The Health and Healthy Behaviors Program at Siraba School in Mali

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Abstract

The Siraba School Village (SSV), a non-profit organization, works to support the educational efforts at Siraba School in Mali, Africa. Siraba School is located in an under-resourced community and supports students in 1st to 6th grades and is connected to a local middle school with students in 7th to 9th grades. SSV runs the Health and Healthy Behaviors Program (HHB) at Siraba School and the middle school to address the knowledge gap around reproductive health, nutrition, and hygiene. This educational initiative provides monthly health classes to students to address the lack of health education. The program had not been evaluated and students in this setting were not accustom to pencil and paper (P&P) tests. SSV designed a P&P baseline and follow-up quizzes for 4th through 9th grades to assess effectiveness of the curriculum. The lessons that were focused on are, 1) women's reproductive health and puberty; and 2) water and hygiene. Assessment data was collected and entered in Qualtrics. Analysis of baseline and follow-up test scores demonstrated that students had some subject knowledge before each lesson, however they were unable to answer short answer questions. Following the lessons, students were able to answer short answer questions. P&P tests were well received in this setting and is a useful tool for program evaluation. A report from the pilot assessment was generated for the SSV team and recommendations were provided for the HHB curriculum and future assessments.

Background

The country of Mali is located in the interior western part of Africa and is a part of the Sub-Saharan region of the continent. It has a population of 18 million people and about 68% live in rural areas in the southern region of the country (The World Factbook-Mali, 2018). Mali has the 3rd highest fertility rate in the world and an increasing infant, child, and maternal mortality rate. In 2017, 9 out the top 10 causes of death in the country were due to communicable diseases (Mali, 2017). Some include malaria, diarrheal diseases, protein-energy malnutrition, and HIV/AIDS.

It has been found that "the role of effective health promotion and simple school-based programs to deliver low-cost interventions has become increasingly important" for the future health of children in low-income countries (Bundy et al, 2006). The focus of school health programs has shifted into low-income countries and they are "essential elements of efforts to improve education access and completion." At Siraba School, the goal of the program is to create a healthy environment for the students so that they can understand their own health, the health of their families and reduce the burden of disease in the community. A framework called "FRESH" was created by the United Nations Educational, Scientific and Cultural Organization (UNESCO) that encompasses four main components for school-based health education and nutrition programs that mirrors the approaches Siraba School is doing in there program. The components *Policy*, *School Environment*, *Education*, and *Services* created by UNESCO are the essential pieces that must be included for a health program to be successful for the population.

A randomized evaluation of school programs in developing countries revealed that school health programs are boosting class participation and attendance (Kremer & Holla, 2009). One intervention in a Kenyan primary school discovered that providing deworming treatment twice a

year resulted in reduced absence rates. It also generated awareness of diseases and transmissions across the school. Mark Epstein and Kristi Yuthas (2012) created a model of schooling, "School for Life," that incorporates the importance of teaching economic and social well-being. The article describes the model created by the authors based off innovative educational programs in developing countries around the world (Epstein & Yuthas, 2012). The authors discovered that giving instruction on basic healthy behaviors could improve life for the population as a whole.

Siraba School is located in Dagabo, a small rural farming village south of Bamako, the capital city. The six-classroom school is funded and run by a non-profit organization, Siraba School Village (SSV), based in the United States. SSV hires local coordinators, teachers and a health education consultant to provide primary education, kindergarten and grades 1st through 6th, to the children in the village and the surrounding area. There are 151 students enrolled in the school, 80 boys and 71 girls. As part of SSV's health initiative, the Health and Healthy Behaviors Program (HHB) was created in 2016 to incorporate health classes into the curriculum.

At Siraba School, the HHB classes are taught by a local health professional, Ms. Hawa Haidara, and they focus on many different topics that include aspects of physical, mental, emotional, sexual, social, and environmental health. Classes are taught once a month lasting approximately two hours and include a review of previously taught material and active learning exercises outside the classroom. Exercises include learning how to keep the local water pump clean and watching how to properly clean and cook different types of food. Ms. Haidara teaches each grade of the school and tailors the program lessons to individual grade levels.

