Evidence-Based Preventive Healthcare in the CWB Family Support Homes: The Healthy Learners Pilot Program

Glossary of Abbreviations and Acronyms

CWB – Community Without Borders
HLP - Healthy Learners Program
AoM - Angels of Mercy
DPT - Diphteria Pertussis Tetanus
URTI - Upper Respiratory Tract Infection
GU - Genitourinary
UTI - Uninary tract infection
OVC – Orphans and vulnerable children
NGO – Non- governmental organization
DRC - Democratic Republic of Congo
ZDHS - Zambia Demographic Health Survey
HIV - Human immunodeficiency virus
US - United States
AIDS - Acquired immunodeficiency syndrome
SWAAZ - Society for Women and AIDS in Zambia
ZANCOB - Zambian Association Nysunga Communities Without Borders
UTH - University Teaching Hospital
USAID - United States Agency for International Development
IRB - Institutional review board
UNZA - University of Zambia
CSTS - Community Support and Treatment Services
WHO - World Health Organization
UNICEF - United Nations International Children's Emergency Fund
FAO – Food and Agriculture Organization
CWH - Child Health Weeks
DALY - Disability-adjusted life year
GDP - Gross domestic product
REC – Research Ethics Committee
FAO- Food and Agriculture Organization

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I. Introduction

ZAMBIA

Zambia is one of the poorest countries in the world.[4] It is a tropical land-locked and one of the largest sub-Saharan countries bordered by Democratic Republic of Congo (DRC) and Tanzania to the North, Malawi and Mozambique to the east, Zimbabwe and Botswana to the south, Namibia to the southwest, and Angola to the west.[1] According to the Zambian 2010 census, the Zambian population has risen to 13.1 million from 9.9 million in 2000.[1] The country is subdivided into major administrative units called provinces, which are sub-divided into districts.[1] The districts were subdivided into chiefdoms and Constituencies/ Compounds, while constituencies are further made of wards.[32] The country has predominantly rural provinces with only two urban provinces Lusaka and Copperbelt, leading to numerous peri-urban communities.[1] In 2000, life expectancy at birth ranged from 44 years in Western province to 56 years in North-western province.[1] The 2007 Zambia Demographic Health Survey (ZDHS) estimated child mortality to be about 70 deaths per 1000 live births, a significant decline from prior years. [1] As of 2005, the Ministry of Health launched the National Health Strategy plan with the goal to accelerate the Millenium Development Goals through a basic healthcare package[1], which along with the contributions of numerous NGOs has contributed to reducing mortality and improving residents' quality of life, including that of school-aged children. While most studies have focused on children under 5, the school aged population experiences high mortality and morbidity from malnutrition, chronic and acute parasitic infections such as *Schistosomiasis haematobium*, hookworm and *Plasmodium falciparum*. [2-3, 32]

SCHISTOSOMIASIS

Schistosomiasis, also known as bilharziasis, is a parasitic infection caused by trematodes (flatworms), parasitic blood flukes. It is second to malaria in public health significance and has an estimated prevalence of 200 million infections worldwide[16]. It is caused by several species that live in freshwater snails, five of which can cause infection in humans.[37] The three major cause of infection are *Schistosoma haematobium* (Africa and Middle East)*, S. japonicum* (East Asia) and *S. mansoni* (Africa and South America).[17] The other two are *S. mekongi* (Laos, Cambodia) and *S. intercalatum* (West, Central Africa).[37] Infection occurs via penetration of free-swimming larvae of schistosomes through the skin.[17] Larvae are present in fresh water, develop in snail and infect individuals swimming or walking in infected waters via excretion of eggs in human urine or faeces.[17] Urinary schistosomiasis caused by *S. haematobium* remains a significant burden for Africa and the Middle East[18]. In sub- Saharan Africa, it is estimated that about 112 million of people are infected with *S. haematobium*, mostly children between the ages of 5 and 15, peak at 10±14years and declines in subsequent years, making school-aged children the most affected sub-group.[19-21] Although it has been initially thought that schistosomiasis caused by *S.*

haematobium is a urinary tract disease, it has become clear that it is actually a urogenital disease as evidenced by numerous studies and case reports on the occurrence of schistosomiasis of the female genital tract, leading to infertility and ectopic pregnancy in some cases.[22,23] Here we will specifically address *S. haematobium,* which is most prevalent in our population under study.

The lifecycle of Shistosomiasis although very complex requires an intermediate and a definitive host (See figure 1).[38]

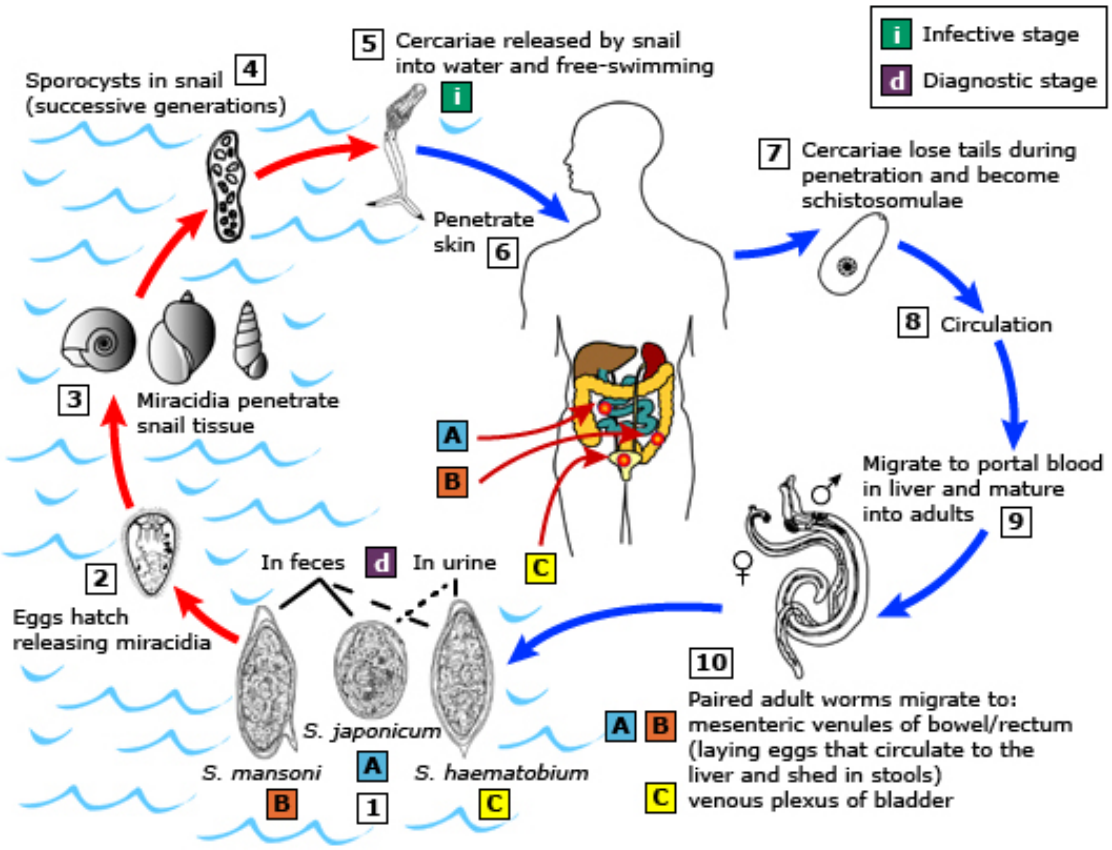

Figure 1: Life cycle of schistosomiasis.
"Reproduced from: Centers for Disease Control and Prevention. DPDx: Schistosomiasis. Available at: http://www.cdc.gov/dpdx/schistosomiasis/."
http://www.uptodate.com/contents/search?search=schistosomiasis&sp=0&searchType=PLAIN_TEXT&source=USER_INPUT&searchControl=TOP_PULLDOWN&searchOffset=&autoComplete=true - Accessed 12/1/14.[38]

In our case with *S. haematobium*, snails are intermediate hosts while humans are definitive hosts; the following is a simplified version of the lifecycle.[38] Human contact with snails in fresh waters is required for transmission. The cycle begins with fresh water contamination with eggs through urine from infected humans or animal reservoir. The cycle outside a host consists of eggs hatching and penetrating a snail. These eggs are viable for up to seven days. The stage in the snail releases infectious cercariae into

the fresh water after four to six weeks. The cercariae larvae can survive for up to two days but are most infectious the first few hours and can penetrate through the human skin.[39] Once in the blood stream, they can migrate to the liver where they mature into adult over two to four weeks. The adult species then migrate against the portal blood flow to the vesical venous plexus in the case of *S. haematobium*. The female resides in the groove formed by the male. The female worms then shed eggs after one to three months into the perivesical system that then move to the bladder and ureters, are eliminated through urine and the cycle continues. The adult worm can survive somewhere between five-seven years and up to 30 years.[40]

In endemic areas, infected individuals are usually asymptomatic due to acquired immunity; individuals most likely to develop disease are travelers exposed for the first time. Acute manifestation of disease include acute schistosomiasis syndrome (also known as Katayama fever) and Swimmer's itch (can also present in individuals in endemic areas).[41] Chronic manifestation of *S. haematobium* include granulomatous inflammation, ulceration leading to gross or microhaematuria, and development of pseudopolyps in the vesical and uretral walls,[42] a set up for malignancy. The diagnosis requires detection of eggs mainly via microscopy in resource limited setting and burden of disease by measuring the number of eggs/10mL of urine.[43] The gold standard for curing *S. haematobium* is treatment with praziquantel, which is only effective against the adult worm.[44] Given this fact, treatment would be only effective after 21 days of infection with 100% effectiveness from day 52.[45] For acute cases, patients may be treated initially with costicosteroids to reduce inflammation.[46] Early and effective treatment is crucial as recurrent and chronic infection is associated with bladder cancer.[24,25] Numerous studies including a longitudinal epidemiological study have shown that, of all modes of control of the infection including safe water provision and killing of snails with molluscicides, chemotherapy with single round of praziquantel is most effective with a significant reduction of severe shistosomiasis and a cure rate >80%.[19,26,27]

Further, other studies in other peri-urban and rural settings have identified anemia and helminthes infections, such as *S. haematobium*, as dominant health problems among schoolchildren.[9,11,14] As reported by the WHO, worms contribute to vitamin A deficiency and anemia. Anemia is also associated with Vitamin A deficiency hence deworming and vitamin A supplementation will reduce risk of anemia.[15] Previous studies have used control and intervention groups in a longitudinal follow-up to show that deworming reduce absenteeism and improve school participation.[12]

