evidence-based GESI transformations can better contribute to the well-being of the most vulnerable children, families, and communities. It is adapted from the United Nations Sustainable Development Goals (SDGs), particularly SDG #s 5, 8, 10, 11, and 16, which emphasize equality and inclusion. World Vision's GESI Theory of Change(ToC) encompasses integrated systems and rights-based approaches toward the advancement of gender equality and social inclusion. The objectives of the GESI approaches are to achieve agency, empowerment, and transformation to support the five domains of change: Access, Decision-Making, Participation, Systems, and Well-Being.[32]

Utilizing these approaches, "Basic for Girls" (B4G) is a school-based project on adolescent sexual and reproductive health and rights (ASRHR) that targets teenage girls and boys, focusing on the ages of 12–15. There are three stages of adolescence, which include early adolescence (10 to 13 years), middle adolescence (14 to 17 years), and late adolescence/young adulthood (18 to 21 years and beyond). It aims to 1) create a gender-equitable school environment for dealing with the issues of menstrual hygiene management (MHM). It addresses menstrual health and hygiene (MHH) through the installation of MHH-responsive school toilets and the distribution of reusable pads, and it addresses school-related gender-based violence (SRGBV) by providing counseling from gender-focal teachers and established reporting systems in schools. The B4G project also aims to 2) raise awareness of key stakeholders such as boys, teachers, and caregivers through sensitization on the rights and special needs of adolescent girls and 3) provide platforms that empower girls, such as leadership training and sports activities, for a safe transition to adulthood through healthy gender development with positive self-identity and high self-

efficacy, avoiding early sexual debut* and teen pregnancy. In order to ensure these desired outcomes, internationally accredited guidelines are applied as follows:

- Global Guidance on Addressing School-Related Gender-Based Violence, UNESCO
- Guidance on Menstrual Health and Hygiene, UNICEF
- International Technical Guidance on Sexuality Education, UNESCO

1.3 Overview of the B4G Impact Evaluation

This report presents the findings from the impact evaluation research for World Vision's B4G project in Zambia. The impact evaluation for the B4G project in Zambia provides evidence of the overall effects of B4G in terms of improvement in health and social outcomes for girls based on the original B4G logical framework. To date, there is very limited research assessing the impact of school-based menstruation hygiene management for young adolescent girls, particularly in Zambia. This evaluation report on the impact of a project implemented by World Vision Korea in rural Zambia was aimed at girls 10–13 years old. This report contributes evidence to help understand the effect of the B4G intervention on early adolescent girls and will guide the lessons to improve the ToC for further projects.

* Commonly defined as having had sexual intercourse at or before the age of 14.

2. Project Description

2.1 Contextual Background

Zambia has ten provinces, and the girls in these provinces face disproportionately more obstacles compared with other geographical areas in terms of education and work compared to boys. For example, Zambia is one of the countries with the highest rates of child marriage. Specifically, 31.4% of women and 2.2% of men aged 20–24 report getting married before the age of 18.[33] According to UNICEF, 46% of schools provide MHM education, and 66% provide basic sanitation services in Zambia. Girls are in a worse situation due to the lack of proper WASH facilities. Because the Ministry of General Education guidelines do not include facilities for MHM, such as water supply provision or washbasins, it is difficult for girls to use the facilities.[34] Most girls lack materials, facilities, and time for MHM, and this can result in their absence from school during their menstruation period. [4,23,25] There are also many community-wide taboos and myths surrounding menstruation, and because girls are not being well-informed on these issues, they lack proper knowledge about menstruation and hygiene. [4,25,35,36]

The study site, Magoye, is situated in the Mazabuka district of Southern Province, Zambia. Mazabuka is located along Lusaka Livingstone Road about 132 kilometers from the country's capital city of Lusaka. According to the 2010 National Census, the Mazabuka district has a total population of 261,268 (130,387 males and 130,881 females), with 50% gender distribution. The district is divided into two constituencies: Mazabuka Central and Magoye. The majority of the Mazabuka population depends on farming- and fishing-related industries for survival. There is, however, an increase in the proportion of the population that subsists either through permanent or casual work in the surrounding commercial farms, shops, and other businesses in the Central Business District, while the rest are government workers.

According to data from the Zambia Magoye B4G Project Deign Document in 2020, although 90% of the targeted schools have separate latrines for girls and boys, most of these latrines lack privacy as they are not lockable from the inside, making the schoolgirls vulnerable when it comes to managing their menstruation. As a result, between 80 and 100 menstruating schoolgirls miss school each month during their menstruation periods (three

to six days each month). The report also shows that 83% of schools do not have running water inside the sanitation facilities, and whenever girls who are menstruating want to clean themselves, they are required to draw water from the hand pump. This leads to stigma from other girls and boys, and the girl involved usually feels embarrassed and opts instead to avoid school during the entire period that she is menstruating. The disposal of sanitary pads is still an issue, and incinerators are needed (or a system for collecting garbage must be prepared) for their disposal in schools. However, most schools' insufficient budgets make it difficult to equip them with related facilities and systems.

From a cultural perspective, although menstruation is a normal biological process and a key sign of reproductive health, many cultures (including the local area where Magoye is located) perceive it as negative, shameful, or dirty. Furthermore, there are many beliefs and prejudices about girls' menstruation periods that forbid teachers (especially male teachers) to discuss menstrual issues with young girls; thus, MHM is taught either late or not at all. In general, there is little male involvement in MHM issues, as this is perceived as a female issue. Nevertheless, teachers, caregivers, and health workers are well positioned to distinguish between facts and myths surrounding menstruation as well as to provide education about puberty and sexuality to schoolchildren. Indeed, the Ministry of General Education has recommended that schools ensure that their WASH infrastructure and supplies meet the needs of girls and female teachers . However, most schools, including those in Magoye, have not met this requirement due to a lack of funds, and for the few that have managed to meet the requirement, the infrastructure does not meet the standard and the emergency sanitary towels usually run out. Furthermore, the free education policy that the government is promoting has negatively affected the schools' finances, and schools are currently struggling to stock enough sanitary towels and soap to be used by adolescent girls in managing their menstruation periods while in school.

2.2 Result Framework

World Vision is applying an integrated approach to increase project impact and sustainability. The integrated approach of World Vision consists of three dimensions: a multi-dimensional integrated approach, a multi-sectoral integrated approach, and a life cycle-based integrated approach. A multi-dimensional integrated approach is to promote cooperation and change with stakeholders across levels, such as a Socio-Ecological Model. In addition, the improvement of child wellbeing pursued by World Vision not only requires a multi-sectoral integrated approach in itself, but also helps to increase the effectiveness and sustainability by considering synergy with related sectors in solving problems in a specific

sector. Finally, the life cycle-based integrated approach provides appropriate services at that time in consideration of the child's developmental stage and life cycle.

According to the Socio-Ecological Model for MHM in schools, this project emphasizes multiple levels of influence: 1) Personal level: empowering girls; 2) Interpersonal level: raising awareness of stakeholders such as boys, teachers, and caregivers; 3) Organizational level: creating a gender-equitable school environment; and 4) Societal level: conducting advocacy at the local government level. The involvement of men and boys is heavily emphasized, with the long-term goal of establishing new gender norms by introducing positive masculinities in the communities that recast traditional gender stereotypes (one of the root causes of gender inequality).

World Vision Zambia (WVZ) has conducted various activities to empower girls as seeds of change. These range from implementing the Comprehensive Sexuality Education (CSE) curriculum, conducting life skills sessions, and offering MHM sessions to facilitate girls' club and sports participation. WVZ can use a high-quality CSE curriculum approved by its government, such as the CSE framework by the Zambian government, which targets both girls and boys from grades 5–12 and addresses six primary areas: 1) Relationships; 2) Values, Attitudes, and Skills; 3) Culture, Society, and Human Rights; 4) Human Development; 5) Sexual Behavior; and 6) Sexual and Reproductive Health. CSE partially covers some areas of life skills education, so WVZ has conducted life skills education as a supplementary means with the CSE curriculum. WVZ has also used the MHM National Guidelines, accredited by a government such as the Zambian one, which is composed of six units: 1) WASH facilities and disposal options; 2) Information and knowledge about MHM; 3) Access to menstrual management materials; 4) Management of pain and discomfort due to menstruation; 5) Guidance/counseling by Focal Point Teachers; and 6) Community and family support.

An MHM-enabling environment includes having school latrines that are designed to meet girls' needs for privacy, hygiene, and water availability; providing access to sanitary materials and disposal facilities; and disseminating the right information to assist teachers, boys, girls, and the community in understanding MHM issues.11 Accordingly, WVZ has built several toilets with MHM requirements and conducted various activities aimed at increasing stakeholders' knowledge of adolescent girls' reproductive health and rights (including MHM). One of these activities includes conducting awareness-raising sessions for boys, teachers, traditional leaders, and parents.

In addition, WVZ has tried to ensure that the gender-based violence (GBV) response

system is in place both inside and outside of schools so that GBV cases involving girls are appropriately addressed. The project has implemented several activities, such as establishing the code of conduct of each target school, supporting Parents-Teachers Associations(PTA) in tackling SRGBV, and establishing a reporting system for SRGBV inside and outside of schools. WVZ has conducted regular meetings with the government and supported it in training teachers selected as Trainers of Trainers (ToT) in the above skills so they can handle issues related to GBV in each school.