Some previous studies of health programs have calculated improvement or retention of the health information through attendance levels and rates of illness in the populations. To address this evaluation, SSV's goal is to assess feasibility of a pre and post test approach to

program evaluation in this setting. This was done through two different quizzes given as a baseline and follow-up. Assessments were created by Ms. Haidara and the SSV team to test the knowledge of the students in grades 4th through 6th and the middle school students grades 7th through 9th. The assessments were written with Ms. Koro Haidara, the Siraba School Coordinator and translator, to effectively and correctly translate the questions and assure understanding and value (WHO, 2010). All questions on the quizzes were created from the HHB lessons and used terms introduced to the students within the lectures. The assessments were composed of 9 multiple choice and short answer questions each and some demographic questions to distinguish grades and gender.

Women's reproductive health and puberty is a main topic of discussion in Ms. Haidara's HHB class for the older students, grades 5th to 9th. Many girls who are in school report leaving early, before 6th grade, or finishing primary school and not continuing onto middle school (7th through 9th) because of early marriages and pregnancy. SSV works to promote girls education and encourages them to stay in school even if they are married or become pregnant. For this reason, SSV is promoting reproductive health and puberty to all students. Within these lessons students learn about their personal anatomy, reproduction, and sexually transmitted infections (STIs). Adolescence is a key time to educate about health and it is a significant time for developmental transitions, setting the stage for habits as an adult (Lassi et al, 2015). "Evidence suggests that interventions to promote sexual and reproductive health, physical activity and healthy lifestyle … can improve health outcomes in young adolescents" (Lassi et al, 2015).

Water safety and hygiene are two other topics that are included in the HHB curriculum. Ms. Haidara prioritized these two topics so that young children can learn early how to prevent water borne diseases and the spread of illnesses related to poor hygiene in the village. The

lessons include what water source is acceptable to drink from, how to properly clean food, and illnesses that can spread from poor hygiene. Through the HHB curriculum, SSV hopes that children will go home to tell their parents what they have learned in the program to influence better behaviors around food and water consumption.

Methods

Introduction

This pilot assessment project will assess the feasibility of using paper and pencil (P&P) quizzes to evaluate health education programs at Siraba School. The two assessments were given to students in January 2019.

Baseline and follow-up intervention assessments (quizzes) were created for topics taught in the HHB curriculum. The quizzes are written in French for the students. They were typed and printed. The quizzes had the same questions for both baseline and follow-up tests. The purpose of the assessments was to assess if the students would be able to fill out the assessments because the P&P method is not the norm in the educational environment.

Quiz 1: Water and Hygiene Program Assessment

Baseline: 4th grade students

Follow-up: 5th grade students

Quiz 2: Reproductive Health and Puberty Program Assessment

Baseline: 5th grade students at Siraba School (orally) and 7th, 8th, and 9th grade students at Piebougou (who had no HHB curriculum in previous years)

Follow-up: 6th grade students at Siraba School and 7th, 8th, and 9th grade students at Piebougou Middle School

The assessments were given to the students via P&P method by Ms. Haidara in their respective classrooms during class time in January 2019. The baseline test for the 5th grade level for reproductive health and puberty was given orally. The students responded to multiple choice questions by raising their hands for the correct answer with their eyes closed and heads down on their desks. The quizzes were given in French according to the standard education practices in Mali. Ms. Haidara and the individual grade level teachers assisted the students with any questions and translations to Bambara (local language) when necessary.

The assessments were graded, entered into Qualtrics, and the scores were analyzed using Qualtrics and Excel.

Participants

A total of 92 students completed the assessments between 1/2/2019 and 1/3/2019, this included 22 students in 4th grade, 21 students in 5th grade, 21 students in 6th grade, 11 students in 7th grade, 7 students in 8th grade, and 10 students in 9th grade.

The students in grades 4th through 6th attend Siraba School and students in grades 7th through 9th attend Piebougou Middle School. Additionally, there were 9 students currently at Piebougou who did not have any of the HHB curriculum before taking the assessment. Students in 4th grade were given baseline assessments on water and hygiene, and the 5th grade students were given follow-up assessments. The students in 5th grade and some students in 7th, 8th, and 9th grade who did not receive HHB curriculum (9 students) were given baseline assessments about the women's reproductive health and puberty lesson. Students in 6th, 7th, 8th, and 9th grade were given follow-up assessments on the same topic.