HIV in ZAMBIA

In addition to schistosomiasis, the impact of the HIV pandemic on Sub-Saharan African countries like Zambia has been deeply remarkable and is well recognized. Of note, schistosomiasis increases the

susceptibility to HIV infection.[47] The pandemic has increased the number of orphans and is of great concern among vulnerable children. These factors impede the performance and success in school among the school-aged population. Worldwide, Zambia ranks 9th among countries with the most people living with HIV (1.1 million per 2013 WHO statistics).[31] HIV prevention and education should be of utmost priority not only to reduce the incidence of horizontal HIV infection but also vertical transmission. A "lifecycle approach" as described by Roxby *et. al.* provides a ideal model for HIV prevention by targeting children and particularly adolescent girls[29], which will not only decrease infection rate among that subpopulation but also provide a conduit to educate their children and generations to follow. School settings provide the best setting in terms of cost, access and safe setting to implement HIV preventative programs.[30] Keeping children in school also will further reduce the risk of infection through education while promoting safe sex and voluntary testing by reducing stigma as supported by Jukes et. al.[29]

SCHOOL BASED HEALTH INTERVENTION

Several publications support the claim that nutrition and health play a major role in pre-school and school-aged children's performance, attendance and success as well as their cognitive function.[4-7] Further, it was recently reported that health conditions during childhood have a strong effect on all adults' indicators of socioeconomic status.[8] This highlights the importance of providing not only educational support to the OVC but also health services. This will have a greater positive impact on their future, and at the same time the social, economic and political status of the community and the country as a whole. Furthermore, school based intervention in solving the community health issues has been previously shown to be most cost effective. [9-10]

COMMUNITIES WITHOUT BORDERS

Communities Without Borders (CWB) has been providing educational support to OVC in the peri-urban slum compounds surrounding Lusaka, Zambia for approximately 15 years. The central mission of CWB is to support the education of children orphaned by the epidemic of HIV in Africa or otherwise made vulnerable due to profound poverty. Operating on the model of ongoing community-to-community partnerships at the grassroots level, individual US-based communities have partnered with Zambian communities to provide quality educational opportunities for the Zambian communities' most vulnerable children. In 2012, CWB was serving over 1300 OVC in the peri-urban slum compounds of Lusaka. CWB has largely functioned in partnership with the Society for Women and AIDS in Zambia (SWAAZ) and the Zambian Association Nysunga Communities Without Borders (ZANCOB), the Zambian NGOs that provide administration for much of the organization's work. CWB also employs one envoy in Zambia. Beginning in 2013, CWB also began operating as a registered Zambian nongovernmental organization and continued in this mission of OVC's educational support.

Numerous CWB volunteers have recognized that health and nutritional status are closely linked to children's ability to attend school regularly and progress academically. Consequently, various secondary projects, related to health and nutrition, had been undertaken under the auspices of CWB. Some Zambian partner communities have received funds from CWB to support feeding programs; some American partner communities have paid for sporadic health screenings to be conducted at their Zambian communities' family support homes; one American partner community funds regular physician visits to its Zambian partner community. Prior to the current project, however, there had not been an official coordinated and dedicated health component to CWB's work in Zambia.

ANGEL OF MERCY

Angel of Mercy (AoM) is a registered Zambian non-governmental organization devoted to providing preventive health services to OVC in Ng'ombe Compound, one of the communities served by CWB. The mission of AoM is to improve the health of OVC and its main goal is to help OVC in community schools achieve their greatest potential by eliminating preventable health issues that may affect their attendance or limit their school performance. AoM's services include preventive health screening, nutritional supplements and referral to the government local clinic, the University Teaching Hospital, or a specialty center for follow-up at no cost.

AoM had first collaborated with CWB in 2007 when a group of three Harvard graduate students referred by CWB to AoM, in collaboration with physicians and medical students from the University Teaching Hospital in Lusaka, generated a comprehensive report on the context, method and outcomes of a cross-sectional health assessment of students from nine community schools in Ng'ombe Compound in Lusaka. Their methodology included surveying school aged children and their caregivers and using data from AoM's health screenings at the community schools. Their study suggested many routes for future work in the community schools in order to improve school children's health and performance. The prevalence of *S. haematobium* in the compound was 20.72% and reported to be one of the major under-reported health issues affecting in majority school aged children, particularly adolescents. [2]

SCOPE OF THE PILOT STUDY

While CWB supports important educational services for OVC, these services may be hindered by inadequate health care, which is the gap the HLP hopes to close. Several studies have demonstrated the cost-effectiveness of treating schoolchildren by taking advantage of educational infrastructures.[9,13] Our pilot study used AoM's existing system to provide deworming, vitamin A supplementation, immunization, and screening for acute health issues among children served by CWB. A health status and needs survey was also administered on screening days. Finally, with the ultimate goal of providing teachers with the necessary tools to incorporate health education into their curricula, a one day workshop

on common public health topics was conducted for CWB-sponsored teachers. The specific goal of the pilot workshop was to assess teachers existing knowledge and the potential of the workshop model to improve this knowledge. While prior studies in Sub-Saharan Africa have looked at the impact of individual components of preventive health care such as deworming or vitamin A supplementation,[9,12] our study sought to assess the feasibility of *a package of multiple preventive health care interventions* to improve health status and school attendance in our target population. This paper will first presents our methods, a summary of our findings followed by a focused discussion of the significance of our data.

II. Subjects and Methods

Needs Assessment and Identification of Partner Organizations

Prior to the pilot study, we reviewed the existing body of knowledge on the efficacy of preventive health care among school aged children in resource-limited settings, particularly sub-Saharan Africa through literature search and collaboration with experts in the field (University Teaching Hospital Department of Pediatrics and Department of Community Health). We examined current availability and use of existing preventive healthcare services for children served by CWB through interviews with local experts (e.g. UTH Dept of Pediatrics and Dept of Community Health, Ministry of Health, members of SWAAZ, Jane Ndulo (CWB Envoy in Zambia), CWB caretakers, families served by CWB. We researched the existence and scope of practice of other NGOs in Zambia with whom CWB might partner in this endeavor (e.g. through conversations with SWAAZ, USAID, Clinton Foundation, etc.). We examined stakeholders' perceptions of preventive health care needs through interviews with families served by CWB, family support home caretakers, and family support home teachers, Jane Ndulo, members of SWAAZ. We collaborated with Angels of Mercy to develop budget, schedule and research other individuals, organizations and agencies that may be attractive as partners in provision of preventive care for CWB's children as needed.

Analysis of Content of AoM's Current Health Screenings for Evidence-Based Utility

A revised version of AoM's health screening model (Appendix A) at the time of he initial pilot study was used as the "starting point" for the CWB program. Components of the screening were examined for feasibility, which included evaluating the screening process, tracking screening methods and number of screenings relative to the cost.

Implementation of health status surveys and pilot health screenings - with AoM for children enrolled in the CWB Family Support Home schools in Ng'ombe, Chawama, Garden, M'tendere, Bauleni, and Mandevu Compounds

1. We Developed documentation tool and created a deidentified database for tracking children longitudinally in terms of health status, including anthropomorphic data, vitamin and deworming medication administration, referrals for acute medical care, etc. Baseline data were collected in the Summer 2012. Of particular interest, will compare 2012 schistosomiasis screening results with those obtained in Summer 2013.
2. Data from the survey and children screened were analyzed using descriptive statistical measures such as mean, standard deviation, Z-scores etc.

IRB/Ethical considerations

Institutional review board (IRB) approval was obtained from Harvard Medical School and the Review Ethics Committee at University of Zambia (UNZA) prior to traveling to Zambia.

Study design

Our pilot study was a feasibility study of a school based health care program for children whose educational costs were being supported by CWB in six peri-urban compounds in Lusaka, Zambia. Project work off-site mainly consisted of conducting a literature study, contacting Zambian partners, IRB approval from local and on-site institutions as well as planning meeting with the CWB volunteers. Project on-site had 3 main parts:

- Six pilot preventive health care screening days at six peri-urban compounds in Lusaka, Zambia conducted by Angels of Mercy for CWB supported children.
- Administration of a health needs assessment survey of a subset of the CWB-supported children and their guardians with the help of teachers and Zambian medical students for interviews and interpretation.
- A day-long schoolteachers' health promotion workshop

Study population

For the health screenings, the population was all pupils served by CWB who were present on screening days were screened and treated when indicated. For the health status survey, the population was a convenience sample of children and their guardians who were attending the health screenings in 4 of the compounds. The teacher training workshop participants included teachers sponsored by CWB who worked in seven pre-primary schools

Data collection

Urine examination

One urine sample was collected from all students at each compound two days prior to the screening day at the respective compounds so that results were available at the time of screening allowing proper treatment, if indicated. All pupils present at school on the day the samples were collected were included in the study. Urine samples were collected in clean and sterile universal containers under the supervision of teachers and laboratory technician(s) present. All containers were labeled using pupils' first and last name. Urine samples were analyzed for presence of detectable hematuria (presence of RBCs), and the prevalence and intensity of *S. haematobium* infection by reporting number of eggs10/mL of samples.

Health Screenings

The HLP pilot program included preventative health screening days run by the Zambian NGO AoM at six CWB family support homes. All children who attended the screening day were registered and assigned a study identification number. The screening components included demographic data, reported immunization status, medical history, physical exam (including full inspection, vision screening), anthropometric measures (height, weight) and, review of urinalysis results. Heights and weights were measured to determine height-for-age z-score (HAZ), weight-for-age z-score (WAZ) and body-mass-index z-score (BMIZ). Heights were measured using a measuring meter taped on a vertical wall and weights measured with an electronic scale. Children were also taught to brush their teeth and received a dental care kit. All pupils present at each screening received vitamin A supplementation and deworming medication (Mebendazole) as well as, when indicated, vaccination against tetanus and tuberculosis, medication for acute illnesses (such as Praziquantel for *S. haematobium* infection) and referral to government clinics or hospitals if specialty care was needed.

Health Status and Needs Survey

A convenience sample of pre-school students enrolled in CWB family support homes and their guardians were approached to participate in a health status survey interview. The guardians and children were verbally consented and assented on site by interviewers, which were the Zambian medical students as well as the Harvard Medical School faculty and student (Lise Johnson and Samsiya Ona). The schoolteachers and the University of Zambia medical students also served as interpreters when needed and were fluent in English, Nyanja and Bemba, which are the three most spoken languages in Lusaka, Zambia. The survey tool was a modification of that used by the previously mentioned CWB affiliated project in 2007, which was an abbreviated CSTS Rapid Catch survey tool (Appendix B). We included aspects in the survey to inform pupils'

susceptibility to *S. haematobium* and the burden of the infection in the community. The survey was modified to include multiple-choice questions instead of open-ended questions given the language barrier of some interviewers such as myself and to facilitate communication. Also included in the nutritional assessments in the health assessment survey are dietary habits obtained from the child's primary caregiver. Teenagers in higher school grades that were presents on screening days were also surveyed with the goal to specifically assess their HIV/AIDS knowledge.