Figure 1. Socio-Ecological Model for MHM in schools

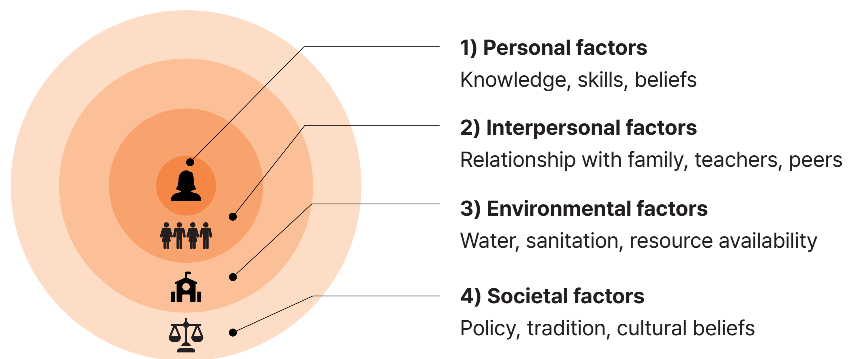
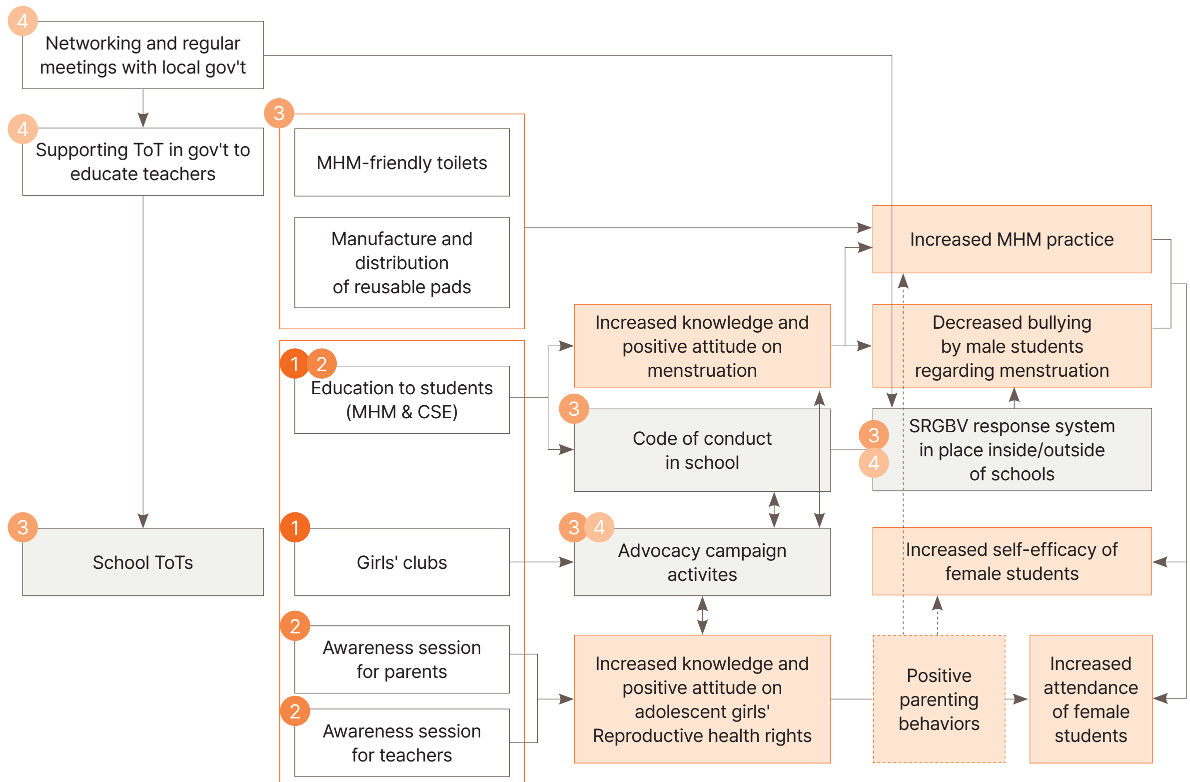


Figure 2. Result Framework for B4G project in Zambia



3. Methods

3.1 Study Design

This is a short-term impact evaluation of the B4G project in Zambia to document the benefits of the project for girls' and other stakeholders' MHM and gender outcomes. The objective of the study is to understand the impact of the B4G project in Zambia on girls' health, education, and empowerment. In addition, this study would like to assess not only girls but also boys and adults. The research questions are as follows:

1) Does receiving B4G interventions improve girls' MHM practice and empowerment?'
2) Does receiving B4G interventions improve boys' attitudes toward MHM and gender norms?
3) Does receiving B4G interventions improve adults' attitudes toward MHM?

This research involved a partial preference, parallel group, cluster randomized controlled pilot study. The girls' health, educational assets, and levels of empowerment before and after the intervention was measured for both the intervention and control groups. A random sampling approach was used. In the Magoye area, there are a total of 22 primary schools, with 5,197 boys and 4,954 girls. Of the 22 schools, only 12 schools agreed to participate in the study. Each of these schools was randomly assigned to either the intervention group (n=6 schools) or the control (n=6 schools) group. Since the B4G project is aimed at early adolescence, the target students were in the 5th grade (10–13 years old).

This study collected baseline data between February and March of 2019 before starting the B4G project. Baseline data was collected a few weeks before the B4G project was delivered to each of the intervention schools. The control schools' data was collected in the same period. Endline data was collected between February and March 2022 after the B4G project was completed.

3.2 Sampling

The study participants were selected using a random number table among 5th-grade (ages 10–13 years) male and female pupils attending the schools. All boys and girls enrolled in 5th grade in a randomized school were eligible for inclusion in the study sample. Girls who had not yet begun their menstruation were excluded. The adult participants included teachers of each group and caregivers of the study participants.

Sample size calculations were conducted using Stata 13.0, and input assumptions from a previous impact study were used. Since there have been relatively few impact studies conducted on menstruation practices in Zambia, this study adopted social-science standard thresholds and findings of levels of detected differences in menstruation management knowledge, attitudes, and practices conducted in Kenya and Ghana.[24,37] The study assumed a power of 0.80, a significance level of 0.05, a standard deviation of 1.6, and an intra-cluster correlation of 0.071. The assumptions suggest a minimum sample of 63 per group (126 total). Considering a loss of 30% by the endline sample, the sample would increase to 80 per group. For the qualitative method, the sampling for In-Depth Interviews(IDI) and Focus Group Discussion(FGD) participants was purposive.

Table 1. Distribution of the samples for baseline/endline surveys

	Group	Baseline Sample	Endline Sample
Girls	Intervention	98	98
	Control	66	66
Boys	Intervention	101	101
	Control	72	72
Adults (Teachers, Caregivers)	Intervention	73	73
	Control	62	62

The participants were purposively sampled in consultation with the PTA. Sampling for qualitative methods (including girls, boys, caregivers, and teachers) was conducted within each of the intervention schools. Only those who voluntarily agreed to particiate in the study were selected as the final study participants, and those who did not consent to the study or did not attend on the day of the study were excluded.

The participants of qualitative methods were purposively sampled in consultation with the PTA. Sampling for qualitative methods (including girls, boys, caregivers and teachers) were sampled from within each of intervention schools. Only those who voluntarily agreed to participate in the study were selected as the final study participants, and those who did not consent to the study or did not attend on the day of the study were excluded.

3.3 Data Collection

The study utilized quantitative surveys as well as qualitative IDIs and FGDs.

3.3.1 Quantitative tools

The baseline and endline surveys were enumerator-led surveys. The survey was the main tool and was designed to collect data on the outcomes and high-level indicators of B4G's ToC. To enhance data accuracy, quality and timeliness of data for analysis and reporting of the data collection were conducted using tablets with the ODK program.

The study collected data in four domains of measures at baseline and at the 24-month follow-up: 1) Knowledge, attitude, cultural beliefs, and practice on menstruation; 2) Self-efficacy; 3) SRGBV; and 4) Gender norms on sexual health, and violence. The quantitative tools were modified from the Global Early Adolescent Study (GEAS) questionnaire (https://www.geastudy.org/) and previous studies.[38–40]

3.3.2 Qualitative tools

The study used qualitative analysis to gain a deeper understanding of the quantitative endline results and the status of B4G interventions in Zambia. There are two components of the qualitative data collection:

- IDIs conducted with girls who participated in the B4G project and an additional IDIs held with boys and adults (teachers and caregivers)
- FGDs with girls who participated in the B4G project and an additional FGDs held with boys and adults (teachers and caregivers)

The FGDs and IDIs provided insight into issues that were not aptly captured by the semi-structured interviews. The analysis and findings of the qualitative survey provide a better contextual understanding of the underlying facilitators and barriers to the success of the B4G project in Zambia. Carefully triangulated with the results from quantitative estimations, the qualitative insights and lessons generated can guide the scaling up of the B4G project to other regions in Zambia.

3.3.3 Data collection process

The researchers recruited and trained 10 field enumerators who were university graduates with prior experience in research data collection. The enumerators were trained for three weeks on using the tools. Before the data collection commenced, the enumerator training covered issues such as research ethics and interview techniques, and a pre-test was conducted to ensure the enumerators' familiarity with the research tools. The training content included the study objectives, the importance of data quality, quantitative and qualitative data collection techniques, research best practices and ethics, and an understanding of the interview guides. The quantitative data collection was done using face-to-face interviews. The enumerators administered the interviews using an electronic questionnaire. Considering the sensitivity of the information being elicited from participants, male enumerators only interviewed male respondents, while female enumerators interviewed female respondents. Teachers used a self-administered questionnaire. For qualitative interviews, interviewers were also involved in piloting and refining the field interview guides. Debriefing sessions followed training and every interview.

3.3.4 Quality management

To ensure the data was of high quality, a data-quality assurance process was implemented throughout the survey process. This included ensuring that all the enumerators underwent training that covered multiple aspects, including research ethics, data collection techniques, and understanding of the questionnaire. The questionnaire was also translated into the local language to ensure that similar translations were used by all the enumerators. During the recruitment process, care was taken to ensure that only those enumerators with experience in conducting surveys and who were conversant in both the English and Tonga languages were selected. During data collection, the enumerators were closely monitored by the supervisors.

3.4 Analysis

The collected data were analyzed using STATA 13.0 statistical software after data coding for statistical processing. Data cleaning was done before conducting the analysis. Frequency analysis was conducted as a general characteristic of the participants, and the mean and standard deviation of each variable were identified with descriptive statistics. For comparison between the experimental group and the control group, first, the normality was checked with the Shapiro-Wilk W test ($p>.05$). The average of each variable before the intervention was compared with the independent -test to confirm whether all variables were in the same status before the intervention. Next, a paired t-test was conducted for the difference before and after the intervention. If normality was not satisfied, the Mann-Whitney Wilcoxon test or Wilcoxon signed-rank test was conducted, respectively. For categorical variables, the chi-square test and McNemar test were performed. The mean and standard deviation were calculated for all data, and the statistical significance level of the data was set as $\alpha=0.05$.

3.5 Ethical Considerations

The study protocol was reviewed by the Institutional Review Board of Ewha Womans University in Korea (ewha-202001-0013-01) as well as by ERES Converge Research Institutional Review Ethics Board before the data collection process commenced. Specific authorization for the study and for the project to be implemented in the specific schools was obtained from the Ministry of Education, District Education Board Secretary. The study questions were assessed to ensure that they were age appropriate. All data collectors were trained in research ethics during the data-collection training workshop. Informed consent from all study participants was obtained and documented in writing before the start of each quantitative interview. For the children, written consent was obtained from caregivers after the child had assented. All interviews were conducted in the local language (Tonga). The data collectors were also made to sign a confidentiality pact, and the need to maintain confidentiality and overall ethical conduct was emphasized during training. The researchers will handle all data following the procedures and protocols approved by the research ethics committee.

4. Findings

4.1 Overview of Study Population

In the final analysis, a total of 98 girls in the intervention group and 66 girls in the control group were used. Table 2 compares the baseline demographics of the control and intervention groups.