There were 22 responses to the water and hygiene baseline test and 21 responses to the follow-up. The baseline group were students in 4th grade and the follow-up group were students

in 5th grade. Additionally, there were 30 responses to the reproductive health and puberty baseline test and 41 responses to the follow-up. The baseline group were students in 5th grade and some students in 7th, 8th and 9th grade at the middle school who had not been exposed to the HHB curriculum. The follow-up group were students in 6th grade and some students in 7th, 8th, and 9th grade that had been exposed to the HHB curriculum before taking the assessment.

Materials

Each individual student was given a typed and printed quiz. The students were also provided with writing utensils, either pens or pencils. Quizzes were written in French and instructors, as needed, provided oral translation to Bambara. The assessments were collected and graded by Ms. Hawa Haidara and the SSV team with translation by Ms. Koro Haidara.

Procedures

Ms. Hawa Haidara created the assessment tools with help from SSV. The assessments focused on two topics that had been addressed in the previous year's classes, 1) women's reproductive health and puberty, and 2) water and hygiene. They include a mix of short answer and multiple-choice questions. There were 9 questions total on each quiz and included some demographic questions. Demographic questions included gender, if they had taken HHB classes, and grade level. The last question, #9, was open-ended and asked the students what they thought was the importance of the program and why it is taught in school. The final assessment question, Q9, was chosen by Ms. Haidara and the SSV team. Questions quality and clarity were evaluated and the team assured the questions address programmatic goals. The final questions were written in French by Ms. Hawa Haidara, and then translated to English by Ms. Koro Haidara so the English-speaking team members could understand the process.

The quizzes were given to the students in their classrooms. They received instruction on the quiz from Ms. Hawa Haidara and their teachers. Instructions included how to answer the multiple-choice questions and any translation from French to Bambara. Students in 5th grade were given the baseline test for reproductive health and puberty orally using a head down hands up method. The students were asked the multiple-choice questions and answered with a raised hand for the response they thought was correct. This method was chosen to keep answers confidential and avoid bias in the student's answers. These responses were written down and tallied for each individual question. All other classes received P&P quizzes that were collected at the end of the lesson.

Results

The P&P approach was well received by the students. Students did not report difficulty with the method and the teaching team was satisfied with the approach. The team agreed this would be a feasible tool for evaluation moving forward.

The goal of the pilot assessment project was not to compare the results of the quizzes between groups, as this was not a true pre and post-test evaluation. However, since 92 students did take the quizzes, SSV asked that the results be summarized and reported. The results were analyzed using Qualtrics and Excel.

Baseline and Follow-up Results: Multiple Choice Questions

Table 1A reports the percentages of correct answers for the multiple-choice questions on the Reproductive Health and Puberty Quiz for students in the baseline group. The mean overall score for the group was 76%. For the first question, "What is a period?", 83% of respondents had the correct answer. Question #2, a question related to #1, "Do You know where the period comes from?" was answered correctly by 70% of the students. Question #3 was answered

correctly by only 55% of the students. Questions #4 was answered correctly by 96% of the students while Question #6 was answered correctly by 76% of the group. All questions, translated to English, can be found in Appendix 1.

Rep and Puberty	Baseline
Average Scores	76%
Individual Questions *	
Q1	83%
Q2	70%
Q3	55%
Q4	97%
Q5 – short answer	n/a
Q6	76%
Q7 – short answer	n/a
Q8 – short answer	n/a

* Individual questions (by number) can be found in Appendix 1

Table 1A:

Multiple Choice response % for Reproductive Health and Puberty Quiz

Table 1B reports the percentages of correct answers for the multiple-choice questions on the Reproductive Health and Puberty Quiz for students in the follow-up group. The mean overall score for the group was 76%. For the first question, “What is a period?”, 63% of respondents had the correct answer. Question #2, a question related to #1, “Do You know where the period comes from?” was answered correctly by 70% of the students. Question #3 was answered correctly by 88% of the students, the highest correct response rate on the quiz. Questions #4 and #6 were answered correctly by 80% of the students. All questions, translated to English, can be found in Appendix 1.

Rep and Puberty	Follow-up
Average Scores	76%
Individual Questions *	
Q1	63%
Q2	70%
Q3	88%
Q4	80%
Q5 – short answer	n/a
Q6	80%
Q7 – short answer	n/a
Q8 – short answer	n/a

* Individual questions (by number) can be found in Appendix 1

Table 1B: Multiple Choice response % for Reproductive Health and Puberty Quiz

Table 2A reports the percentages of correct answers for the multiple-choice questions on the Water Hygiene and Safety Quiz for students in the baseline group. The mean overall score for the group was 90%. Students had a 100% correct response rate for questions 1 through 4 on the assessment. Q5 had a response rate of only 59%. Question #6, covering sickness caused by unclean water had a 90% average and question #7 covering oral health had an 81% average. All questions, translated to English, can be found in Appendix 2.