Statistical analysis

Data were collected on paper on site using assigned study identifications numbers then transferred to a deidentified excel spreadsheet. Data were then transferred and run using SAS software (Version 9.3, SAS institute). Anthropometric z-scores were calculated using World Health Organization (WHO) reference data.[36] As previously reported, BMIZ is the parameter of choice to evaluate recent weight loss due to undernutrition, while HAZ and WAZ are more indicators of long-term growth.[19] Anthropometric z-scores were calculated using World Health Organization (WHO) reference data.[36]

III. Results

1. Health screenings data from pilot study: Summer 2012

455 pupils were screened during the pilot study at six compounds served by CWB over six screening days. Table 1-1 summarizes the distribution of screened participants at the various sites.

- *Demographic Characteristics*

Participation varied greatly across communities depending on how well the screenings were advertised within each community. The children ranged in age from 2-20 years. The average age of the children screened was 7.45 years. Three-quarters of the children were between 5 and 12 years of age. Of the children screened, 54% were female and 45% were male (1% missing data). Over half of the children screened attended pre-primary school (59.5%) and another 25% were in grades 1, 2 or 3. A quarter of the children (24%) were either single or double orphans.

Table 1-1. Demographic Characteristics (n=455)

Variable	Percentage (n)
Community	
Bauleni	22.9 (104)
Chawama	13.6 (62)
Garden	8.6 (39)

Mandevu	28.4 (129)
Mtendere	11.0 (50)
Ngombe	15.6 (71)
Gender*	
Male	45.1 (205)
Female	54.3 (247)
Children's ages (in years) <5 5-12 13-18 18-20	 17.0 (77) 74.0 (336) 8.1 (37) 0.9 (4)

* Missing data n=3

- *Guardian Report of Immunization status*

Guardians were asked about children's immunization status regarding polio, DPT, and measles and children were examined for evidence of a BCG scar. Immunization records were not available for review. Results are summarized in Table 1-2. Overall the majority of guardians reported children to be fully vaccinated against polio (72.5%), DPT (72.9%), and measles (77.8%). Most children screened had evidence of a BCG scar (69.3%) or reported that they had been vaccinated against tuberculosis but did not have evidence of scar (23.9%). The remaining 6.9% of children either had not been vaccinated against tuberculosis or did not know if they have been. 26.0% of the children had incomplete polio vaccination while ~2% were not immunized. Similarly, 24.1% had received 4 doses of DPT vaccine, which is incomplete. 5.8% of children had not been vaccinated against DPT. Although most of the children were vaccinated against measles, 17.9% had not received the measles vaccine and 4.9% were unsure about their immunization status.

Table 1-2. Reported Immunization Status (n=455-missing data)

	Fully Immunized Percentage (n)	**Partially Immunized Percentage (n)**	**Not immunized Percentage (n)**	**Unknown Innunization Status Percentage (n)**
Tuberculosis* (BCG vaccine)	93.2 (421)	N/A	5.8 (26)	1.1 (5)
Polio#	72.5 (321)	26.0 (115)	1.6 (7)	0.0 (0)
Diptheria, Pertussis, Tetanus (DPT)$	72.9 (320)	24.1 (106)	3.0 (13)	0.0 (0)
Measles†	77.8 (347)	N/A	17.9 (80)	4.3 (19)

* Missing data n=3; # Missing data n=12; $ Missing data n=16; † Missing data n=9

- *Illness and Symptoms history*

Guardians were asked about recent episodic illness as well as recurrent illnesses. Many reported having had malaria (73.2%) but a few reported TB (1.8%), measles (8.0%) or shistosomiasis (1.6%). Of the 35

children (7.7%) who reported having "other" episodic illness, 16/35 reported chicken pox. Many children had recurrent diarrhea (43.8%) or respiratory infections (64.6%). In addition, 9.2% reported recurrent cough. A more detailed history of symptoms was obtained prior to physical examination. In this setting, 18.8% reported body hotness, 5.7% reported headache, 1.8% reported recent weight loss, and 29.2% reported tiredness. Many had current cough (39.2%). Less frequently reported active problems were skin rash (2.4%) or diarrhea (6.4%).

- *Growth Indicators*

Height, weight, and calculated body mass index (BMI) measurements were obtained for 409 students. Mean z-scores are presented in table 1-3 for two age groups (2-4 years, and 5-19 years). Reporting mean z-scores were useful for describing the nutritional status of the entire population. The expected value for the reference population was zero. While WHO classifies children as wasted, stunted, or underweight based on a cut-off of negative two standard deviations (-2SD) z-scores for weight and height, there were no BMI standards for children over five years of age.[36] Reference data for weight-for-age- for children over 10 years of age were not available because weight-for-age was not considered a good indicator of growth for children over 10. These data did not suggest a significantly malnourished population. The data demonstrated that 1.1 % of children ages 2 to 4 years had a BMI-for-age consistent with underweight status (<-2 SD from the mean), while 4.1% of children ages 5 to 19 were considered underweight. 12.4% of children ages 2 to 4 years and 5 to 19 years had a weight for age <-2 SD. Furthermore, 31.2 % of children ages 2 to 4 years were 2 SD below the norm and 19.6 % of children ages 5 to 19 years were shown to be less than 2 SD from the norm. Height-for-age z-scores indicated a significant group of children who are stunted with more than a quarter of the young children and males surveyed falling below -2SD from the mean.

Table 1-3. Mean Z Scores for BMI, Weight, and Height by age (n=409)[59]

			z-score			% of <-2SD
Indicator	**Age Group**	**Gender**	**n**	**mean**	**SD**	**% (95% CI)**
BMI for Age	2-4 years old	M	40	0.48	1.08	0.0 (0.0, 1.3)
		F	53	0.39	1.03	1.9 (0.0, 6.5)
		Total	93	0.43	1.05	1.1 (0.0, 3.7)
	5-19 years old	M	152	-0.19	0.93	2.6 (0.0, 5.5)
		F	164	-0.46	0.88	5.5 (1.7, 9.3)
		Total	316	-0.33	0.91	4.1 (1.8, 6.5)
Weight for Age	2-4 years old	M	40	-0.50	1.19	10.0 (0.0, 20.5)
		F	53	-0.44	0.85	0.0 (0.0, 0.9)
		Total	93	-0.46	1.00	4.3 (0.0, 9.0)

	5-10 years old*	M	116	-0.83	0.93	12.1 (5.7, 18.4)
		F	117	-0.96	1.03	12.8 (6.3, 19.3)
		Total	233	-0.90	0.98	12.4 (8.0, 16.9)
Height for Age	2-4 years old	M	40	-1.25	1.36	27.5 (12.4, 42.6)
		F	53	-1.11	1.55	34.0 (20.3, 47.7)
		Total	93	-1.17	1.46	31.2 (21.2, 41.1)
	5-19 years old	M	152	-1.34	1.10	25.7 (18.4, 32.9)
		F	164	-1.03	1.19	14.0 (8.4, 19.6)
		Total	316	-1.18	1.16	19.6 (15.1, 24.2)

* There is no reference data for age above 10 years old because weight-for-age is not a good indicator of growth in children over 10 years.

- *Physical Examination and Findings*

During physical examination, positive findings were identified as follows: none (64.2%); visual acuity (16.8%); scalp (5.8%); caries (3.5%); ears (2.4%); eyes-general (1.8%); mouth/throat (1.1%); lungs (1.1%); abdomen (2.4%); skin (.09%). Schistosomes were identified in urine samples of 51/447 screenings (11.4%). 53/455 children (11.6%) who attended screenings had not provided urine samples. Of those that were positive, 18/51 (35.3%) did not present on screening day.

Medications and Referrals

One or more diagnoses were made for 91 children (20%). Frequent diagnoses included: GU – excluding bilharzia (n=53); URTI n= (51); schistosomiasis (n=51); abnormal eye findings (n=27); Tinea Capitis (n=26); anaemia (n=13). Immunizations were administered for 168 children (37.3%). Of the 455 children screened, 438 (96.9%) received Mebendazole and 446 (97.4%) received Vitamin A. Other medications were provided for half of the students (n=226, 50%). Frequently prescribed medications included: Amoxicillin (n=74); Piriton (n=46); Praziquantel (n=32); Miconazole (n=19); Panadol (n=15); Erythromycin (n=13); Griseofulvin (n=10); Clotrimazole (n=10); Penicillin V (n=10); and Cough Syrup (n=10).

2. Surveys Data from pilot study: Summer 2012

A health status and needs survey was conducted to better understand the overall health status and socioeconomic profile of the community. Surveys were completed with parents or guardians of 223 children, representing a total of 177 households in four communities; Bauleni (n=65), Chawama (n=61), Mandevu (n=58) and Mtendere (n=39). Demographic characteristics of the 223 students who completed

health surveys are presented in Table 2-1. There were101 males (45.3%) and 122 females (54.7%). The age of the students ranged from 2 years to 16 years with a mean age of 6.6 years. Sixty-five percent (65%) of the students were between the ages of 4 and 7 years.

Table 2-1. Demographic Characteristics (n=223)

Variable	Percentage (n)
Community	
Bauleni	29.1 (65)
Chawama	27.4 (61)
Mandevu	26.0 (58)
Mtendere	17.5 (39)
Gender	
Male	45.3 (101)
Female	54.7 (122)
Children between the ages of 4 and 7 years	65.0 (146)

- *Family Information and Socioeconomic Status*

The students who attended the screenings were required to be accompanied by a guardian. More than half (63.2%) attended the screenings with a parent, and of those surveyed (n=223), 81.2% reported that both parents of the child were alive. Still, there were 4 double-orphans and 38 children (17.0%) who had lost either their mother or their father. The children who were surveyed live in 177 households where 46 of the households include more than one child who was interviewed. For 42 households, 2 children were interviewed and for 4 households, 3 children were interviewed.

Guardians were asked about what the head of household did for work. Fifteen (6.7%) respondents said that the head of household is unemployed. Frequently reported occupations were small business owner (17.0), general or part-time worker (15.2), trader (13.0%), driver (7.6%), maid (6.7%), land farmer (4.5%), and brick layer (4.5%). In addition, the guardians were asked the highest grade-level they had completed. Nearly a quarter (22.9%) did not respond to this question. Another quarter (25.1%) reported no higher than a 3rd grade education or no formal education at all. Only 2 of the student's guardians reported having completed 12^{th} grade.

The vast majority of these children lived in houses that are constructed from concrete or cement (91.9%). Fifteen students (6.7%) were living in mud or tin homes. Most homes contained 2 rooms (67.3%). While more than three-quarters (77.6%) of respondents reported having 2 or more windows in the house, 18 (8.1%) students lived in window-less homes. Characteristics of the households are presented in Table 2-2.

Over 90% of students reported using a traditional pit/latrine as their most frequently used type of sanitation facility. Twelve students (5.4%) reported having access to an improved, ventilated pit/latrine while 8 students (3.6%) had access to flush toilets. Drinking water was obtained from a community tap for 81.6% of students whereas other students regularly obtained drinking water from a borehole well or protected dug well (14.3%); 3.6% of students reported having access to tap water in their homes. Drinking water was disinfected regularly for 61.0% of respondents whereas 37.2% did not regularly disinfect their drinking water and 1.3% respondents did not know if their drinking water is disinfected. Over half (51.1%) always or sometimes used bleach to disinfect drinking water and 14.4% always or sometimes boiled their water.