Table 2. Socio-demographic characteristics of girls

Item	Intervention (n=98)	Control (n=66)	*t* or x^2
Age	14.52±1.22	14.61±1.19	-0.45
Age of menarche	12.22±0.89	12.27±1.06	-0.29
Economic status			
Very poor	5 (5.10%)	1 (1.52%)	3.28
Poor	32 (32.65%)	19 (28.79%)	
Moderate	61 (62.24%)	45 (68.18%)	
Rich	0 (0.00%)	1 (1.52%)	
Very rich	0 (0.00%)	0 (0.00%)	
Father's job 1			
No	23 (23.47%)	17 (25.76%)	1.59
Yes	67 (68.37%)	40 (60.61%)	
Don't know	0 (0.0%)	0 (0.0%)	
Don't have or don't see father/mother	8 (8.16%)	9 (13.64%)	
Father's job 2 – if yes, what is your father's occupation?			
Farmer	38 (56.72%)	25 (62.50%)	3.70
Seasonal laborer	2 (2.99%)	4 (10.00%)	
Regular employee	10 (14.93%)	5 (12.50%)	
Running business	17 (25.37%)	6 (15.00%)	
Other	0 (0.0%)	0 (0.0%)	
Mother's job			
No	36 (36.73%)	23 (34.85%)	0.88
Yes	56 (57.14%)	37 (56.06%)	
Don't know	2 (2.04%)	3 (4.55%)	
Don't have or don't see father/mother	4 (4.08%)	3 (4.55%)	

Mother's job 2 – if yes, what is your mother's occupation?			
Farmer	35 (62.50%)	24 (64.86%)	
Seasonal laborer	6 (10.71%)	3 (8.11%)	
Regular employee	1 (1.79%)	1 (2.70%)	3.66
Running business	14 (25.00%)	7 (18.92%)	
Other	0 (0.00%)	2 (5.41%)	
Number of people who sleep in the same room as you			
I sleep alone	19 (19.39%)	15 (22.73%)	
2 people	41 (41.84%)	31 (46.97%)	
3 people	30 (30.61%)	15 (22.73%)	1.36
4 or more other people	8 (8.16%)	5 (7.58%)	
Refuse to answer	0 (0.00%)	0 (0.00%)	

* Mean ± SD (Standard Deviation) is presented for continuous variables, N (%) for categorical variables.

The mean age and the age of menarche were similar in both groups. For economic status, both groups responded that they were "moderate" — 62.24% for the intervention group and 68.18% for the control group — but as an overall trend, the responses of "poor" for both groups were also widely distributed: 32.65% for the intervention group and 28.79% for the control group. In both groups, the most common occupation for both fathers and mothers was farming. In the experimental group, 56.72% and 62.50% answered that their fathers' and mothers' occupations were farmers, respectively, and in the control group, 62.5% and 64.86% answered that their fathers' and mothers' occupations were farmers, respectively.

The sociodemographic information was similar between the control and intervention groups, suggesting that any potential change between baseline and endline in girls' knowledge, attitudes, and behaviors regarding MHM and gender norms is less likely to result from demographic factors. The sociodemographic information from other participant groups, such as boys or adults, is attached in Appendix 1. In other groups, there were no statistical differences in basic demographic data between the intervention group and the control group.

4.2 Outcome 1. Improving Girls' MHM Knowledge, Attitudes, and Behaviors

To measure the impact on girls' knowledge, attitudes, behaviors on MHM, this study conducted paired t-test or McNemar test on pretest and posttest from both experimental

group and control group. The following Table 3 presents the average score in each of the indicators including knowledge on MHM, attitude toward menstruation, attitude toward cultural belief related to menstruation and MHM behaviors.

Table 3. Girls' knowledge, attitudes, and behaviors regarding MHM

Indicator		Group	Pretest	Posttest	Improvement	*t or x^2*
Outcome 1.1	Knowledge of MHM	Exp.	52(53.06%)	65(66.33%)	13.27%p	3.31
		Cont.	41(62.12%)	45(68.18%)	6.06%p	0.62
Outcome 1.2a	Attitude toward menstruation	Exp.	2.51±0.49	2.22±0.59	-11.6%	-3.75***
		Cont.	2.52±0.46	2.47±0.63	-2.0%	-0.49
Outcome 1.2b	Attitude toward cultural belief related to menstruation	Exp.	3.19±0.58	3.09±0.75	-3.1%	-1.15
		Cont.	3.32±0.42	3.42±0.65	3.0%	1.1
Outcome 1.3a	MHM Behaviors 1: Pad type (Commercially made or reusable pad)	Exp.	40(40.82%)	84(85.71%)	44.89%p	35.85***
		Cont.	26(39.39%)	46(69.70%)	30.31%p	12.5***
Outcome 1.3b	MHM Behaviors 2: Pad change frequency (More than 3 times/day)	Exp.	60(61.22%)	75(76.53%)	15.31%p	5.77*
		Cont.	42(63.64%)	49(74.24%)	10.6%p	1.96
Outcome 1.3c	MHM Behaviors 3: Pad condition (Very clean and dried)	Exp.	36(36.73%)	94(95.92%)	59.19%p	56.07***
		Cont.	36(54.55%)	60(90.91%)	36.36%p	18.0***

**** p<0.001; ** p<0.01; * p<0.05*

In order to examine the change in the knowledge of MHM for girls, the percentage of correct answers to the questionnaire items, which related to menstrual cycles and causes was measured. The results showed that in both the experimental group and the control group, knowledge increased by 13.27% and 6.06%, respectively. In the posttest, the experimental group showed a higher level of knowledge increase, but there was no statistically significant difference.

Outcome 1.2a, attitude toward menstruation, measures whether the respondent has a positive or negative attitude toward menstruation and menstruating women. The given statement included prompts such as "Activities done by menstruating women are not blessed and they are dirty" and "It is not good to discuss menses." A total of six items were measured on a 4-point Likert scale (Strongly Disagree – Disagree – Agree – Strongly Agree). A higher score, closer to 4, indicates that the respondent has a negative attitude

toward menstruation. In the pretest, the attitudes toward menstruation in the experimental group and the control group were similarly negative (2.51 and 2.52, respectively). However, after the B4G intervention was implemented, the negative attitude for the experimental group significantly decreased from 2.51 to 2.22. In the control group, the average score decreased by only 0.05, and no statistically significant change was found.

Previous researchers have argued that the cultural beliefs of the community are one of the major barriers affecting girls' healthy menstruation practices.[11,19,36,41] Therefore, this study addressed not only general attitudes toward menstruation but also girls' attitudes toward the negative cultural beliefs related to menstruation that are inherent in the community. The given statements were based on the findings from formative interviews with residents and girls in the project area. From formative interviews conducted before the pretest, it was found that there are numerous widespread misconceptions and beliefs in the community related to menstruation, such as "Not allowed to touch chili plant during menstruation" and "Menstruating women [are] not allowed to cook with salt." This study utilized a total of four statements that were measured on a 4-point Likert scale (Strongly Disagree – Disagree – Agree – Strongly Agree) intended to evaluate general attitudes toward menstruation. A higher score, closer to 4, indicates that the respondent has internalized a strong cultural norm with a negative connotation of menstruation.

In the pretest, it was found that the cultural norm was firmly formed in a negative way, with averages of 3.19 and 3.32 in the experimental group and the control group, respectively. This is more than 0.74 points higher than the average score of general attitudes toward menstruation, indicating that girls strongly agree with the negative myths and cultural beliefs surrounding menstruation that are inherent in the community. After the B4G intervention, the attitude toward negative cultural beliefs about menstruation became flexible in the experimental group. The mean attitude toward cultural belief showed a partial decrease, moving from 3.19 to 3.09. In the control group, the cultural norm remained firm, moving from 3.32 to 3.42. However, both results were not statistically significant.

The MHM behaviors were measured through the direct assessment of the type of sanitary pad used, the frequency of replacement of the sanitary pad per day, and the condition of the sanitary pad. In these three areas, the correct MHM behavior was marked only when a "commercially made pad or a reusable pad" was used, the pad was "changed more than 3 times a day," and "a very clean and dried pad" was used. In the pretest, the proportion of girls using commercially made or reusable pads was similar, at 40.82% in the experimental group and 39.39% in the control group. In the posttest, this number more than doubled in the experimental group, indicating that 85.71% of girls used a commercially made or

reusable pad. In the control group, the proportion of girls using a commercially made or reusable pad increased to 69.7%. These changes represent a statistically significant level in both groups. Regarding the frequency of changing the pad, the percentage of girls who changed pads more than three times a day in the pretest was similar, at 61.22% and 63.64% in the experimental group and the control group, respectively. After the B4G intervention, the proportion of girls who changed pads more than three times daily increased by 15.31% in the experimental group, which was statistically significant. This behavior in the control group also increased—by 10.6%—but was not statistically significant. Finally, for the pad condition, only 36.73% of the experimental group used very clean and dried pads in the pretest condition. However, after the B4G intervention, this value increased to 95.92%, which was statistically significant. The control group also increased in a statistically significant way, from 54.55% to 90.91%.

Table 4. Girls' school absences during menstruation pretest-posttest between control and experimental groups

Indicator	Group	Pretest	Posttest	Improvement	x^2
Absence during menstruation	Exp.	39 (39.8%)	7 (7.69%)	-32.11%p	22.73***
	Cont.	33 (50.77%)	11 (17.74%)	-33.03%p	15.13***

**** p<0.001; ** p<0.01; * p<0.05*

In addition to the knowledge, attitudes, and behaviors regarding the MHM of girls, school absence rates during menstruation were also included in the survey as B4G indicators. In the pretest, 39.8% of the experimental group and 50.77% of the control group responded that they had been absent from school during their menstrual period in the past six months. In the posttest, the proportion of girls who missed school during menstruation significantly decreased. In the experimental group, only 7.69% reported absenteeism during menstruation in the past six months, and only 17.74% of the control group responded the same. Both groups showed a statistically significant decrease.

The results do not clearly show whether the B4G intervention had an impact on the girls' knowledge, attitude, and behaviors regarding MHM and school absenteeism. In particular, for hygiene behavior, high levels of improvement were achieved in both the experimental group and the control group. These results can be explained, at least in part, by the global impact of the Covid-19 virus. The Covid-19 pandemic overlapped with the implementation of the B4G project in Zambia. School lockdowns occurred in Zambia during the research,

delaying some education and activities. During the pandemic, in addition to the B4G intervention, personal hygiene was emphasized at the government, community, and school levels, and a significant improvement was made in both the experimental group and the control group in hygiene-related MHM behavior. In addition, since the absence of school during the menstruation period also overlapped with the period of school lockdowns, attendance rates improved significantly in both groups.

In addition, from qualitative interviews with the female caregiver group, this study found that there was a strong desire to directly help girls with menstrual problems. Female caregivers stated that they empathize with the menstruation problems girls face because they, too, experienced being teased by boys during menstruation at school when they were young; therefore, they had tried to afford commercial or reusable pads rather than the "old cloths" that were inconvenient to use. For this reason, they consider the "reusable pad-making class" very useful in the B4G project.