Water and Hygiene	Baseline
Average Scores	90%
Individual Questions *	
Q1	100%
Q2	100%
Q3	100%
Q4	100%
Q5	59%
Q6	90%
Q7	81%
Q8 – short answer	n/a

* Individual questions (by number) can be found in Appendix 2

Table 2A: Multiple Choice Response % for Water Safety and Hygiene Quiz

Table 2B reports the percentages of correct answers on the multiple-choice questions from the Water Safety and Hygiene in the follow-up group. The average score of the assessment overall was 80%. Question #1 had a 95% average and Questions #2 had an 81% average. Questions #3-#5 all had 76% averages and the questions asked about drinking water and food preparation. Questions #6 had the lowest average and was focused on water borne illnesses. Lastly, question #7 had a 90% average and had a focus on oral health. All questions, translated to English, can be found in Appendix 2.

Water and Hygiene	Follow-up
Average Scores	80%
Individual Questions *	
Q1	95%
Q2	81%
Q3	76%
Q4	76%
Q5	76%
Q6	67%
Q7	90%
Q8 – short answer	n/a

* Individual questions (by number) can be found in Appendix B

Table 2B: Multiple Choice Response % for Water Safety and Hygiene Quiz

Baseline and Follow-up Results: Short Answer Questions

Figure 1 displays the number of students who answered correctly on the short answer questions. There were 5 correct responses for each question that were taught during the HHB lessons and were labeled as correct by the health education consultant. Some students in the baseline group were able to give correct answers to the short answer questions. There were more students in the follow-up group that were able to respond correctly. Most significantly, there were 28 students in the follow-up group who gave correct answers to Question #7. The short answer questions provide an example of data that demonstrates retention of knowledge from the follow-up-test students.

The baseline students in 5th grade were given the quiz orally and answered via heads down hands up method. When prompted orally during the quiz, baseline students from the 5th grade were able to give some correct answers to the questions as a group, however these answers are not recorded in **Figure 1**. The answers are not represented in the figure because the students

did not write them on the assessments and were able to answer as a group. The answers were written down and students were able to give correct answers to Q5 and Q7.

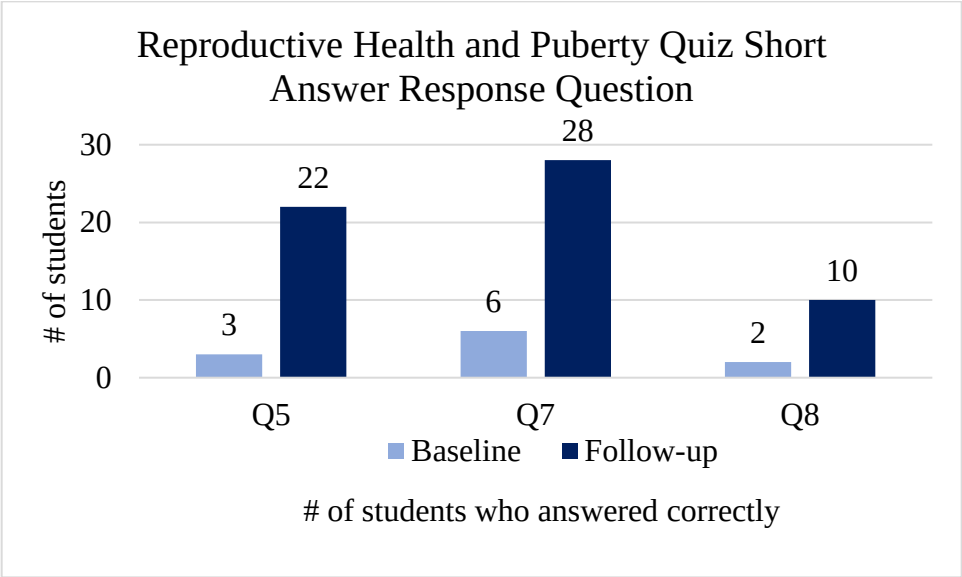

Figure 1: Number of Students who Answered Correctly on the Three Short Answer Questions on the Reproductive Health and Puberty Quiz

Figure 2 displays the results from the short answer question on the Water Safety and Hygiene quiz. There were 7 examples given during the HHB lesson that were labeled as correct by the SSV team and health education consultant. Baseline students were unable to respond to the question while taking the quiz. All of the students in the follow-up group were able to give responses that were correct. When prompted orally after the quiz, baseline students were able to come up with some responses to the question as a group. These responses were not recorded as correct for the quiz because the students were unable to come up with them individually.