Table 2-2. Characteristics of Households (n=223)

Characteristic	Percentage (n)
2 or 3 rooms per house	79.9 (178)
Between 4 and 7 people living in house	74.4 (166)
Between 2 and 4 people under age of 18 in house	72.7 (162)
House made of concrete or cement	91.9 (205)
House has either one or no windows	22.0 (49)
Traditional pit latrine (unventilated)	90.6 (202)
Flush Toilet	03.6 (8)
Primary water source is community tap	81.6 (182)
Regularly disinfect drinking water	61.0 (136)

- *Preventive Health Measures*

Information was obtained about routine preventive health measures such as immunizations, Vitamin A supplements, deworming medications, mosquito prevention, and hand washing. Results are presented in Table 2-3

Table 2-3. Preventive Health Measures (n=223)

Variable	Percentage (n)
Vitamin A dose within last 6 months	26.5 (59)
Deworming medication within last 6 months	32.3 (72)
Ever received any vaccinations	91.9 (205)
Own mosquito nets	48.4 (108)
Slept under mosquito net last night	21.5 (48)
Always wash hands before eating	91.5 (204)
Uses soap or detergent	55.6 (124)

Most of the students (85.2%) responded that they had received a Vitamin A dose in the past although only 26.7% had received a dose in the last six months. There were 14.8% of students who had either never received a Vitamin A dose or who did not know if they had ever received a Vitamin A dose.

Deworming medication had been received by 76.7% of the children, 32.3% of whom said it had been received in the last six months. Nearly one quarter (22.4%) either had never received deworming medication or did not know if they had.

Most of the students (91.9%) had received vaccinations; 85.6% in the last six months. There were 8.1% of children for whom no vaccinations had been received or for whom it was unknown if they had received vaccinations.

Most reported washing hands always or sometimes before eating (96.8%) or after using the bathroom (97.2%) and 70.8% always used running or poured water. More than half (55.6%) used soap or detergent; the remaining 44.4% used water only. When asked if the student used soap "yesterday" to wash their hands, 51.1% said yes and 39.0% said no (the remaining students either did not know or did not answer the question).

Slightly less than half of the children (48.4%) reported owning mosquito nets to be used while sleeping. For those who do not have mosquito nets, 35.9% could not afford them and others (11.2%) did not use them because they had not been offered them, found them to be uncomfortable or other. Only 21.5% of the children reported having slept under a mosquito net the previous night and a similar percentage (19.7%) reported that the nets had been treated to repel mosquitoes or bugs. Approximately half of those children (9.0%) reported that the nets had been treated within the last six months; the others either did not know, did not answer, or said that the time since the mosquito nets were last treated was greater than six months.

- *Child Diet Information*

Most of the children (97.8%) reported having eaten two or more meals "yesterday" and over half (58.7%) had at least one snack opportunity. Children were asked about the nutritional content of the meals they ate "yesterday" (see Table 2-4). Examples of types of foods found in four major food groups including, protein, carbohydrates, fat, fruits and vegetables, were provided. Most children (87.0%) reported eating protein the day prior. Frequent responses for the type of protein included meat (n=89), fish (primarily kapenta) (n=65), beans (n=51), and eggs (n=30). More than one protein source is reported for 23.2% of the children.

Table 2-4. Diet Information (n=223)

Variable	Percentage (n)
Ate 2 or more meals "yesterday"	97.8 (218)
Ate protein "yesterday"	87.0 (194)
Ate carbohydrates "yesterday"	99.1 (221)
Ate from fat group" yesterday"	95.5 (213)
Ate fruits/vegetables "yesterday"	80.3 (179)
Lost weight over last month	22.0 (49)

Nearly everyone (99.1%) reported having had carbohydrates the previous day. For 94.2%, Nshima (white cornmeal) was included in their daily diets. For 14% of the children, bread was also part of their daily meal usually in addition to Nshima. Other carbohydrates mentioned (for 12.7% of the children) were cassava, porridge, rice, or potato.

Nearly everyone (95.5%) also reported having some fat in their daily diet; for most people this took the form of cooking oil; a few also mentioned butter.

Fruit and vegetables were included in "yesterday's" meal for 80.3% but the variety of fruits and vegetables was very limited. More than half who had eaten fruits and vegetables the previous day reported eating rape (54.2%) and another 26.8% ate cabbage. Aside from rape and cabbage, options were limited. A small number (5.8%) reported eating fruits such as apple, banana, or orange.

Nearly a quarter (22.0%) of children reported having lost weight in the previous month. Most did not report issues with swelling of face and/or lower legs/feet (94.6%) nor changes in hair color and texture (95.5%).

- *Systemic Issues (Table 2-5)*

Reported signs and symptoms of illness are summarized in Table 2-5. Children and their guardians were surveyed on the most common symptoms attributed to major organ systems to assess the burden of illness. Overall, URTI symptoms are most commonly reported followed by gastrointestinal issues and body hotness. Although most respondents (88.8%) did not report blood in their urine, it is worth noting that most children and guardian acknowledged not paying particular attention to urine color.

Despite URTI being so common, only 35.5% consulted with a health care provider for treatment. In most cases, the health care provider was a nurse, followed by a traditional healer, a medical doctor and a community health worker. For their GI issues, only one quarter (25.0%) of the children reported having been given fluids to treat the diarrhea.

For those who had experienced body hotness during the last month, only 10.8% sought treatment for body hotness and 12.6%, took medicine for the body hotness. Antipyretics/analgesics were the most frequently reported medication type (7.2%), followed by antimalarials (2.7%), antibiotics (2.2%), and other (1.8%) (respondents could report more than one type of medication).

- *Chronic conditions*

A small number of children 3.6% reported suffering from a long-term illness whereas most answered "no" to this question (96.0%) (1 person did not respond).

Table 2-5. Systemic Issues (n=223)

Variable	Percentage (n)
Experienced body hotness over previous 2 weeks	22.0 (49)
Had diarrhea during previous 2 weeks	09.0 (20)
Worms in vomit or stool (ever)	18.8 (42)
Illness with cough during previous 2 weeks	61.9 (138)
Brown or red urine (current)	09.0 (20)
Blood in urine (ever)	07.2 (16)
Visible, pimply rash in previous 2 weeks	07.2 (16)
Itchy, watery, red eyes in previous 2 weeks	08.0 (18)

- *Community attitudes about HIV/AIDS*

Most guardians (83.0%) had not spoken to these children about HIV/AIDS. Of those who had not spoken to the children about HIV/AIDS, 77.8% offered a reason. For most, (88.1%) they felt the child was too young to understand. Others mentioned being too busy, not having information, or being embarrassed.

Children were then asked directly if they had ever heard of HIV/AIDS. Most had not (74.9%) while 15.3% said yes and 3.1% did not know. Most children did not answer additional questions about HIV/AIDS transmission and prevention. Still, of 49 children who answered the question, "how can a person get HIV/AIDS?", most said "other" (16.1%), 3.1% answered "through sex", 2.2% answered "through blood exposure via needles" and 0.4% answered "from exchange of blood or bodily fluids". Fifty-one children responded to the question, "who can get HIV/AIDS?" and 15.7% of them responded "other" whereas 4.0% said "anyone" and the remaining 3.1% answered "either men, or women, or children". Finally, children were asked how could one prevent HIV/AIDS and of the 48 who responded, most (n=40) said "other", whereas 7 identified "abstaining from sex" and 1 said "to use a condom".

- *Health status/attitudes*

Guardians were asked what the three most significant health problems affecting the community and 96.4% responded to the question (see Table 2-6). The most common answer was malaria (37.7%) followed by diarrheal disease (33.2%), respiratory illness (30.5%), pneumonia (26.5%), fever (10.8%), HIV/AIDS (5.4%), URTI (4.9%), and eye infections (4.5%). Of note, some respondents seemed to associate any febrile illness with malaria, so it is unclear if the malarial cases reported were all truly due to malaria.

A scheme card is available to residents for a monthly fee and provides free healthcare at local clinics for acute and health problems. Almost half of the respondents (45.3%) reported having a scheme card but many did not answer this question (42.2%). Another 11.2% said that they did not have a scheme card.

Approximately one third of children (33.6%) were reported to have received formal medical care during the previous six months whereas 63.2% had not (missing data for 1% and did not know for 2.2%). Of those who had received medical care (n=49), the most frequent diagnoses were malaria (9.0%), chicken pox (n=7), cough (n=6), and URTI (n=3). Everyone reported having received some treatment. Specific medications reported include Panadol (n=21), Amoxicillin (n=14), Coartem (n=10), Piriton (n=10), and Flagyl (n=4). Many respondents could not remember the names of the medications that were prescribed.

In the previous two weeks, 19.7% (n=44) of the children had missed 1 or more days of school because of an illness. Of these, 63.6% missed 1 or 2 days and for the rest, more than 3 days. Five children missed a week or more of school. Most did not report a description of illness but 7 children said that they had a cough and four described stomachaches or diarrhea.

Table 2-6. Health Issues in Community (n=223)

Most commonly reported health problems in community	**Number (unless percentage noted)**
Malaria	84
Diarrheal diseases	74
Respiratory issues	79
Pneumonia	59
Fevers	24
HIV/AIDS	12
Received medical care in last 6 months	Include n 33.6%
Common Diagnoses in last 6 months (54 responses)	
"Malaria"	20
Chicken pox	7
Cough	9
Missed school because of illness during last two weeks	Include n 19.7%

3. Data from teachers' health promotion workshop

We organized a workshop to educate teachers in important basic public health topics. The workshop was led by Mr. Ignicious Bulongo clinic supervisor at Ng'ombe Clinic, a well-known and respected government clinic in one of the communities served by CWB. He ran this workshop with an environmental health technician and a nutritionist and covered various topics including sanitary needs, water-borne diseases and other common infectious diseases such as HIV and tuberculosis. The session included short presentations, small and interactive small group sessions and a myth-buster. Feedback from teacher after the session through an anonymous survey was overwhelmingly positive and all requesting for more educational sessions. Table 3 summarizes the pre and post-training test results, which supports the efficacy of such intervention in teaching the educators, with the goal to have such knowledge passed on to the pupils as part of a school health program. Success of the session was evidenced by the post-test results with improvement scores increase as high as 53%.