> ***"There was a time I didn't go to school because of my menses; in those days, times were very hard [shaking her head]. I was scared that maybe the cloth I had used for menses would just fall off when I was among a lot of people at school [laughs]."*** *(IDI from caregiver)*
>
> ***"I am very different from her in the way she manages her menses by far. In the olden days, we never had the supplies to be used, but nowadays at least my daughter can manage her menses better than I used to do."*** *(IDI from caregiver)*
>
> ***"I have to buy pads every month for her because she is my responsibility. I need to buy for her to ensure that she doesn't look dirty and is able to take care of herself."*** *(FGD from caregivers)*
>
> ***"As for me, I think I remember there are pads for sewing/making that are with the headmaster we were looking at that the children were making using chitenge material. I don't really know what they call them, but they are pads like. So I noticed that these pads are good and would wish all parents to join together with the students in making these things because these things are helpful."*** *(FGD from caregivers)*

The female caregivers agreed that the girls were absent from school due to menstrual cramps and related symptoms. Because families do not have enough information about how to manage menstrual cramps, they regarded allowing school absences as a method of

supporting the girls. As the creation of a supportive environment from female caregivers and the pandemic overlap, the hygiene behaviors of girls are continuously improving. In the future, it will be important to carefully identify what information is lacking and plan appropriate interventions.

> ***"She doesn't need to go to school if she is in serious pain. For me, in my schooldays, whenever I felt that my stomach was seriously paining, I would leave class and go home and sleep in the blanket's"*** *(FGD from Caregivers)*
>
> ***"Whenever she starts my periods, even if she is in school, I let her ask for permission to go home because her stomach would pain to an extent. It makes her to fail to sit in class."*** *(IDI from Caregivers)*

The B4G intervention is also showing its impact on the knowledge and attitudes about MHM that are not related to hygiene behaviors or school lockdowns. The qualitative interview results showed that most girls receive limited help from their mothers after they start menstruating, learning only how to use sanitary pads and the rules they need to follow (e.g., bathing, not getting close to men) without receiving detailed explanations about the reasons for body changes or menstrual cycles. Only traditional cultural norms are transmitted.

In the posttest, although not statistically significant, the experimental group achieved a higher level of improvement than the control group in knowledge of MHM. In addition, the negative attitudes of the experimental group were significantly reduced compared to the control group in general attitudes about menstruation, which can be confirmed as an impact of the B4G project. However, although the girls acquired some knowledge, the interviews show that most of them had no knowledge or information about menstruation until their menarche. Many of the girls started menstruation without having any prior information, so they feared menstruation and kept it a secret. Most of the girls felt secure with the support of friends who had already started menstruating. Thus, the timing of the knowledge intervention should be planned in advance of the age of menarche.

> ***"When I started the menstruation, mom just bought pads and gave it to me without saying any special thing. She just told me that use a pad and [when] it gets soaked, change it and use another one. And she said I am not supposed to touch salt or chili plants when I am on my period."*** *(IDI from girl)*
>
> ***"When I started menstruation, I got scared because I thought it was happening only to me, and no one else menstruates. I was so afraid that I almost stopped going to school. When I started my first period, I was not prepared."*** *(IDI from girl)*
>
> ***"My friend encouraged me that she had already started her menses and it is a normal thing."*** *(IDI from girl)*

This study is significant in that it investigated cultural beliefs about menstruation. In the geographic region in which the study was conducted, the taboos regarding women during menstruation have been traditionally transmitted, and when girls start menstruating, mothers or grandmothers educate the child. Most of the cultural beliefs instill a negative image of menstruation among the community and make the girls uncomfortable. Therefore, the B4G project addresses taboos related to menstruation and educates girls about the unfounded beliefs that have been passed down in the region and that are without scientific basis. The participants were also instructed that some of the beliefs involve unnecessary sanctions supposedly imposed in the interest of health. After the B4G intervention, in the experimental group, the attitudes toward negative cultural beliefs about menstruation became weak, but in the control group, the attitude toward negative cultural beliefs became more robust. This did not reach a statistically significant level, but it seems that there is also an effect from the pandemic. During the project period, the time spent at home was relatively longer than at school due to the pandemic, and the negative cultural norms may have created more of an impact on the girls due to the increased proximity to their caregivers. Indeed, the caregivers' interview results showed that various cultural norms are strongly transmitted to girls by female caregivers (see Outcome 4 section). Nevertheless, the experimental group showed a weakening of negative cultural norms about menstruation compared to the control group. This can be seen as an achievement of the B4G intervention. During the girls' interviews, many questioned and expressed resistance to the existing cultural norms related to their bodies and behavior, stating that they did not practice those behaviors or agree with those norms.

> ***"Adults said I should not hold a baby while you are on your period, but for me I still do. Also, they said I should not put salt in relish when I cook. But, if there is no one, I put the salt and nothing happened… I didn't ask why I cannot do those things. Just they say like that."*** *(IDI from girl)*
>
> ***"Do you accept that when you start your menses you are not supposed to put salt in the relish?… No! I thought that whatever they say isn't true."*** *(IDI from girl)*

Although there may be some effects of this B4G project, it seems that girls take a more active stance now than they did in the past on issues directly related to them.

4.3 Outcome 2. Increasing Girls' Self Efficacy

According to the results framework, the empowerment of girls is ultimately expected to be a major outcome within the B4G project. This includes learning how to manage menstrual hygiene, providing reproductive health education, and improving toilets and facilities. The project is also expected to improve the gender norms of girls. To assess the impact on girls, this study measured the girls' empowerment and gender norms focusing on sexual reproductive health and gender violence. To measure girls' empowerment, questions were selected from the GEAS. Empowerment was measured based on problem-solving ability. Among the GEAS questions, four items that fit the context of the local community and that girls can understand were selected and modified for use. The empowerment level was captured by using a 5-point Likert scale (Strongly Disagree – Somewhat Disagree – Neither Agree, Nor Disagree – Somewhat Agree – Strongly Agree); the closer the score was to 20, the higher the empowerment level. Gender norms were measured focusing on sexual reproductive health and gender violence. A total of eight items were measured on a 4-point Likert scale (Strongly Disagree – Somewhat Disagree – Somewhat Agree – Strongly Agree). The closer the score to 32, the higher the adherence to the gender norm. To assess the impact, this study conducted a paired *t*-test on the pretest and posttest from both the experimental group and the control group.

Table 5. Girls' self-efficacy pretest-posttest result of change between two groups

Indicator		Group	Pretest	Posttest	Improvement	*t*
Outcome 2.1	Empowerment	Exp.	18.68±2.30	19.11±1.82	2.3%	1.43
		Cont.	19.08±3.50	18.15±3.92	-4.9%	-3.14**
Outcome 2.2	General understanding of sexual reproductive health and gender violence	Exp.	27.44±3.43	28.35±3.04	3.3%	2.32*
		Cont.	26.92±5.53	26.5±5.89	-1.6%	-0.76

**** p<0.001; ** p<0.01; * p<0.05*

In the pretest, the level of girls' empowerment was similar in both the experimental and control groups. In the pretest, the mean of the experimental group was 18.68, and the mean of the control group was 19.08. In the posttest, the mean of the experimental group slightly increased from 18.68 to 19.11, while the control group's mean dropped from 19.08 to 18.15 (about 4.9%). The change in the experimental group was not significant, but the decrease in the control group was found to be statistically significant.

For the gender norms, the mean of the experimental group in the pretest was 27.44, and the mean of the control group was 26.92, indicating that the level of understanding of sexual reproductive health and gender violence was at a similar level. However, in the posttest after the B4G intervention, the experimental group demonstrated a statically significant increase from 27.44 to 28.35, while the control group scored 26.5, a slight decrease in conformance to gender norms. In other words, the experimental group significantly increased in its adherence to gender norms after the B4G project, while the control group decreased.

Considering the characteristics of adolescence, it is natural for empowerment to appear somewhat unstable as adolescents begin the exploration process. Nevertheless, the experimental group participating in the B4G intervention showed a slight increase in their empowerment level. Although this did not reach a statistically significant level, it can be interpreted as a result of the B4G project because B4G targeted early adolescence, and the control group's decreased empowerment level was statistically significant. Gender norms also increased to a statistically significant level in the experimental group. Thus, awareness of sexual reproductive health and gender violence among girls was increased through participation in the project. Such a result can be interpreted as a more meaningful achievement considering the slight decrease in the gender norms of the control group in the post survey.

4.4 Outcome 3. Creating Supportive Environments - Free From SRGBV

The B4G project was implemented in the school setting, which is the safest and most familiar space for children. Therefore, it was expected that the achievement of gender-norm enhancement and the empowerment of girls would be most visible in the school. If the girls are empowered, and the gender norms of boys and girls are increased, gender violence can naturally decrease in schools. Therefore, B4G can contribute to creating an SRGBV-free environment, which means that school is a safe and comfortable space. Therefore, Outcome 3 assessed whether SRGBV decreased by measuring the proportion of students who witnessed violence by boys against girls in or around the school. By measuring whether children feel safe at school, this study can help to ensure that the environment is safe for both girls and boys.

Table 6. SRGBV environments pretest-posttest

Indicator		Group	Pretest	Posttest	Improve-ment	x^2
Outcome 3.1	% of students (girls and boys) who witnessed any form of violence perpetrated against girls by boys in or around their schools over the last 12 months	Exp.	35 (17.59%)	14 (7.04%)	-10.55%p	9.8***
		Cont.	11 (7.97%)	18 (13.04%)	5.07%p	2.13
Outcome 3.2	% of students (girls and boys) who feel safe in/around their schools	Exp.	176 (88.44%)	129 (93.48%)	5.04%p	1.13
		Cont.	182 (92.46%)	119 (86.23%)	-6.23%p	4.17*

*** p<0.001; ** p<0.01; * p<0.05

The Outcome 3.1 indicator measured the percentage of students who had witnessed violence perpetrated against girls by boys in or around their school in the past 12 months. “Violence” does not refer only to physical attacks. Violence includes making threats, spreading rumors about someone, attacking someone verbally, or purposely excluding someone from a group. The goal of Outcome 3.1 was to capture whether girls had been exposed to verbal, physical, or psychological violence in or around their school. For the pretest, 17.59% of the children in the experimental group and 7.97% of the children in the control group answered that they had witnessed girls being exposed to various forms of violence. In the posttest, after the B4G project intervention, there was a statistically significant decrease in the rate of witnessing violence against girls in the experimental group. Only 7.04% of the children in the experimental group responded that they had

witnessed girls being exposed to violence in or around the school—a decrease of about 10.55%, representing a statistically significant change. In the control group, the rate of witnessing violence increased by 5.07% to 13.04%.

Similar results were found in Outcome 3.2. In the pretest, the proportion of children who felt that school was safe was 88.44% in the experimental group and 92.46% in the control group. However, after the implementation of the B4G project, the posttest showed the opposite result. In the posttest, the proportion of children who felt that the school is safe was 93.48% in the experimental group and 86.23% in the control group. In the experimental group, the number of children who felt that the school is safe increased, whereas in the control group, the proportion of children who felt that the school was safe decreased statistically significantly.