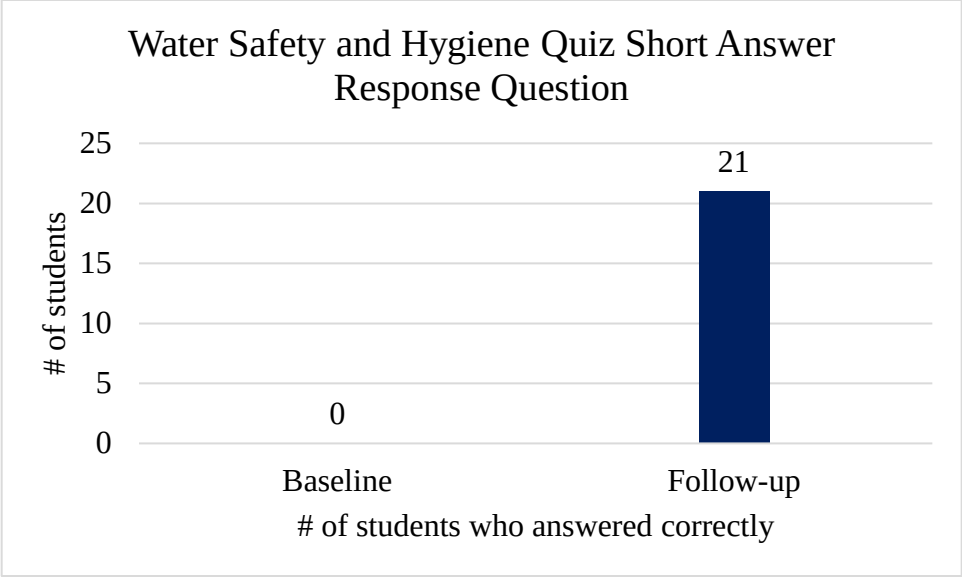

Figure 2: Number of Students who Answered Correctly on the One Short Answer Question on the Water Safety and Hygiene Quiz

Discussion

P&P assessments are a feasible approach to assess the knowledge of the students before and after the HHB lessons. The teachers in the school were accepting of the assessments and encouraged the students to do their best when answering the questions. P&P tests are not the norm in this environment; however, the students were open to the challenge and with their teachers and Ms. Hawa Haidara's help were able to complete them.

Reproductive Health and Puberty Quiz

The baseline and follow-up assessments demonstrated that students had some prior knowledge about reproductive health and puberty before the HHB lessons. The multiple-choice questions for the Reproductive Health and Puberty Quiz showed the ability of baseline students to answer questions about basic health information. They had a higher rate of correct answers on questions that asked, "What is a period?" and "What are the age ranges of adolescence?". Follow-up students showed a higher rate of correct answers for questions that asked about when

a girl is able to get pregnant and “What is an STI?”. The two groups also had an equal response rate for Q2: “Do you know where the period comes from?”. The equal averages for the group, 76%, demonstrate that some of this health information is available for students outside of school and the HHB lessons. The results may also be skewed because of outside information from family, community members, or cultural beliefs.

The short answer questions demonstrate that follow-up students were able to retain information from the HHB lessons. Follow-up students were able to write out correct responses on the quiz while many baseline students left blank answers. When asked orally as a group the baseline group of 5th grade students were able to come up with some of the correct responses. The baseline 7th, 8th, and 9th grade students were able to answer correctly and wrote answers on their quizzes but overall had less knowledge of the topics covering Sexually Transmitting Infections (STI’s) and body changes during puberty.

Water Safety and Hygiene Quiz

The assessments for the Water Safety and Hygiene quiz demonstrated that the baseline students had a higher rate of correct responses to the multiple-choice questions than the follow-up students. The answers could be skewed because follow-up students in 5th grade may have outside information from family or community members contradicting what they learn in school during HHB lessons. Because the students are older, they may have more responsibilities in the home and have been taught from parents how to do things a certain way. The two groups have had the same amount of HHB lessons; however, the responses show that the younger students may have not been persuaded by outside information.