Table 3: Teacher's health promotion workshop: Pre and post-test results

Teacher's ID	Pre-test Score (%)	Post-test Score (%)
1	93	100
2	96	100
3	53	98
4	70	80
5	76	93
6	60	80
8	46	80
9	40	70
11	66	98
12	73	98
14	83	93
15	53	100
18	56	100
19	13	66

IV. Discussion

The pilot study provided a tremendous insight not only into the health status of our school-age population under study but also an informative look at the health needs of the target population, which were similar across the communities. It also provided insight into the feasibility of school-based health care delivery staffed by a combination of trained healthcare providers, teachers, and volunteers. Further, we also were able to trial the potential efficacy of training teachers in basic health care topics that they might utilize in their classrooms.

1. Analysis of health status survey

The health status analysis included socioeconomic status evaluation of health determinants. From the data acquired, children served by CWB are from very poor socioeconomic background, which is not surprising as they were initially recruited by CWB given their disadvantaged background.

In terms of living situation and sanitation, most of the children live in overcrowded homes and share their toiletry with possibly several neighbors. Almost 91% of the pit latrines are unventilated leaving room to infection spread among users. Given the population high density and lack of ventilation, there is an urgent need for public health intervention. However, lack of financial support makes such intervention a lower priority next to the health problems that affect the residents.

The Child Health Weeks (CHW) is an outreach-based event held twice a year to provide nutrition and health services to children under the age of five. During the survey, not all participants were aware of this campaign and hence have never partaken. During the campaign, participants are provided with Vitamin A supplementation, deworming medication, immunization, growth monitoring, bed-net distribution and much more.[55] However, this campaign does not include children 5 years and older, which is the vast majority of our participants (about 77%). Further, despite the inclusion of free bed-nets during the campaign since 1999, less than 50% of respondents own a net and less than 22% use one, which is a major public health issue given the high risk of malaria in this region. Less than 26% of participants report receiving vitamin A supplementation six months prior to the interview. Only about a third of respondent received deworming medications and about 22% have never or do not recall ever receiving deworming medications in the past, which reinforces the need for expanding the CHW to include more children, as budget allows.

Other pertinent issue surround health status and attitude of the community as a whole. The three most reported chronic health problems are malaria, diarrheal disease and respiratory illnesses, which are for the most part sanitation related diseases. This may be confounded by the fact that the interviews were being conducted during Zambian winter season right after the rainy season. It is unclear whether responses would have been different if the interview were being conducted during another season.

2. Nutritional and growth status

The most significant identified nutrition problem in our patient population is growth stunting as evidenced by their height-for-age data. This may be as a result of poor nutrition in utero, poor nutrition from birth, and infectious diseases during childhood. Essential micronutrients to growth include iron, iodine, Vitamin A, which are essential for both growth and mental developments as well as immunity.[53] Although most children lack the resources and means to live comfortably, from our survey, over 97% of participants have at least two meals/ day and report a somewhat balanced diet at least the day prior to the interview. As argued elsewhere, when children aim for specific dietary habits, their chances of success are

maximized.[53] This supports the need for a formal teachers' training including a nutritional component with the goal of including such elements in the school curriculum. With such implementation, not only may pupils' nutritional habits improve but also this may in the long-term improve their mental growth and decrease susceptibility to infections. The recommended curriculum design stems from a FAO Guide for Planning Nutrition Education Curricula (the "Planning Guide"), which in turn was derived from the WHO "concept of health-promoting school". [53] To be effective such intervention need to involve not only the community schools served by CWB, but also government schools and endorsed by the school district for a universal implementation so that not only all students benefit nationally but also once our students move on to government schools, they continue to acquire the health and nutritional knowledge indispensable for a healthy development.

3. Immunization status

The comprehensive history on screening days included collecting immunization data. Children under 5 are provided with "under-5 card" from their first immunization. Record of immunization history is recorded on that card to ensure that all children receive all their immunizations as recommended. On the screening day, guardians did not have children's under 5 cards reporting they were unaware they needed to have it, hence data acquired were per guardians' report, a limitation of our data. They were instructed to present with children's under 5 cards at all future screenings or health visits.

Although records of immunization were incomplete, the majority of children attending screening days were reported to have received some or all of the recommended immunizations. However, our data suggest some possible important gaps in immunization within this vulnerable population.

Among the children at our health screenings, 1.1% of guardians did not know if the child had received BCG and another ~6% of the child did not have a BCG scar. *Mycobacterium tuberculosis* is the leading infectious cause of mortality in the world, particularly a great public health issue in the developing world. Worldwide it affects approximately one-third of the world.[49] Although the efficacy of the *Mycobacterium bovis* bacillus Calmette-Guérin (BCG) vaccine is suboptimal and only useful in preventing disease in certain population,[49] it has been fully implemented in the developing world where tuberculosis (TB) is most prevalent and most deadly. A meta-analysis from Harvard School of Public Health supported the efficacy of BCG vaccine in newborn in reducing the risk of TB over 50%.[50] For these aforementioned reasons, children with no recall/ no history of BCG vaccine were provided with a BCG vaccine on the day of screening when indicated.

Of the children surveyed, ~2% were not known to be immunized against polio while 26% were reported as partially immunized. Before the era of polio vaccine, poliomyelitis was the leading cause of permanent disability in children. Poliomyelitis is a communicable disease, which can be spread by feacal-

to-oral or oral-to-oral transmission. The disease has since been eradicated in most part of the world. Currently there is no cure for poliomyelitis and treatment is mainly supportive,[51] hence the importance of making sure that children are adequately immunized. Since 1988, due to the Global Polio Eradication initiative, the number of endemic countries have been reduced from 125 to 3 (Nigeria, Pakistan and Afghanistan); 223 and 403 poliomyelitis cases were reported in 2012 and 2013, respectively, [51] which although still significantly lower represent an increase in cases. Hence, although the vast majority of the students are reportedly immunized (91.6%), some are still unsure or not immunized. Much of the counseling was also often provided regarding the importance of polio immunization given long-term consequence on victim's future and the safety and productivity of the community as a whole.

About 23% (102 out of 446) of our population's guardians were unsure of prior immunization against measles or reported children as not immunized, which is concerning. Due to much work by the WHO and UNICEF, measles deaths in Africa decreased by about 91% between 2000 and 2006, an estimate of 70% decrease mortality worldwide.[52] We also choose to target this issue through teachers education and training to ensure implementation or immunization, possibly as a school enrollment requirement. Vitamin A deficiency has been linked to worsening mortality and morbidity in children with some infections including diarrheal diseases and measles.[60] Evidence support the fact that biannual vitamin A supplementation (VAS) to at least 80% of the population decreases child mortality attributed to measles by 50%.[60] This highlights the importance of VAS, particularly among our high risk population and the immunization status as discussed earlier. The Child Health Weeks are partly in place to reach this goal. During our screening, 97.4% of children received VAS.

Finally, although the majority of participants were also reportedly immunized against DPT (73%), 24% were partially immunized and so the same intervention as mentioned earlier regarding school requirement still applies.

4. ***Prevalence of Schistosomiasis haematobium***

We found a high prevalence of *S. haematobium* (11.4%) among the children who participated in the pilot school-based health screenings. Of note, prevalence among communities varied widely from as low as 0.0% in Chawama to as high as 21.4% in Bauleni. While the majority of children diagnosed with schistosomiasis were treated on the health screening days, 18/51 (35.3%) children found to be infected did not attend their community's health screening and needed to be tracked down subsequently through their teachers for treatment and follow-up. The strategy of collecting urine samples a few days prior to the health-screening day thus presented some logistical challenges.

Given the burden of the disease particularly in sub-Saharan Africa, there is a need for inexpensive ways of screening for the disease in addition to other low-cost preventative and therapeutic measures. A

cross-sectional school-based study in a rural community of Nigeria reported in June 2014[48] investigated testing for microhematuria and proteinuria as rapid and indirect diagnostic methods in an effort to map the infectious burden in endemic areas and inform infection control programs' strategies. Microhematuria had a lower test sensitivity of 73.3% while proteinuria had a higher test sensitivity of 80.3%, both of which are good S. haematobium infection indicators.[48] Both were performed using chemical reagent strips, which is not only quick but also relatively inexpensive.

The gold standard for curing *S. haematobium* is treatment with praziquantel,[44] Numerous studies including a longitudinal epidemiological study have shown that of all modes of control of the infection including safe water provision and killing of snails with molluscicides, blanket treatment with single round of praziquantel is most effective with a significant reduction of severe shistosomiasis and cure rate >80%.[19,26,27] Screening and treatment only of positive cases, while most likely effective in the immediate phase, would not be a sustainable quality improvement tool in infection control. Given this data, to improve our quality of care, future intervention will include blanket treatment on screening days instead of cumbersome collection of urine samples before screenings. This will not only improve outcomes but also decrease the cost associated with purchasing pneumatic tubes and provide coverage for children who may be positive screens but not present on screening days for treatment.

Other issues are yet to be addressed regarding shistosomiasis persistently high prevalence and lack of community knowledge about the burden of the disease and its consequences. In terms of the cause of the high prevalence of schistosomiasis infections, it was unclear what the most likely source was at the time of the pilot study. Some but not all communities have small water streams and all communities suffer from poor water drainage. A follow-up investigation led by another Harvard medical student revealed that 4 out of the 6 communities have a stream or local lagoon that are very unsanitary and easily accessible by all: Garden, Mandevu and Ng'ombe compounds have a major stream, while Chawama has a lagoon. Some residents, particularly in Ng'ombe compound wash their dirty cloths at the stream. In addition, our pilot study was held right after the rainy season, with numerous beds of stagnant waters around the community. Further, most children walk around the community barefoot. From a follow-up project in Summer 2013, from data collected during the same month of the year, the three compounds with the highest prevalence were Garden (26.7%), M'tendere (19.0%) and Bauleni (19.0%), rates remaining consistently higher in Bauleni and M'tendere when compared with the pilot study data of Summer 2012. This does not necessarily correlate with communities that have a major stream. Furthermore, of those that were diagnosed with shistosomiasis in 2012 who were treated with praziquantel and/ or referred to the local clinic, the University Teaching Hospital, or a specialty center for

follow-up, there were no follow-up reported and no data or information on test of cure. This was a major limitation.

Finally, schistosomiasis is a major public health issue not only because of the burden of the disease but also the lack of acknowledgement by the community members. No surveyed guardian identified shistosomiasis as one of major diseases affecting the community, although it was one of the three most prevalent diagnoses during our screenings. This suggests that much needs to be done to educate children and guardians on the importance of follow-up in cases of positive shistosomiasis infection even if the patient remains asymptomatic, considering the long-term health sequelae, if untreated. Several factors may have contributed to this lack of follow-up: limited knowledge regarding health consequence of untreated/ chronic shistosomiasis infection, miscommunications between guardian and health providers, belief that lack of symptoms or resolution of symptoms implies complete cure with no future consequences, busy guardian(s) who is (are) unable to take students to clinic, overcrowded clinics discouraging busy parents from waiting long hours to be treated or simply forgetfulness. This is worsened by the very low socioeconomic status of our population of interest. This limitation was expected so to improve adherence to follow-up, we planned to include a nurse or clinical officer from the government clinic local to each screening site in following screenings. We hoped this would establish stronger ties with those local clinics and help ensure that referrals are adequately followed-up with.