The results from Outcome 3 show that the physical, mental, and verbal violence of boys targeting girls in or around school decreased, which is consistent with the results regarding the perceived safety of the school. In light of these results, the creation of a safe and supportive environment for children can be interpreted as a B4G impact. This is the result of the combination of hardware (such as renovating toilets) and software aspects (such as education, advocacy etc.) of B4G activities. This environment has been created by organically working with various elements within the B4G project, such as new toilet construction and various educational programs for girls and boys.

4.5 Outcome 4. Increasing Stakeholders' Awareness of Gender Equality (Focusing on MHM and GBV)

As introduced in Section 2.2, the B4G project was targeted not only at girls but also at boys, caregivers, and teachers based on the socio-ecological framework. This is because girls' menstrual problems and empowerment cannot be dismissed only as individual problems of girls. Factors influencing these problems occur not only as social and structural elements but also in the home, school environment, and relationships with surrounding people, including family members and peers. To promote girls' health and empowerment, rather than demanding change solely for the individual girls, the surrounding environment (such as family, school, and social life) should be built into a supportive ecosystem. This requires accompanying changes in the people within the girls' lives. In the B4G project, sexual and reproductive health and gender education were conducted together for boys and adults, including teachers and caregivers, and Outcome 4 assessed the results of those

changes. The attitudes toward menstruation and attitudes toward negative cultural norms were measured in the same way as for girls (Outcome 1). In addition, the gender norms focusing on sexual reproductive health and gender violence were also measured in the same way as for girls (Outcome 2).

Table 7. Stakeholders' (boys' and adults') awareness of gender equality focusing on MHM and GBV

Indicator		Group	Pretest	Posttest	Improvement	*t*
Outcome 4.1a	Boys' attitudes toward menstruation	Exp.	2.74±0.71	2.47±0.50	-9.9%	-2.68**
		Cont.	2.8±0.72	2.45±0.52	-12.5%	-2.54*
Outcome 4.1b	Boys' attitudes toward cultural beliefs related to menstruation	Exp.	2.9±0.70	3.19±0.81	10%	2.23*
		Cont.	3.03±0.82	3.0±0.91	-1.0%	-0.09
Outcome 4.2a	Teachers' attitudes toward menstruation	Exp.	1.94±0.44	1.76±0.39	-9.3%	-2.46*
		Cont.	1.9±0.53	1.75±0.44	-7.9%	-1.07
Outcome 4.2b	Teachers' attitudes toward cultural beliefs related to menstruation	Exp.	2.00 (1.50, 2.33)	1.50 (1.00, 1.75)	-25%	-3.98***
		Cont.	2.10±0.75	2.02±0.81	-3.8%	-0.48
Outcome 4.3a	Caregivers' attitudes toward menstruation	Exp.	2.6±0.49	2.38±0.58	-8.5%	-2.03*
		Cont.	2.53±0.57	2.28±0.71	-9.9%	-2.30*
Outcome 4.3b	Caregivers' attitude toward cultural beliefs related to menstruation	Exp.	3.1±0.8	3.29±0.82	6.1%	1.40
		Cont.	3.03±0.79	3.25±0.83	7.3%	1.96
Outcome 4.4	Boys' general understanding of sexual reproductive health and gender violence	Exp.	28.00 (26.00, 30.00)	29.00 (26.00, 32.00)	2.5%	2.4*
		Cont.	27.44±2.61	27.08±3.94	-1.3%	-0.58

**** p<0.001; ** p<0.01; * p<0.05*

Outcome 4.1 measured boys' attitudes toward menstruation and their attitudes toward negative cultural beliefs related to menstruation. In the pretest, the attitude toward menstruation was negative in both the experimental and the control groups. The mean of the experimental group was 2.74, and the control group had a similar level of 2.8. In the posttest, the mean of the experimental group was 2.47 and the mean of the control group was 2.45—statistically significant in both groups—indicating that boys' negative attitudes toward menstruation had decreased. It is likely that the negative attitudes toward menstruation were improved in both groups due to the regular sexual and reproductive health education for elementary school students implemented by the Zambian government.

However, those attitudes decreased by a more significant degree in the experimental group, which had received the B4G intervention.

For negative cultural norms related to menstruation, in the pretest, the mean of the experimental group was 2.9 and the mean of the control group was 3.03, indicating that both groups agreed with the negative cultural norms inherent in the local community. Surprisingly, in the post survey, the negative cultural norms were stronger among the boys in the experimental group. In the posttest, the mean of the experimental group was 3.19, which was slightly higher than the pretest figure of 2.9, and in the control group, the mean was similar (from 3.03 in the pretest to 3.0 in the posttest).

According to a qualitative interview conducted with the boys, through the B4G project, they generally acquire sufficient general knowledge about menstruation and understand the correct attitude they should have toward girls. Like girls, boys also learned most of the information in the B4G classes at school and had not received any relevant education at home. Most of the boys said it is taboo to talk about menstruation at home, and in particular, negative cultural norms are exposed through words spoken by male adults. Boys highly trust what they have been taught in school, but they believe that only a "female teacher" can speak about menstruation issues—not fathers or male teachers.

> ***"Before learning at school, I did not know anything about girls' menstruation. I never heard about it at home. But now I have learned how to behave in a right way… Teachers teach better than parents, and you just don't know, parents can feel shy and hide something. So the teacher will not hide anything… We prefer female teachers because they say everything, and with parents, we feel shy to talk but with teachers, we are free."*** *(FGD from boy)*
>
> ***"I can tell her that we were taught how to make pads and how a girl is supposed to manage her menses. Also the things she is not supposed to do while menstruating. I can teach a girl that she is not supposed to handle salt while menstruating."*** *(FGD from boy)*
>
> ***"I know that she is not supposed to sit by the hearth or add salt to relish. When we got home, we asked to say why doesn't one add salt when she is menstruating? My grandfather said I don't know why, but just know that she doesn't add salt; that's how it was in the olden days."*** *(IDI from boy)*
>
> ***"It is a big taboo if girls counsel with [their] father or male family member regarding [their] menstruation issue."*** *(IDI from boy)*

Information gathered in the interview confirmed why the negative cultural norms of boys had become more robust; some teachers were providing incorrect information during the education. For example, teachers were perpetuating the erroneous norm that menstruating girls should not touch salt or chili plants. Some boys had the right information, but some boys stated that they were educated by their teachers, talking about wrong cultural norms. The students showed blind faith when they were taught at school about the negative cultural norms regarding menstruation that they had also learned from home or other sources. It was confirmed that general information was delivered correctly during education on menstruation, but content related to the cultural norms on menstruation had not been delivered correctly. Some educators conveyed negative cultural norms on menstruation without correction, causing misunderstandings from boys as if the negative cultural norms were correct. This is clearly an area that needs to be improved in future B4G projects.

> ***"Sometimes male teachers teach us, sometimes female teachers. I can't remember whom but teacher said menstruating girls are not supposed to cook."*** *(FGD from boys)*
>
> ***"Teacher said they are not supposed to add salt in relish. Because, they will make the food dirty if they touch the salt with their hands."*** *(FGD from boys)*

In the adult group, teachers showed a positive attitude toward menstruation compared to children. In the pretest, the teachers' general attitudes toward menstruation were 1.94 for the experimental group and 1.9 for the control group, showing similar levels in both groups. After the B4G project, the mean of the experimental group was 1.76 and the mean of the control group was 1.75. In both groups, the attitudes toward menstruation changed in a positive direction, but only the experimental group's change was statistically significant. Regarding attitudes toward negative cultural norms, the impact of the B4G project was clearly revealed in the teacher group. In the teachers from the experimental group, the mean attitude toward cultural beliefs related to menstruation was 2.0 in the pretest, but in the posttest, the mean was statistically significant at 1.5. The control group showed a similar figure from the pretest to the posttest (2.10 and 2.02). Thus, after the B4G intervention, teachers from the experimental group agreed less with negative cultural beliefs related to menstruation.

In the caregiver group, both attitudes toward menstruation and cultural beliefs were

similarly changed in the experimental group and the control group, and there was no significant difference. For the pretest of the caregiver group, the mean of the experimental group was 2.6 and the mean of the control group was 2.53, indicating similar negative attitudes toward menstruation. In the posttest, the mean of the experimental group was 2.38 and the mean of the control group was 2.28, showing similar positive changes in both groups. Both groups showed statistically significant changes. However, for negative cultural norms related to menstruation, both groups became more robust over time . In the pretest for the caregiver group, the mean of the experimental group was 3.1 and the mean of the control group was 3.03 (close to 4 points), indicating that negative cultural norms related to menstruation are firmly established. The responses became more robust in the posttest: the mean of the experimental group was 3.29 and the mean of the control group was 3.25. Changes in the caregiver group's cultural beliefs related to menstruation did not appear as flexible as for the teachers, even for the same adult.

According to the qualitative interviews with female caregivers, they believed in and practiced cultural beliefs related to menstruation. Female caregivers stated that in the past there had been stricter rules and norms for menstruating women, but that today only the milder norms remain, such as "Women who menstruate should not put salt during cooking." They say that it will be difficult for all the traditional beliefs to be applied to the current society, but the problem is that they have a false belief that those around them will get sick or die prematurely if they do not follow these cultural norms. They also expressed concern that girls these days are not properly complying with the norms. The cultural beliefs of caregivers are strongly entrenched, as demonstrated by the finding that only one female caregiver stated that she did not follow these cultural norms.

> ***"We menstruate to remove the dirt. When I was young, when a girl is of age, there is a ceremony that is practiced; the ceremony is called 'chimoye.' They teach you a lot of things, including you are not supposed to put salt in relish when you are on your period because in case you have young male children, you might disturb them; they may develop backaches and some persistent coughs. So as a woman when you are on your period, you need to find someone else to put the salt [in] for you so that you do not put others at risk."*** *(FGD from caregiver)*
>
> ***"Long time ago, menstruating women weren't supposed to participate in certain activities; for instance, they don't cut their nails, so [they] could only be allowed to sweep. She is not allowed to cook until her periods are over. That was how it was in the past. Nowadays, some of these girls don't even like to be advised. You would find her cooking for her family without any guilt. So, we have made rules to fit you because those that we followed in the past, you wouldn't manage to***

> ***follow them. These days we die early because of not obeying traditional rules."*** *(FGD from caregiver)*
>
> ***"At church, menstruating girls are not allowed to read in front of people. It is a taboo [responding confidently]."*** *(IDI from caregiver)*
>
> ***"She is not supposed to add salt or get near to where cooking is taking place because if she does it's believed that others that eat the food she cooks will get sick. Because people that eat that food can have a cough called Mankowesha (cough that does not finish, you can be coughing throughout your life)."*** *(IDI from caregiver)*

For the pretest on gender norms focusing on sexual reproductive health and gender violence from boys, the mean of the experimental group was 27 and the mean of the control group was 27.44, indicating a similar level of gender norms in both groups. However, in the posttest after the B4G intervention, the boys in the experimental group increased their gender norms significantly. The mean of the experimental group was increased from 27 to 29. The control group values showed a slight decrease to 27.08 in the posttest. A common finding in the qualitative interviews of girls and boys is that boys often tease girls when they are unfamiliar with women's menstrual issues. Boys stated that they made fun of girls before they had learned about girls' menstruation and that their uneducated friends still do the same. From the results, it seems that the acquisition of knowledge in boys is an important factor in behavior and attitude changes.