The short answer question, “How do you protect your environment?”, was difficult for the baseline students to answer. They were unable to respond to the question on the quiz directly,

however when asked after the quiz they were able to think of answers as a group after some prompts from Ms. Haidara and their teacher. The follow-up students in 5th grade were able to give correct answers to the question without prompts. This shows retention of the HHB lesson by the 5th grade students. The follow-up students are a year older than the baseline so the results cannot be compared directly.

Open Ended Question #9

The last question on both quizzes was "What is the importance of this lesson of hygiene and health? What change does it bring you and your family?". Many of the older students were able to respond to this question and reported that the lessons will help their families stay healthy. Some said that they knew more about how to keep themselves and use the information to health their siblings stay healthy. Some students said that they knew how to brush their teeth the correct way or how to prevent illnesses from water or bad hygiene practices. Overall, the students who took the quizzes reported that they learned something new from the lessons and how they can profit from good hygiene practices. From this open-ended question, the SSV team can see that the HHB lessons are influencing some good hygiene practices at the school and that the students want to spread their knowledge to their families.

Limitations

There were limitations to this project including issues related to translation in French. Ms. Haidara wrote the quizzes in French, the national language, but had to translate many of them into Bambara, local language, for complete understanding of the questions. The translation may have helped the students to pick the correct answer without trying or limited them in answering at all because they did not understand the translation. The students were also not accustomed to taking P&P tests with multiple-choice and short answer questions. Ms. Haidara

and the teachers gave instructions before and during the quizzes. Some questions may not have been answered correctly because students were unfamiliar with multiple-choice questions. Additionally, students may have also been nervous to take the quizzes while the SSV team was at the school. They were given notice that the quizzes were not for a grade, but unfamiliarity with the testing method and distraction by the SSV team may have contributed to students being nervous.

HHB Program Continuation/ Future Research

From the results of the pilot assessment project, it is important that the HHB program continue to assess knowledge of the students before and after the HHB lessons. From the project, SSV can confirm that the P&P method is feasible in this setting for pre and post tests. Creating assessments to address retention of health information is important for SSV as they continue to update their HHB curriculum to address specific information that the students are lacking. Baseline assessments need to be given at the beginning of the year with quarterly assessments as follow-ups. Baseline assessments could be given to younger students via the heads down hands up method to assess their knowledge prior to the program and paper quizzes could be given to the older students. Short answer questions should be given in both settings to understand retention of information after the HHB lessons.

Lastly, HHB classes could be offered to the whole village after school hours to address the conflicting information the older students may be getting. The adults may profit from understanding more about the important health behaviors discussed during the lessons. Additionally, they may be able to increase retention of information if they are following the lessons at home with their children watching.

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Appendix 1

HHB Translated Quiz Questions: Women's Reproductive Health and Puberty

1. What is a period?
    a. A sickness
    b. A natural process that every girl goes through
2. Do you know where the period comes from?
    a. The stomach/intestines
    b. The uterus
3. YES or NO is a girl able to get pregnant after her first period?
4. From what ages (range) is adolescence?
    a. 12-18
    b. 7-11
5. Give 2 signs of adolescence for girls or boys
    a. _____
    b. _____
6. What is an STI?
    a. A sexually transmitted infection
    b. Malaria
7. Give 2 ways that you may contract a STI.
    a. _____
    b. _____
8. Give 2 signs of a STI infection.
    a. _____
    b. _____
9. What is the importance of this lesson of hygiene and health? What change does it bring you and your family?

Appendix 2

HHB Translated Quiz Questions: Water and Hygiene

1. YES or NO Does washing your hands prevent you from getting sick?
2. What water do you prefer to drink?
    a. Well
    b. Pump
    c. Lake
3. How do you filer water?
    a. With a cloth
    b. With a sifter
4. How do you protect food?
    a. Leave it open
    b. Covering it
5. How do you clean fruits and vegetables?
    a. Water (simple water)
    b. Water and bleach or salt
6. Which sickness are caused by unclean water?
    a. Malaria
    b. Dysentery
7. How do you avoid getting cavities?
    a. Brushing teeth with a finger
    b. Using a natural brush (tree branch)
8. How do you protect your environment?
    a. _____
9. What is the importance of this lesson of hygiene and health? What change does it bring you and your family?