Given previous failure to follow-up, implementation of other strategies were urgently needed to ensure compliance and increase awareness of the long-term consequences of the infection and simplicity of treatment, hence the emphasis on teachers training as a conduit to health education of the OVC.

5. ***Community attitude and knowledge about HIV/AIDS***

As part of the health status survey, participants were asked about their knowledge on HIV and the guardians questioned about discussing the disease with their child/children. It was apparent that most guardians are uncomfortable discussing the topic with their children with the most reported reason being that the child was too young to be engaged in such discussion. Although this is an understandable reason, most teenagers did not seem to know most of the essential information about the topic but it is also unclear if they were not comfortable discussion a sexual topic. Per our survey, although many of the children were early school age (between 4 and 10 years of age) almost 75% of them have never heard of HIV/AIDS. This is surprising considering the rate of HIV infection in the region. A community -based intervention is needed to increase awareness and decrease the stigma. As implemented by the Bahamian Ministry of Education in a study published last year, teachers training, as mentioned earlier, as our major intervention tool should include:[54] (1) A review of the history of HIV/AIDS and the importance of HIV

prevention; (2) Review of effectiveness of school-based intervention (3) pre-intervention assessment; (4) Review of the content of the training including abstinence and contraception; (5) Question and answer session/ myth-buster and discussion of teachers' action plan in perfecting a particular area (such as abstinence) to improve prevention.

6. ***Our promising interventional model: teachers' education***

The adult to child ratio was very high in most homes and most parents/guardians have to work away from home throughout the day, which limit parenting time. Consequently, pupils not only depend on school for their academic learning but also for social training, which will also enhance child-community learning as knowledge is passed on from year to year. Several studies have supported the efficacy of teachers' training to implement a school-based health and nutrition education of students. [56-58] The advantage of teaching younger children in local language, as needed, was also highlighted.[56]

The full day health promotion workshop for CWB preschool teachers was one of the highlights of the 2012 summer for our HLP team, with positive review by teachers and significant improvement in post-workshop assessment (table 3).

Following the workshop, each teacher had the task of developing an "action plan" for their school, which should consist of a small health promotion program they wish to initiate in their school with little or no financial cost. They could work on this project throughout the year with mentorship by HLP. In a follow-up communication with several teachers, planned projects included (1) hand-washing before and after each meal in school and encourage such behavior at home; (2) requiring an under-5 card prior to registration and enrollment at government schools; (3) Introducing cholera, HIV/AIDS education in their curriculum.

Follow-up plans for teacher trainings should include:

(1) Introduction to hygiene and sanitation practices: lecture based and practice-based teaching mirroring a curriculum implemented among minority students in northern Vietnam.[56] This would include hand-washing practices, cutting windows to unsure ventilation of latrines, teaching about prevention of waterborne diseases, preventative behaviors to avoid contracting or spreading respiratory illnesses, other febrile illnesses (explaining that not all febrile illnesses are due to malaria) and common symptoms of these ailments.

(2) School based HIV/AIDS prevention: would include a review of HIV transmission routes, abstinence (mostly among teenagers), preventative measures and addressing stigma surrounding the infection
(3) Immunizations: including importance of under-5 card and Child Health Weeks
(4) Meaning of a diagnosis and importance of follow-up when referrals are made.
(5) School-based nutrition education

V. Obstacles and challenges

Several obstacles were encountered on-site, some of which were anticipated and others a surprise but we quickly learned from them and rapidly adjusted. Some of the challenges included the language barrier, staff shortage sometimes, the location of the screenings being too small to accommodate all participants contributing to the chaos, some unprepared staff, dealing with some administrative challenges such as coordination of referrals (connecting the students to appropriate and closest clinics or hospitals), efficiency, punctuality, internet access, connecting with the right people and gathering of information about common local medications. We attempted to adapt to the logistical challenges in a number of ways. We found it very helpful to visit schools prior to the screening day to plan how to set up different areas of the screening process. This allowed a more "manageable chaos" on the screening days and helped keep the screenings running more smoothly. Debriefing meetings with screening staff after each screening also helped to trouble-shoot logistical challenges. Through our partnership with Dr. Mary Ngoma, my on-site mentor, we had the help of three skilled medical students in addition to the schoolteachers to help with translation. To overcome the issue regarding insufficient staff, we were more than grateful to have the help of the CWB volunteers and also hired more staff during our last screening. A lot was learned from this experience, which gives room for tremendous future improvements.

VI. Limitations

The project was school-based and only included students and guardians that presented at the school on screening days. In addition, if pupils were not present in school the day the urine samples were collected, no data were available on their shistosomiasis status on screening day and hence if there were no active symptoms or signs to warrant referral, cases would have then been missed. We focused on the school-aged population and the screening was held when the students came to school, leading to issues regarding generalizability. Consequently, we could not reach out to all the students, as some may have been too sick to be in school during the time of the screenings. This study also excluded those not currently enrolled in school. This is the main reason why we hope to establish a more longitudinal health service program to

reach out to all the students served by the CWB. Further, one of the major limitations was the lack follow-up when referrals are made for further care. We attempted to bridge this gap in the Summer 2012 by meeting with local experts in the field of school-based preventative healthcare to share our ideas and challenges and seek feedback. These officials included Dr. M. M. Zulu, Registrar at the health Professions Council of Zambia and former Chair of the District Medical Office, and Ms. Doreen Mwondela, Coordinator of Oral Health and School Health Services at the District level. Further pursuit of this initiative would be a great tool to improve follow-ups with referrals. Regarding the health status and needs survey, one limitation included not grouping responses by household when the information provided was generally the same. One obstacle in achieving that was the fact that guardians may present with children from different households. We also expect there may have been some recall-bias in the survey when asking children and caregivers questions pertaining to past medical history.

VII. Conclusions and Recommendations

The health status and needs survey confirms a target population with significant health challenges and needs. We strongly believe that our model of school based health screenings is promising. It would benefit from improved planning for logistics. Establishing contacts with local government clinics through the District will improve follow-up. Other quality improvement tools would include providing more infrastructure and record-keeping so that children may be tracked from year to year. To facilitate future screenings:

(1) We recommend holding a training session for all stuff that will be involved in the screening to make sure everyone understands his/her role, explain the forms to them and specifically what is expected of each team member. We left this at the discretion of the leading nurse due to time constraint but we would save even more time in the end if we run the information sessions ourselves.

(2) We also recommend involving all the local clinics in all the compounds to facilitate follow-ups with referrals.

(3) For the medications administered, it would be helpful to have a roster of needed medications and predicted cost prior to initiating screenings

Teacher training has great potential value as a cost-effective method of improving the health status of school-aged children in resource limited settings. Possible strategies include training teachers to the level of community health worker to facilitate the integration of health and nutrition education into their curriculum. This is not only cost beneficial but also efficient as they can teach in local languages. This could be implemented but organizing several workshops and including topics as discussed earlier in our interventional model section. Intervention effectiveness can be measured not only through teachers'

knowledge assessments but also their ability to implement these acquired knowledge into their curriculum at a level that the pupils could comprehend. Tracking the volume of disease treated can help but other metrics should be considered in a short term such as frequency of health and nutrition lessons in schools as well as teachers' comfort through frequent surveys. Scheduled children examinations would also be informative and could be integrated into final school examinations. Other positive predictors of system improvement can include better school attendance and better performance on standardized testing.

VIII. Acknowledgements

I would like to acknowledge Dr. Mary Ngoma, Associate Professor of Pediatrics, Child Health and Neonatology at the University of Zambia and former Chief of Pediatrics at the University Teaching Hospital in Lusaka, who was the Zambian academic advisor and our on-site project sponsor. She also assisted in providing the program with three medical students Webster Musonda, Arthur Mumba and Lauraine Kapembwa, whom I would also like to acknowledge for their support and contribution in data collection.

This program was also supported by Dr. Zhigang Lu, a programmer at the Brigham and Women's hospital, and Katie Tumpowsky, the epidemiologist who volunteered her time to analyze our data sets and prepare most of the results summaries.

I am also grateful to my mentors Dr. Lise Johnson and Dr. Richard Bail for their support in initiating this project, particularly Dr. Lise Johnson for spending extra time in advising and her fundraising efforts to make this project possible. Also thanks to Jill Ann Goslinga, current 3rd year Harvard medical student for sharing some of her findings from the 2013 Summer. I would also like to acknowledge the Scholars in Medicine office at Harvard Medical School for the financial support during the summer of 2012, which made it possible to be on-site and Dr. Kim Wilson for willing to review this work and offer her expertize.

Finally, I would like to express my gratitude to CWB, CWB volunteers and Zambian teachers for their indispensable contribution.

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X. APPENDIX A

Angel of Mercy Community Child Health Project
Sheet 1: Demographic Information and History

Name: _____
Date of Birth: _____/_____/_____
Age: _____
Sex: _____
Grade: _____
Address: _____
Name of School: _____
Date of Exam: _____/_____/_____

I. **Guardian status**
Father: Alive ☐ Died ☐
Mother: Alive ☐ Died ☐
Other guardian, if applicable: _____
If father died, cause of death: Long illness ☐ Short illness ☐
If mother died, cause of death: Long illness ☐ Short illness ☐

II. **Occupation**
Father: _____
Mother: _____
Other guardian, if applicable: _____

III. **Immunization status**
BCG: ☐ *If no scar seen, repeat* ☐
Polio: Dose 0 (birth) ☐ Dose 1 ☐ Dose 2 ☐ Dose 3 ☐ Dose 4 ☐
Measles: ☐
DPT: Dose 0 (birth) ☐ Dose 1 ☐ Dose 2 ☐ Booster 1 ☐ Booster 2 ☐

IV. **Illness history**
Episodic illnesses: Malaria ☐ TB ☐ Meningitis ☐ Measles ☐ Bilharzia ☐ Other ☐ (_____)
Recurrent illnesses: Asthma ☐ Diarrhea ☐ Respiratory infection ☐ Epilepsy ☐
Other ☐ (_____)

V. **Household**
Number of rooms: _____
Number of people: Total: _____ Adults: _____ Children: _____
Source of Water: Community Tap ☐ Borehole ☐ Shallow well ☐
Other ☐ (_____)
Type of toilet: Pit latrine ☐ Ventilated/improved pit latrine ☐ Flush toilet ☐
Other ☐ (_____)

SHORT HISTORY FORM A

Instructions: *Please use this **short history form A** if caretaker is present or if child is old enough to understand the detailed questions. If there is no caretaker and if child is too young to understand form A questions, please use simpler **short history form B**.*
Please place a check mark in the appropriate box next to each question.
Code: Y = yes; N = no; NR = no response

SYSTEMIC:

1. Have you had any episodes of body hotness in the last month? Y☐ N☐ NR☐
2. Did the body hotness accompany any other illnesses? Y☐ N☐ NR☐
3. Have you had any headaches in the last 2 weeks? Y☐ N☐ NR☐
4. *TO CARETAKER IF PRESENT:* Have you noticed that your child has lost a great deal of weight in the last month? Y☐ N☐ NR☐
5. Do you think that you are much more tired than other children throughout the day? Y☐ N☐ NR☐

RESP:

1. Do you currently have a cough? Y☐ N☐ NR☐
2. Have you had a cough two or more times in the last month? Y☐ N☐ NR☐
3. *IF YES:* Did this cough last longer than two weeks? Y☐ N☐ NR☐
4. *IF YES TO ANY COUGH:* Is/was there chest pain with the cough? Y☐ N☐ NR☐
5. *IF YES TO ANY COUGH:* Did you cough up lots of mucus? Y☐ N☐ NR☐

SKIN:

1. Have you had any skin rash in the last two weeks? Y☐ N☐ NR☐
2. *IF YES:* Where? _____

GI:

1. Do you currently have any diarrhea? Y☐ N☐ NR☐
2. Have you had any diarrhea in the last 2 weeks? Y☐ N☐ NR☐
3. Have you had either blood or whitish mucus in your stool in the last 2 weeks? Y☐ N☐ NR☐

IS THERE ANYTHING ELSE WE SHOULD KNOW ABOUT THE CHILD'S CURRENT HEALTH?