> ***"If you [do] not look like normal, boys give silly comments, saying "wali kujaya kapongo," meaning you were killing a goat simply because your skirt is messed up."*** *(IDI from girl)*
>
> ***"Before learning at school, I did not know anything as to how I was supposed to behave. At first, we didn't know that girls were menstruating, and we just made fun of them. But not now, I know that I have to protect girls, give them pads, and help them."*** *(FGD from boy)*
>
> ***"Because our teacher told us that a girl who is menstruating must not be teased. If a girl is menstruating and is nearby us, we should help her and not to tease her and if there is a pad you give her a pad and if there is water you draw water for her."*** *(IDI from boy)*

The results demonstrated that the changes in the stakeholders' beliefs that were intended

from Outcome 4 were centered on the boys' and the teachers' groups. Boys' and teachers' attitudes toward menstruation changed positively after the B4G project, and teachers have become significantly flexible, even regarding cultural norms regarding menstruation. For boys, the gender norms focusing on sexual reproductive health and gender violence were also significantly improved compared to the control group. The general attitude of boys toward menstruation showed a positive change, even in the control group, although this seems to be mixed with the impact of the Zambian government's sexual and reproductive health education program for upper-grade children in elementary schools.

Overall, the general attitudes toward menstruation showed a positive change in all groups, while the attitudes toward negative cultural norms were more resistant to change (except for the teachers' group). These results mean that the attitudes toward menstruation related to general knowledge have been improved as a result of the B4G intervention, but cultural norms inherent in the local community are difficult to change over a short period of time. Among the adult group, especially the caregiver group, attitudes and ideas were not easily changed because those individuals had been exposed to, and had accepted, these cultural beliefs for a long time. However, in the teachers' group, the cultural beliefs seem to have changed more readily, perhaps because their education levels are higher than the caregivers', and some teachers from other regions do not hold the same cultural beliefs. Nevertheless, caregivers expressed that they had gained substantial knowledge through their participation in B4G education. The qualitative results show that they realize children are not only learning at school but are also influenced by their parents at home. Now, caregivers are gradually realizing the importance of their roles in supporting adolescent children.

Interestingly, boys' attitudes toward negative cultural norms became more solidified. After being exposed to the negative cultural beliefs regarding menstruation, they accepted and agreed with those norms without any objection or question. Also, some educators were misinformed about cultural norms, so the boys likely trusted those educators' teachings. This is an area that must be improved in future projects. The qualitative interviews with girls showed that many of the girls actively raised questions rather than simply accepting the taboos or cultural beliefs such as "Menstruating women should not touch salt" or "You should not touch the chili plant during menstruation." However, the boys accepted the taboos at face value. To the boys, the taboo was accepted without any question, as it had nothing to do with restrict their behaviors. If the negative cultural beliefs about menstruation are readily accepted by early adolescent boys, these misconceptions will continue into adulthood and become more robust. Ultimately, this is reflected in their attitudes toward women. Therefore, early intervention is critical in reshaping these cultural beliefs that may act as negative factors in the future.

5. Conclusion

The findings of this impact study of the World Vision B4G project enable us to assess the effects of the project on early adolescent girls and boys, and on adult beneficiaries. The project was designed to provide education about female menstrual issues and more general sexual and reproductive health. Its key objectives are to strengthen the rights of girls, promote gender norms, and improve MHM knowledge and practices. While the project focuses on early adolescent girls, efforts were made to also involve boys, parents, and teachers, with the aim of creating a supportive environment for girls. The implementation of the project was limited somewhat due to the Covid-19 pandemic and resulting school lockdowns, meaning some project activities were delayed. Despite these setbacks, the project showed evidence of success. In reflecting on the B4G project, this study answers a series of evaluation questions and draw the following conclusions:

To what extent did participation in the B4G project lead to improvements in girls' knowledge, attitude, and practices regarding MHM?

Domain	Impact
Knowledge of MHM	A small positive impact, not statistically significant
Attitude toward menstruation	A large positive impact, statistically significant
Attitude toward negative cultural beliefs	A small positive impact, not statistically significant
MHM practices	A large positive impact, statistically significant

Girls who participated in the project showed an overall improvement in knowledge, attitudes, and practices regarding MHM. Negative attitudes toward menstruation were significantly reduced after the project. MHM practices, including frequency of sanitary pad use, type of pad used, and pad condition, also improved. Knowledge of menstruation improved, though not at a statistically significant level.

To what extent did participation in the B4G project lead to improvements in girls' empower-ment and gender norms?

Domain	Impact
Empowerment	A small positive impact, not statistically significant
Gender norms	A moderate positive impact, statistically significant

Girls' understanding of empowerment and gender norms were positively impacted through participation in the B4G project. However, changes in empowerment, while positive, were not statistically significant. It appears that the B4G project's primary focus on menstruation health led to weaker effects on secondary outcomes such as female empowerment. Nevertheless, results do at least indicate the potential of the project to enhance girls' sense of empowerment, and that this may be related to improvements in MHM attitudes and practices. Although the current B4G activities mainly consists of MHM practice improvement and sexual reproductive health education, it has demonstrated the potential for empowerment of girls. If future B4G project enhance the empowerment activities such as career exploration or leadership program, it is expected that the girls' empowerment will be further improved, combining with the existing program. Gender norms, which are likely more closely linked to menstruation health, were found to improve significantly among those in the project group compared to the control group.

To what extent did participation in the B4G project lead to improvements in creating an SRGBV-free environments?

Domain	Impact
SRGBV free in the schools	A large positive impact, statistically significant
Feel safe in/around their schools	A small positive impact, not statistically significant

The B4G project made a positive contribution to fostering SRGBV-free environments. The percentage of students who had witnessed violence perpetrated against girls by boys in or around their school decreased significantly in the experimental group. And the proportion of children considered safe by schools has also risen. Fostering SRGBV-free environments required inter-sectoral coordination. As the B4G projects combines hardware and software aspects, it contributes to creating SRGBV-free environments in a positive way.

To what extent did participation in the B4G project lead to improvements in boys' attitude toward MHM and gender norms?

Domain	Impact
Attitude toward menstruation	A moderate positive impact, statistically significant
Attitude toward negative cultural beliefs	A negative impact
Gender norms	A moderate positive impact, statistically significant

Boys that took part in the project showed a significant change in attitude toward menstruation and gender norms. Negative attitudes about menstruation decreased, and there were significant improvements in understanding of gender norms regarding sexual reproductive health and gender violence compared to the control group, who showed decreased understanding. Attitudes toward negative cultural beliefs, assessed through a quantitative survey, showed a negative impact of the project. Analysis of qualitative interviews revealed that this negative effect was due to the project's educational content being delivered incorrectly. Some trainers transmitting negative cultural norms as it is without explanation or correction., such that issues surrounding negative cultural beliefs and taboos were not challenged successfully. This is an area that must be improved in future B4G activities.

To what extent did participation in the B4G project lead to improvements in adults' attitude toward MHM?

Domain	Impact
Attitude toward menstruation	A moderate positive impact, statistically significant
Attitude toward negative cultural beliefs	Caregivers: Negative impact Teachers: A large positive impact, statistically significant

This study founds variation in effects among adults who participated in the B4G project. Adult participants were divided into teacher and caregiver groups. Both groups showed a statistically significant decrease in negative attitudes toward menstruation. However, there were group differences regarding attitudes toward negative cultural beliefs. Whereas teachers' attitudes became significantly more flexible, caregiver attitudes showed the reverse effect. For teachers, this increase in flexibility of cultural beliefs may be explained by a higher level of education compared to the caregiver group, or the fact that teachers were

more diverse in terms of their region of origin. In the caregiver group, both quantitative and qualitative data showed strong trust in cultural beliefs. The findings note that in order to end the vague fears and misunderstandings that participants have in the current negative cultural norms, rather than simply conveying that the existing norms are incorrect, the educational content should dispel false beliefs based on empirical evidence and actual stories and disseminated through influential groups in the community.

To summarise, the B4G project led to significant improvements in MHM and gender norms of girls, achieving its primary aim. Most notably, negative attitudes toward menstruation were reduced in all groups. Nevertheless, the size of effect differed according to gender, age, and position (i.e., parents versus teachers). Following this synthesis of results from quantitative and qualitative surveys, the next section proposes suggestions for how the B4G project can be improved in future.

6. Implications

Active interventions for changing cultural beliefs about menstruation

Negative cultural norms and taboos regarding menstruation within a community can restrict young girls' capacity for correct MHM and hygiene behaviors. Negative cultural norms surrounding menstruation lead to prejudices, such as menstruating women being viewed as unclean. Such beliefs undermine girls' development in education, health, and mobility, and lead to incorrect gender norms being held by members of the community. It is therefore crucial to include interventions that target these negative cultural beliefs in any MHM program. Prior to the implementation of the B4G project in Zambia, this study conducted formative research to identify existing negative cultural beliefs about menstruation in the community. The study findings informed the educational aspects of the B4G project, which included activities to correct negative cultural norms as part of its general sexual and reproductive health curriculum. Unfortunately, the project did not produce the desired changes in this area. Although there was a modest positive impact on teachers and girls, negative cultural norms remained fixed among caregivers and boys. In addition, some educators delivering the project were found to only educate about negative cultural norms rather than make efforts to correct them.

Individuals in their early adolescence will encounter many cultural beliefs for the first time and ponder whether or not to follow them. Early adolescence is thus a critical period when negative cultural norms for menstruation can be challenged before they are formed or solidified. The findings here show that early adolescent girls first encounter cultural norms after menstruation begins. Girls tended to raise many questions about the cultural beliefs that restricted their physical activities and normal behaviors. Moreover, compared to boys, girls experienced these negative cultural norms about menstruation as directly linked to their own lives, and so actively contemplated whether to accept them, expressing many concerns. However, while many girls doubted the legitimacy of prevailing norms, they did not seek to actively oppose what they had been taught by their caregivers. The results showed that only a few girls decided to not follow cultural beliefs.

Most female caregivers surveyed showed strong beliefs and support for negative cultural norms. Girls are typically helped with menstrual issues by their female caregivers. If girls

accept and practice problematic cultural beliefs, there will likely be intergenerational transmission of these beliefs in future. Therefore, active intervention must be made at the point when girls first develop attitudes about their body and begin to learn MHM habits. Boys in this study appeared to accept negative cultural norms when first encountering them, with no evidence of resistance or questioning. Cultural beliefs about menstruation are not directly related to boys' own lives and thus do not restrict their behavior, meaning such beliefs can be accepted with no need for critical assessment. In addition, after acquiring a general degree of knowledge about menstruation, boys quickly formed ideas about what could be done to support girls who are menstruating, but tended to still rely on false cultural norms to do this, for example believing that not touching salt during menstruation would be helpful. As boys appear to accept cultural norms about menstruation as they are, greater efforts will be needed in future to provide accurate information delivery and education, and encourage boys to challenge norms that may be harmful or unhelpful.

Lastly, education targeting caregivers should be further strengthened based on relevant evidence. Female caregivers have the most significant influence on the formation of good MHM habits and behaviors in girls. Therefore, any opportunity for changes in attitudes and behaviors among girls will be constrained by the degree to which caregivers support problematic cultural norms. In this respect, the socio-ecological framework adopted in the B4G project is an appropriate approach. It seems, though, that more active interventions that attempt to modify the content of cultural beliefs are necessary. Many female caregivers surveyed showed the incorrect belief that if they do not follow cultural beliefs about menstruation, they will bring harm to their families in the form of sickness or death. Simply educating these individuals to not follow cultural norms is therefore insufficient to correct their thoughts and behaviors. Educational programs should be structured in a more sophisticated manner with a basis in actual cases and experiences, and an understanding of the context that such beliefs exist in. Effective interventions to modify cultural beliefs on menstruation in these communities should be based on formative research. Intervention content should be designed with appropriate targeting in terms of age, gender, and level of education, and with consideration of how different groups are involved with the belief being challenged.

Intervention timing for early adolescents

Most sexual reproductive health projects are targeted at individuals in middle to late adolescence. The B4G project, in contrast, was designed for children in early adolescence, aged 10 to 13. As such, there was limited and insufficient information available regarding

effective project implementation with this age group. The B4G project was conducted with children aged around 12 in the 5th grade of elementary school in Zambia. The average age of menarche of the girls participating in the study was 12.2 years, and the average age at which they started participating in the project was 12.5 years. Participation thus begun very shortly after menarche for many of study participants. Considering the findings of the study, it is recommended that the timing of the intervention be brought forward by one semester so that more girls have the benefit of experiencing the project before reaching menarche.

The evaluation of the effectiveness of the B4G project revealed significant improvements in MHM and gender education. However, findings also showed that most of the girls involved in the study did not have adequate information before menarche and thus faced this milestone unprepared and fearful. The results indicate that neither female caregivers nor school staff provided MHM information to girls. Female caregivers reported not knowing exactly what education girls needed before and after the onset of menstruation, and so only education about cultural norms and the use of sanitary pads was provided after the onset of menarche. In this environment, girls had very little time to acquire information and prepare before experiencing developmental changes. If an overarching aim of the B4G project is to pursue 'seeds of prevention', adjusting the project's timing of implementation is needed.

To verify the effectiveness of the B4G project, it was necessary to measure knowledge and behavior after menarche begins, and to assess the degree of improvement after the intervention. The evaluation confirmed the impact of the B4G project, and allowed us to make this recommendation for a revision to the timing of the intervention. Based on the results of the evaluation, future projects may consider advancing the education timing for girls to have more stable experiences and be better prepared for menstruation. This study also anticipates that more meaningful results could be produced if the impact evaluation were to be tracked over a mid- to long-term timeframe.

Exploring the experiences of mothers and caregivers

The role of female caregivers is pivotal if girls are to learn correct MHM behaviors. Results of the study showed that the experiences and knowledge of female caregivers had a pronounced effect on girls' attitudes and practices. Analysis of qualitative interviews found that female caregivers responded to the problems of girls by reflecting on their

own experiences, actively intervening only when they deemed it necessary. Most female caregivers reported experiences of using uncomfortable sanitary pads and being teased by boys their age. Therefore, these caregivers had a motivation to purchase and provide commercial pads for their children rather than 'cloth' or 'matrix pieces', which are inconvenient to use. In addition, caregivers recommended that girls wear pants or a local traditional skirt called a *'Chitenge'* to be able to move around freely. Caregivers emphasized that girls should bathe several times during menstruation and make an effort to hide odors and stains as much as possible. Many caregivers expressed a strong interest in reusable pads. Any active interventions made by female caregivers were typically based on their own experiences. Their interventions were boosted as a result of the B4G project, as hygiene-related behaviors such as choosing the type of sanitary pad used by girls and the frequency of replacement were improved to a greater degree than for those in the control group. In other words, female caregivers actively sought solutions based on their own experiences, and it was shown that the impact of the intervention could be maximised if there was synergy between caregiver experience and the information provided within the B4G project.

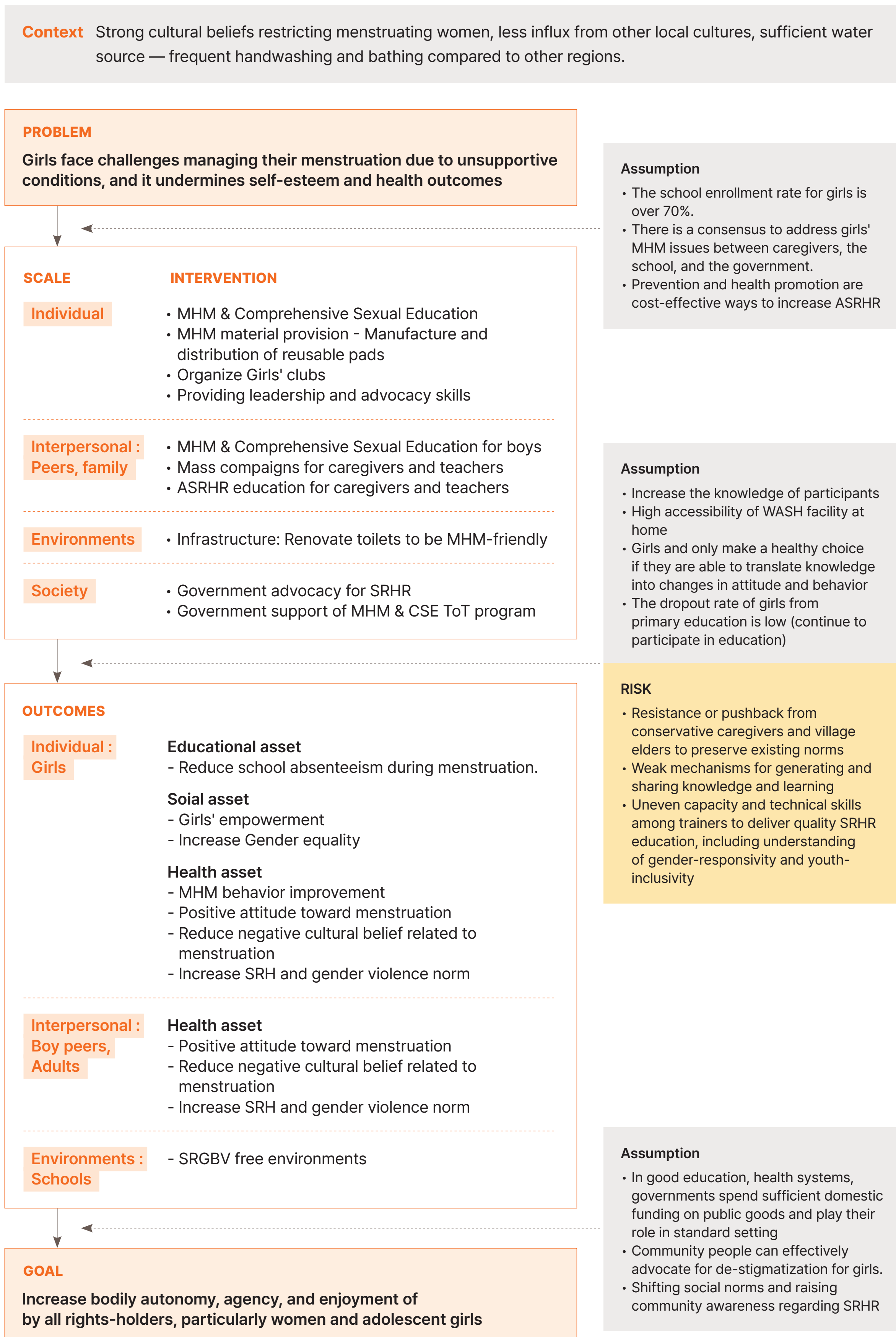
That said, this study also found that female caregivers often did not actively intervene due to lack of information about menstrual pain and limited knowledge regarding menstruation. Caregiver education is thus still an area needing improvement. Girls in the study expressed many concerns related to menstrual cramps, school absences, and the inconvenience of not being able to attend classes properly. Yet caregivers generally offered no solutions other than to 'rest at home', and provided coping guidelines based only on their own knowledge and cultural beliefs. Such guidance may have been inadequate to help the girls.

In considering how to enhance the efficiency of project, the findings suggest that it is necessary to explore mothers' and caregivers' experiences prior to project implementation. The B4G project involved comprehensive assessment of MHM-related features such as the provision of sanitary napkins and sexual reproductive health education. In future, this assessment should take into account the pre-existing experiences and behaviors of female caregivers to identify areas where synergy can occur, as well as possible hindrances to the intervention. By better understanding the experiences of female caregivers, project designers will be able to distinguish obstacles that girls can easily overcome from those where interventions are most needed. This deeper understanding will enhance the efficiency and impact of future projects.

ToC Suggestion

Based on these findings, this study would like to suggest modifications to the ToC for the B4G project. Based on the existing ToC, impact was visualized more specifically, with some modifications and supplements made in line with this project's unique context.

Figure 3. Modified ToC for further B4G project



Reference

1. Kapadia-Kundu N, Storey D, Safi B, Trivedi G, Tupe R, Narayana G. Seeds of prevention: the impact on health behaviors of young adolescent girls in Uttar Pradesh, India, a cluster randomized control trial. *Soc Sci Med.* 2014;120:169-179.

2. Blake S, Boone M, Yenew Kassa A, Sommer M. Teaching girls about puberty and menstrual hygiene management in rural Ethiopia: Findings from a pilot evaluation. *J Adolesc Res.* 2018;33(5):623-646.

3. Blum RW, Mmari K, Moreau C. It begins at 10: How gender expectations shape early adolescence around the world. *J Adolesc Heal.* 2017;61(4):S3-S4.

4. Person C, Nonde KC, Opong E. *Investigating the Perceptions and Barriers to Menstrual Hygiene Management (MHM) in Zambia.*; 2014.

5. Long, Jeanne, Bethany A. Caruso, et al. *WASH in Schools Empowers Girls' Education in Rural Cochabamba, Bolivia: An Assessment of Menstrual Hygiene Management in Schools.* New York: United Nation's Children's Fund; 2013.