_____
_____
_____

SHORT HISTORY FORM B

1. Have you had a coughing illness in the last week? Y☐ N☐ NR☐
2. Have you had body hotness in the last week? Y☐ N☐ NR☐
3. Have you had diarrhea in the last week? Y☐ N☐ NR☐
4. Do you have any skin itchiness or rash? Y☐ N☐ NR☐
5. Have you felt sick in any other way this week that you need to tell us about?

_____
_____

Angel of Mercy Community Child Health Project
Sheet 2: Physical Exam

Name: _____
Age: _____
Sex: _____

Please check box if present and explain in line space given. If a section has no positive findings, only check "all normal" box for that section.

A. Exam Stage 1

I. General

i. Weight (kg): _____
ii. Height (cm): _____
iii. Temperature: _____
iv. Blood pressure (mm Hg): _____

Vit A given ☐
Vermox given ☐

II. Scalp *(Check if all normal: ☐)*

i. Abnormal ☐ (Explain: _____)

III. Eyes – Visual Acuity *(Check if all normal: ☐)*

i. Abnormal-left eye ☐ Abnormal-right eye ☐

IV. Eyes – General *(Check if all normal: ☐)*

i. Discharge: Y ☐ N ☐
ii. Redness: Y ☐ N ☐
iii. Swelling: Y ☐ N ☐
iv. Jaundice: Y ☐ N ☐
v. Other abnormality: ☐ (Explain: _____)

V. Ears *(Check if all normal: ☐)*

i. Growths: Y ☐ N ☐
ii. Pus: Y ☐ N ☐
iii. Severe wax impaction: Y ☐ N ☐
iv. Sores: Y ☐ N ☐
v. Other abnormality: ☐ (Explain: _____)

VI. Mouth/Throat/Neck *(Check if all normal: ☐)*

i. Caries: Y ☐ N ☐
ii. Inflammation in back of throat: Y ☐ N ☐
iii. Swollen tonsils: Y ☐ N ☐
iv. Swollen neck lymph nodes: Y ☐ N ☐
v. Other abnormality: ☐ (Explain: _____)

VII. Palms *(Check if all normal: ☐)*

i. Pallor: Y ☐ N ☐

B. Exam Stage 2

I. **Lungs** *(Check if all normal:* ☐*)*
   i. Abnormal breathing movements: Y ☐ N ☐
   (Explain: _____)
   ii. Abnormal breathing sounds: Y ☐ N ☐
   (Explain: _____)

II. **Heart** *(Check if all normal:* ☐*)*
   i. Heart sound abnormality: Y ☐ N ☐
   (Explain: _____)

III. **Abdomen** *(Check if all normal:* ☐*)*
   i. Hepatomegaly: Y ☐ N ☐
   ii. Splenomegaly: Y ☐ N ☐
   iii. GI palpation abnormality: Y ☐ N ☐
   iv. Other abnormality: ☐ (Explain: _____)

IV. **Genitourinary** *(Check if all normal:* ☐*)*
   i. *ASK:* Hematuria in last 2 weeks: Y ☐ N ☐
   ii. *ASK:* Dysuria in last 2 weeks: Y ☐ N ☐
   iii. *ASK:* Genital ulcers/lesions: Y ☐ N ☐
   iv. *ASK:* Genital discharge: Y ☐ N ☐
   v. Other abnormality: ☐ (Explain: _____)

V. **Dermatological** *(Check if all normal:* ☐*)*
   i. Rash: Y ☐ N ☐ (Location: _____)
   ii. Infection: Y ☐ N ☐ (Location: _____)
   iii. Other abnormality: ☐ (Explain: _____)

Remarks: _____

Name of Examining Officer: _____

Signature: _____

C. Exam Stage 3

I. **Laboratory urinalysis results** *(Check if all normal:* ☐*)*
   i. Leukocytes: Y ☐ N ☐ (Grade: _____)
   ii. Erythrocytes: Y ☐ N ☐ (Grade: _____)
   iii. *S. haematobium* seen: Y ☐ N ☐ (Grade: _____)

II. **Urine dipstick results** *(Check if all normal:* ☐*)*
   pH: _____
   Specific Gravity: _____
   Hematuria ☐ Ketone bodies ☐ Glucose ☐ Nitrites ☐
   Leukocytes ☐ Bilirubin ☐ Urobilinogen ☐ Protein ☐

XI. APPENDIX B

Communities Without Borders
Healthy Learners Program
Health Status Survey 2012

INTERVIEWER INITIALS:
_____

INTERVIEW CONDUCTED IN SCHOOL (Name):
_____

DATE OF INTERVIEW (mm/dd/yy):
_____/_____/_____

CHILD STUDY NUMBER:
_____

Sex: 1. Male 2. Female
0.1._____

Child's Age (integer number in years)
0.2._____

1. Family Information/Socioeconomic Status

1-1. What is your relationship status to the child?
1.1._____

1. Mother
2. Father
3. Aunt
4. Grandmother
5. Sibling
6. Neighbor
7. Other: _____ (Please Specify)

1-2. Are the child's parents living? 1.2. _____

1. Yes, both
2. Just mother
3. Just Father
4. Neither, child is an orphan

1-3. What does the head of the household do for work? 1-3. _____

1. Land Farmer
2. Live stock farmer
3. Trader
4. Small business owner
5. Other_____(Please Specify)

TO MOTHER IF PRESENT

1-4. What is the highest-grade level you completed? 1-4. _____

1. 0 Grade
2. 1st Grade
3. 2nd Grade
4. 3rd Grade
5. 6th Grade
6. 7th Grade
7. 8th Grade
8. Beyond 8th Grade (Please Specify)_____

1-5. What is the main material in your house made of? 1-5. _____

1. Concrete/Cement
2. Mud
3. Tin
4. Other:_____ (Please Specify)

1-6. How many people live in a house? (integer number) 1-6. _____

1-7. How many of those people are under the age 18? (integer number) 1-7. _____

1-8. How many rooms are in the house? (integer number) 1-8. _____

1-9. How many windows are there in the house? (integer number) 1-9. _____

1-10. Of the sanitation facilities on this list, which one does (Name) most often use? (record all that apply) 1.101._____ 1.102. _____ 1.103. _____

1. Traditional pit/latrine
2. Ventilated improved pit/latrine
3. No facility/bush/field
4. Other

(Please Specify) _____

1-11. Of the sources of drinking water on this list, which one does (Name) MOST often use**?** 1.111._____
(record all that apply) 1.112. _____
1.113. _____

1. Bore hole
2. Water from community tap
3. Protected dug well
4. Unprotected dug well
5. Body of water (stream/river/pond/lake)
6. Other
(Please Specify)_____

1-12. Do you disinfect your water before you drink it? 1-12. _____

1. Yes 2. No 3. Don't Know

IF YES 1-13. How?

1-131. Add bleach/chlorine 1-131._____
1-132. Boil 1-132._____
1-133. Other_____ 1-133._____

0. Never
1. Sometimes
2. Always

2. Preventive Health Measures

2-1. Has (Name) ever received Vitamin A does (excluding today)? 2-1. _____

1. Yes 2. No 3. Don't know

IF YES 2-2. In the last 6 months, did (Name) receive a 2-2. _____
Vitamin A dose (excluding today)?

1. Yes 2. No 3. Don't know

2-3. Has (Name) ever received deworming medication (excluding today)? 2-3. _____

1. Yes 2. No 3. Don't know

IF YES 2-4. In the last 6 months, did (Name) receive 2-4. _____
deworming medication (excluding today)?

1. Yes 2. No 3. Don't know

2-5. Has (Name) received any vaccinations? 2-5. _____

1. Yes 2. No 3. Don't know

IF YES 2-6. Has (Name) completed his/her vaccinations? 2-6. _____

1. Yes 2. No 3. Don't know

2-7. Does (Name) wash his/her hands before eating? 2-7. _____

0. Never 2. Sometimes 3. Always

2-8. Does (Name) wash his/her hands after using the bathroom? 2-8. _____

0. Never 2. Sometimes 3. Always

IF YES 2-9. Does (Name) use running or poured water to wash his/her hands? 2-9. _____

0. Never 2. Sometimes 3. Always

2-10. What does (Name) use for cleaning when he/she washes his/her hands? 2-10. _____

1. Water
2. Soap
3. Detergent
4. Other (Please Specify): _____

2-11. Yesterday, did (Name) use soap to wash his/her hands? 2-11. _____

1. Yes 2. No 3. Don't know

2-12. Does your household have any mosquito nets that can be used while sleeping? 2-12. _____

1. Yes 2. No

IF NO 2-13. If no, why not? 2-13. _____

1. Can't afford
2. Net never offered
3. Uncomfortable
4. Don't want
5. Other: _____ (Please Specify)

IF YES 2-14. Did (Name) sleep under a bed net last night? 2-14. _____

1. Yes 2. No 3. Don't Know

IF YES 2-15. Were any of the households bet nets ever treated to repel mosquitoes or bugs? 2-15. _____

1. Yes 2. No 3. Don't know

IF YES 2-16. How long ago were the nets last treated? 2-16. _____

1. Less than 1 month
2. Less than 6 months
3. Less than one year
4. Less than 2 years
5. Cannot remember

3. Child Nutritional Status

3-1. Yesterday, how many meals did (name) eat? (integer number)
3-1. _____

3-2. Yesterday, did (name) have the opportunity to snack outside of meals?
3-2. _____

1. Yes 2. No

IF YES 3-3. How many times? (integer number)
3-3. _____

3-4. Yesterday, which of the following foods did (name) eat a snack or meal sized portion of?