6. Alam M-U, Sultana F, Hunter EC, et al. Evaluation of a menstrual hygiene intervention in urban and rural schools in Bangladesh: a pilot study. *BMC Public Health.* 2022;22(1):1-16.

7. Phillips-Howard PA, Caruso B, Torondel B, Zulaika G, Sahin M, Sommer M. Menstrual hygiene management among adolescent schoolgirls in low- and middle-income countries: research priorities. *Glob Health Action.* 2016;9(1):33032.

8. Sumpter C, Torondel B. A systematic review of the health and social effects of menstrual hygiene management. *PLoS One.* 2013;8(4):e62004. doi:10.1371/journal.pone.0062004

9. Sahiledengle B, Atlaw D, Kumie A, Tekalegn Y, Woldeyohannes D, Agho KE. Menstrual hygiene practice among adolescent girls in Ethiopia: A systematic review and meta-analysis. *PLoS One.* 2022;17(1):e0262295.

10. Tegegne TK, Sisay MM. Menstrual hygiene management and school absenteeism among female adolescent students in Northeast Ethiopia. *BMC Public Health.* 2014;14(1):1-14.

11. UNICEF. *Guidance on Menstrual Health and Hygiene.*; 2019. www.unicef.org/

wash. Accessed August 17, 2022.

12. Geertz A, Mazzola F, Peterson K, Iyer L, Kasen P. An opportunity to address menstrual health and gender equity. 2016.

13. Sommer M, Torondel B, Hennegan J, et al. How addressing menstrual health and hygiene may enable progress across the Sustainable Development Goals. *Glob Health Action*. 2021;14(1):1920315.

14. Sommer M, Caruso BA, Torondel B, et al. Menstrual hygiene management in schools: Midway progress update on the "MHM in Ten" 2014–2024 global agenda. *Heal Res Policy Syst.* 2021;19(1):1-14.

15. Alam M-U, Luby SP, Halder AK, et al. Menstrual hygiene management among Bangladeshi adolescent schoolgirls and risk factors affecting school absence: results from a cross-sectional survey. *BMJ Open.* 2017;7(7):e015508.

16. Alexander KT, Oduor C, Nyothach E, et al. Water, sanitation and hygiene conditions in kenyan rural schools: Are schools meeting the needs of menstruating girls? *Water (Switzerland)*. 2014;6(5):1453-1466. doi:10.3390/w6051453

17. Sommer M, Sahin M. Overcoming the taboo: advancing the global agenda for menstrual hygiene management for schoolgirls. *Am J Public Health.* 2013;103(9):1556-1559.

18. Van de Walle E, Renne EP. *Regulating Menstruation: Beliefs, Practices, Interpretations*. University of Chicago Press; 2001.

19. McMahon SA, Winch PJ, Caruso BA, et al. "The girl with her period is the one to hang her head" Reflections on menstrual management among schoolgirls in rural Kenya. *BMC Int Health Hum Rights.* 2011;11:7. doi:10.1186/1472-698X-11-7

20. Mahon T, Fernandes M. Menstrual hygiene in South Asia: A neglected issue for WASH (water, sanitation and hygiene) programmes. *Gend Dev*. 2010;18(1):99-113. doi:10.1080/13552071003600083

21. Mason L, Nyothach E, Alexander K, et al. 'We keep it secret so no one should know'--a qualitative study to explore young schoolgirls attitudes and experiences with menstruation in rural western Kenya. *PLoS One*. 2013;8(11):e79132. doi:10.1371/journal.pone.0079132

22. Sommer M, Sutherland C, Chandra-Mouli V. Putting menarche and girls into

the global population health agenda. *Reprod Health*. 2015;12(1):1-3.

23. Oduor C, Alexander KT, Oruko K, et al. Schoolgirls' experiences of changing and disposal of menstrual hygiene items and inferences for WASH in schools. *Waterlines.* 2015;34(4):397-411. doi:10.3362/1756-3488.2015.037

24. Austrian K, Kangwana B, Muthengi E, Soler-Hampejsek E. Effects of sanitary pad distribution and reproductive health education on upper primary school attendance and reproductive health knowledge and attitudes in Kenya: a cluster randomized controlled trial. *Reprod Health.* 2021;18(1):1-13.

25. Austrian K, Soler-Hampejsek E, Behrman JR, et al. The impact of the Adolescent Girls Empowerment Program (AGEP) on short and long term social, economic, education and fertility outcomes: a cluster randomized controlled trial in Zambia. *BMC Public Health.* 2020;20(1):1-15.

26. Caruso B, Fehr A, Inden K, et al. WASH in Schools empowers girls' education in Freetown, Sierra Leone: An assessment of menstrual hygiene management in schools. *New York UNICEF*. 2013.

27. Sinha RN, Paul B. Menstrual hygiene management in India: The concerns. *Indian J Public Health.* 2018;62(2):71.

28. McLaren MA, Padhee M. A sexual and reproductive health rights approach to menstruation. *Gend Dev.* 2021;29(1):131-150.

29. Fialkov C, Haddad D, Ajibose A, Le Flufy C, Ndungu M, Kibuga R. The impact of Menstrual Hygiene Management and gender on psychosocial outcomes for adolescent girls in Kenya. *Int J Adolesc Youth*. 2021;26(1):172-184.

30. World Vision International. *Child and Youth Participation Strategic Direction*. New York; 2015. https://www.wvi.org/sites/default/files/Strategic Direction Child and Youth Participation 2015-2020 World Vision_1.pdf. Accessed September 2, 2022.

31. Cuevas-Parra P, Stephano M, Zhu Y. Unpacking gender equality approach to children and young people's participation. *World Vis*. 2016.

32. Symes C, Kalima-Phiri B, Shteir S, et al. *GENDER EQUALITY SOCIAL INCLUSION*. New York; 2020.

33. Central Statistical Office (CSO) [Zambia], Ministry of Health (MOH) [Zambia], ICF International. *Zambia Demographic and Health Survey 2013-14*. Rockville, Maryland, USA; 2014.

34. Ministry of Education. *Menstrual Hygiene Management National Guidelines*.; 2016. https://menstrualhygieneday.org/wp-content/uploads/2017/09/MHM-Guidelines_Final-Version_20160831_With-foreword.pdf. Accessed August 22, 2022.

35. Chandra-Mouli V, Patel SV. Mapping the knowledge and understanding of menarche, menstrual hygiene and menstrual health among adolescent girls in low-and middle-income countries. *Palgrave Handb Crit menstruation Stud*. 2020:609-636.

36. Thakur H, Aronsson A, Bansode S, Lundborg CS, Dalvie S, Faxelid E. Knowledge, practices, and restrictions related to menstruation among young women from low socioeconomic community in Mumbai, India. *Front Public Heal*. 2014;2(JUL). doi:10.3389/fpubh.2014.00072

37. Wilson EF, Reeve JMK, Pitt AH, Sully BG, Julious SA. INSPIRES: Investigating a reusable sanitary pad intervention in a rural educational setting-evaluating the acceptability and short term effect of teaching Kenyan school girls to make reusable sanitary towels on absenteeism and other daily activities: a pa. 2012.

38. Belayneh Z, Mekuriaw B. Knowledge and menstrual hygiene practice among adolescent school girls in southern Ethiopia: a cross-sectional study. *BMC Public Health*. 2019;19(1):1-8.

39. Mmari K, Blum RW, Atnafou R, et al. Exploration of gender norms and socialization among early adolescents: The use of qualitative methods for the Global Early Adolescent Study. *J Adolesc Heal*. 2017;61(4):S12-S18.

40. Moreau C, Li M, De Meyer S, et al. Measuring gender norms about relationships in early adolescence: results from the global early adolescent study. *SSM-population Heal*. 2019;7:100314.

41. Jewitt S, Ryley H. It's a girl thing: Menstruation, school attendance, spatial mobility and wider gender inequalities in Kenya. *Geoforum*. 2014;56:137-147.

Appendix 1

Table 8. Socio-demographic characteristics of boys

	Intervention	Control	p-value
Age	14.69±1.26	14.58±1.32	0.581
Economic status			
Very poor	1 (0.99%)	1 (1.39%)	
Poor	34 (32.66%)	22 (30.56%)	
Moderate	60 (59.41%)	48 (66.67%)	0.442
Rich	6 (5.94%)	1 (1.39%)	
Very rich	0 (0.00)	0 (0.00)	
Father's job 1			
No	24 (23.76%)	18 (25.00%)	
Yes	70 (69.31%)	49 (68.06%)	0.982
Don't know	0 (0.0)	0 (0.0)	
Don't have or don't see father/mother	7 (6.93%)	5 (6.94%)	
Father's job 2 – if yes, what is your father's occupation?			
Farmer	34 (48.57%)	21 (42.86%)	
Seasonal laborer	12 (17.14%)	8 (16.33%)	
Regular employee	12 (17.14%)	12 (24.49%)	0.802
Running business	12 (17.14%)	8 (16.33%)	
Other	0 (0.0)	0 (0.0)	
Mother's job			
No	35 (34.65%)	29 (40.28%)	
Yes	62 (61.39%)	38 (52.78%)	0.469
Don't know	0 (0.00%)	1 (1.39%)	
Don't have or don't see father/mother	4 (3.96%)	4 (5.56%)	
Mother's job 2 – if yes, what is your mother's occupation?			
Farmer	31 (50.00%)	21 (55.26%)	
Seasonal laborer	8 (12.90%)	6 (15.79%)	
Regular employee	1 (1.61%)	3 (7.89%)	0.159
Running business	22 (35.48%)	7 (18.42%)	
Other	0 (0.00%)	1 (2.63%)	
Number of people sleep in the same room as you			
I sleep alone	17 (16.83%)	28 (38.89%)	
2 people	51 (50.50%)	30 (41.67%)	
3 people	25 (24.75%)	12 (16.67%)	0.014
4 or more other people	5 (4.95%)	2 (2.78%)	
Refuse to answer	3 (2.97%)	0 (0.00)	

** Mean ± SD(Standard Deviation) is presented for continuous variables, N (%) for categorical variables.*

Appendix 2

Table 9. Socio-demographic characteristics of adults and teachers

	Caregivers			Teachers		
	Experimental	Control	t or x^2	Experimental	Control	t or x^2
Age	46.30±12.00	42.65±12.59	1.406	40.22±7.39	39.22±7.11	0.451
Economic						
Very poor	1 (2.17%)	3 (6.82%)	2.140	0 (0.00)	0 (0.00)	1.571
Poor	13 (28.26%)	11 (25.00%)		0 (0.00)	0 (0.00)	
Moderate	31 (67.39%)	30 (68.18%)		26 (96.30%)	17 (94.44%)	
Rich	1 (2.17%)	0 (0.00		1 (3.70%)	1 (5.56%)	
Very rich	0 (0.00)	0 (0.00)		0 (0.00)	0 (0.00)	
Don't know	0 (0.00)	0 (0.00)		0 (0.00)	0 (0.00)	

World Vision