FOOD GROUP	PROTEIN GROUP	CARBS GROUP	FAT GROUP	FRUITS/VEGETABLE
EXAMPLE	**red meat, chicken, fish, kapenta, beans, eggs**	**nshima, bread, rice, sweet potato, potato**	**cooking oil, butter**	**Veg: rape, cabbage. Fruit: banana, watermelon, apples, avocado, guava**

3-41. Protein Group 1. Yes (Please Specify)_____ 3-41. _____

2. No

3-42. Carbs Group 1. Yes (Please Specify)_____ 3-42. _____

2. No

3-43. Fat Group 1. Yes (Please Specify)_____ 3-43. _____

2. No

3-44. Fruit/ Vegetable 1. Yes (Please Specify)_____ 3-44. _____

2. No

3-5. Over the last month, has (name) lost weight? 3-5. _____

1. Yes 2. No 3. Don't know

3-6. In the past two weeks, has (name) had swelling (that feels firm, but can be depressed), 3-6. _____

especially of the feet/lower legs or face?

1. Yes 2. No 3. Don't know

3-7. Over the past 3 months, has (name) had a change in hair color or texture, 3-7. _____

especially to a more orange/golden color or a more coarse texture?

1. Yes 2. No 3. Don't know

4. Systemic

4-1. In the last one month, has (name) had body hotness that lasted more than 2 weeks? 4-1. _____

1. Yes 2. No 3. Don't know

4-2. In the last two weeks, has (name) been ill with body hotness at any time? 4-2. _____

1. Yes 2. No 3. Don't know

IF YES 4-3. How many days did the body hotness last? 4-3. _____
(integer number)

IF YES 4-4. Is the body hotness present today? 4-4. _____

1. Yes 2. No 3. Don't know

IF YES TO ANY BODY HOTNESS IN THE LAST MONTH

4-5. Did you seek treatment for (name) when he/she had body hotness? 4-5. _____

1. Yes 2. No

IF YES 4-6. How many days after the body hotness began did you first seek treatment for (name)? 4-6. _____

1. First day of body hotness
2. Second day of body hotness
3. Third day of body hotness
4. More than 3 days (Please Specify Integer Number) _____

IF YES 4-7. Did (name) take any medicine for the body hotness? 4-7. _____

1. Yes 2. No 3. Don't know

4-8. What medicine(s) did (name) take? (record all that apply)
4-81._____
4-82._____
4-83._____
4-84._____

Medication Type
1. Antimalarials (ex: chloroquine, quinine, fansidar)
2. Antibiotics (vanco, clinda, TMP-SMX)
3. Other antipyretic/analgesics (aspirin, ibuprofen, paracetamol)
4. Other (Please specify) _____

4-9. In the last 2 weeks, has (name) had night sweats? 4-9. _____

1. Yes 2. No 3. Don't Know

5. Gastrointestinal

5-1. In that last one month, has (name) had diarrhea that lasted longer than two weeks? 5-1. _____

1. Yes 2. No 3. Don't know

5-2. In the last 2 weeks, has (name) had diarrhea? 5-2. _____

1. Yes 2. No 3. Don't know

IF YES to any diarrhea in the last month 5-3. Was s/he given any special fluids to drink at any time to treat his/her diarrhea: 5-3._____

1. Yes 2. No 3. Don't know

IF YES 5-4. Which of the following fluids was given? (record all that apply) 5-41._____ 5-42._____ 5-43._____

Fluid Type
1. An ORS powder in special packet used to make a fluid?
2. A government-recommended HOMEMADE fluid?
3. Other (Please Specify)

5-5. In that last two weeks, has (name) had any blood in the stool**?** 5-5. _____

1. Yes 2. No 3. Don't know

5-6. In the last two weeks, has (name) had any mucus in the stool? 5-6. _____
(explain what mucus is: slippery, whitish substance))

1. Yes 2. No 3. Don't know

5-7. Have you ever seen any worms in his/her vomit or stool? 5-7. _____

1. Yes 2. No 3. Don't know

6. Respiratory

6-1. In the last 2 weeks, has (name) had an illness with cough? 6-1. _____

1. Yes 2. No 3. Don't know

IF YES 6-2. Did (name) have chest pain at the same time 6-2.

_____
as the cough was present?

1. Yes 2. No 3. Don't know

IF YES 6-3. Did (name) cough up thick fluid that you could hear? 6-3.
_____

1. Yes 2. No 3. Don't know

IF YES 6-4. When (name) had an illness with a cough, did he/she 6-4.
_____
have trouble breathing or breathe faster than usual with short, fast breaths?

1. Yes 2. No 3. Don't know

IF YES 6-5. When (name) had an illness with a cough and difficult and/or fast breathing, did he/she also have body hotness? 6-5.
_____

1. Yes 2. No 3. Don't know

IF YES 6-6. Did you seek advice or treatment for the cough/fast breathing? 6-6.
_____

1. Yes 2. No 3. Don't know

IF YES 6-7. (If yes to previous questions) Who gave you advice or treatment? 6-71._____
6-72._____
6-73._____

Person who gave advice:
1. Doctor
2. Nurse
3. Trained community health worker
4. Traditional Healer
5. Other (please specify) _____

6-8. In the last 1 month, has (name) had a cough lasting greater than 2 weeks? 6-8. _____

1. Yes 2. No 3. Don't know

IF YES 6-9. How long did this cough last? 6-9._____

1. Between 2-3 weeks
2. Between 3-4 weeks
3. Greater than 4 weeks

4. Don't know because (name) is still coughing
5. Don't know because cannot remember

7. Genitourinary

7-1.What color is (name's) urine? (Please circle ONE) 7-1. _____

1. Yellow
2. Clear
3. Brown
4. Red
5. Other _____
6. Don't know

7-2. Has (name) ever had any blood in the urine? 7-2. _____

1. Yes 2. No 3. Don't know

7-3. Does (name) get up more than 3 times in the night to urinate? 7-3. _____

1. Yes 2. No 3. Don't know

7-4. Has (name) ever had any foul-smelling discharge from his/her genitals? 7-4. _____

1. Yes 2. No 3. Don't know

8. Skin, Vision, Thyroid

8-1. In the past two weeks, has (name) had any visible pimply rash, particularly on the hands, legs, or feet? 8-1. _____

1. Yes 2. No 3. Don't know

8-2. Does (name) ever have trouble seeing? 8-2. _____
(give examples: can't see board in school, can't recognize approaching people until very close)

1. Yes 2. No 3. Don't know

8-3. In the last 2 weeks has (name) had watery and itchy red eyes? 8-3. _____

1. Yes 2. No 3. Don't know

IF YES 8-4.Were (name's) red, itchy eyes accompanied with pus/discharge? 8-4. _____

1. Yes 2. No 3. Don't know

8-5. In the last 2 weeks, has (name) had raised white patches/spots on his/her tongue/inside of cheeks/throat? 8-5. _____
(IF YES, and parent allows, look in mouth/throat)

1. Yes 2. No 3. Don't know

9. Chronic Conditions

9-1. Does (name) currently suffer from any long-term illness that you know of? 9-1. _____

1. Yes 2. No 3. Don't know

Inform guardian that the next section includes several questions about HIV/AIDS for both her/him and the child. Obtain permission to proceed. If permission not granted, proceed to question 10-7.

10. Community Attitudes

10-1. Have you ever spoken to (name) about HIV/AIDS? 10-1. _____

1. Yes 2. No 3. Don't Know

IF NO, WHY?

_____

_____

_____

TO CHILD 10-2. Have you ever heard of HIV/AIDS? 10-2. _____

1. Yes 2. No 3. Don't know

TO CHILD 10-3. Have you ever discussed HIV/AIDS with your friends? 10-3. _____

1. Yes 2. No 3. Don't know

TO CHILD 10-4. How can a person get HIV/AIDS? (DO NOT GIVE OPTIONS) 10-4. _____

1. Exchange of blood or body fluids
2. Sexual exposure
3. Blood exposure via needles
4. Maternal-fetal transmission

5. Blood transfusion
6. Other (PLEASE NOTE BELOW)

_____

_____

TO CHILD 10-5. Who can get HIV/AIDS? (DO NOT GIVE OPTIONS) 10-5. _____

1. Anyone can get HIV/AIDS
2. Men
3. Women
4. Children
5. People of all races
6. Other (PLEASE NOTE BELOW)

_____

_____

TO CHILD 10-6. How could one prevent HIV/AIDS? (DO NOT GIVE OPTIONS) 10-6. _____

1. Abstain from sex
2. Be faithful to one partner
3. Use a condom (male, female condoms)
4. Other (PLEASE NOTE BELOW)

_____

_____

10-7. What do you think are the **3 most significant** health problems affecting the school-aged children in your community? (DO NOT GIVE OPTIONS)
10-71. _____
10-72._____
10-73._____

1. Pneumonia
2. Malaria
3. Diarrheal diseases
4. HIV/AIDS
5. Other (PLEASE NOTE BELOW)

_____

_____

_____

10-8. Does (name) have a scheme card? 10-8. _____

1. Yes 2. No 3. Don't know

10-9. In the last 6 months, has (name) received any formal medical care? 10-9._____

1. Yes 2. No 3. Don't know

IF YES 10-10. Where was the care received? 10-101._____
10-102._____
10-103._____

Place of Care
1. Clinic
2. Hospital
3. With Traditional Healer
4. Other (Please specify)
_____

10-11. Was this care arranged through Angel of Mercy? 10-11. _____

1. Yes 2. No 3. Don't know

10-12. Was diagnosis given at time of formal medical care? 10-12. _____

1. Yes 2. No 3. Don't know

10-13. **(If yes to previous question)** What diagnosis was given?
10.13_____
(If guardian doesn't know, please indicate "Don't know")

_____

_____

10-14. Was treatment given at the time of formal medical care? 10-14. _____

1. Yes 2. No 3. Don't know

IF YES 10-15. What treatment was given? 10-15. _____

_____

_____

10-16. In the last two weeks has (name) missed one or more days of school because of illness? 10-16. _____

1. Yes 2. No 3. Don't know

IF YES 10-17. How many days school has (name) missed? 10-17.

_____
(integer number)

END OF SURVEY, THANK PARTICIPANTS FOR THEIR TIME

XII. APPENDIX C

	Cost broken down by service, administrative cost and miscellaneous
	Total cost ($)
UNZA REC Clearance Fee	*729*
Binding	*1*
Office staff coordination	*152*
UNZA Student Stipends	*313*
UNZA Student transport	*54*
Office supplies	*82*
Photocopying	*311*
Airtime for phonecall	*149*
Wireless Access time(approx)	*10*
Transportation	*167*
Medications	*171*
Medical supplies	*133*
AoM Staff for screening days	*844*
Logistics for AoM organizer	*875*
Health Promotion Teachers Workshop (x3 faculty)	*156*
Miscellaneous	*31*

Total cost ($)
4178