



# HEALTH AND EDUCATION WORKING TOGETHER

A Case Study of a Successful School Health and Nutrition Model





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2005

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**DESIGN & LAYOUT:**

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“Good health, good nutrition, and education are synergistic: good health and nutrition enable children to learn better, and a good education gives children the tools to grow up as healthy adults and lead productive lives.”

Partnership for Child Development

“Our satisfaction comes from the fact that Justin Phiri and Beauty Nyirenda can, for the first time in years, walk to school without the pain of schistosomiasis or without their bodies being robbed of what meager nutrition they have received at home by intestinal worms. Equally important, teachers now feel pride that they have made a difference in the health of pupils in their care and parents have increased respect for them.”

Paul Freund  
CHANGES Program SHN Coordinator



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# ACRONYMS

BCC	Behavior Change Communication
BESSIP	Basic Education Sub-Sector Investment Programme
CBO	Community-based Organization
CHANGES	Communities Supporting Health, HIV/AIDS, Nutrition, Gender Equity, and Education in Schools
EMIS	Education Management Information System
FRESH	Focusing Resources on Effective School Health
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IEC	Information, Education, and Communication
JICA	Japan International Cooperation Agency
LOU	Letter of Understanding
MCDSS	Ministry of Community Development and Social Services
MOE	Ministry of Education
MOH	Ministry of Health
NGO	Non-Governmental Organization
PCD	Partnership for Child Development (University of London)
PEPFAR	President's Emergency Plan for AIDS Relief
PTA	Parent-Teacher Association
SCI	Schistosomiasis Control Initiative, funded by the Gates Foundation
SHN	School Health and Nutrition
SI	Successful Intelligence (Yale University)
SO	Strategic Objective (USAID)
TOT	Training of Trainers
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization
Z-CAI	Zambia Cognitive Assessment Instrument



# EXECUTIVE SUMMARY

The Zambia CHANGES School Health and Nutrition Program (SHN), which has just completed Phase One (2001-2005), is part of a growing body of evidence that SHN is a cost-effective, worthwhile investment for developing countries wishing to improve the health and learning of school-aged children. Impact data from the innovative Zambia SHN pilot demonstrated significant impact of deworming on student health and cognition.

Equally important, the USAID-funded CHANGES SHN program, managed by Creative Associates International, Inc., developed a workable and easy-to-administer model for health and education working together that the Ministry of Education (MOE) can now confidently adopt and expand into a national program. Other countries can easily replicate this SHN model and take it to scale, as they strive to achieve universal education, and gender equality in education access while improving the future of their people.

This paper first examines the rationale for linking health and education, focusing on the synergistic relationship between better health and increased academic performance, especially for girl children. The school is increasingly viewed as an ideal vehicle from which to launch health education, basic health interventions, HIV/AIDS prevention, and care and support for orphans and vulnerable children. There is a strong association between heavy worm infestations and children's decreased cognitive function and educational achievement. Worms are largely an illness of the poor and particularly of school-aged children, but the increasingly lower cost of the deworming drugs and relative simplicity of administration make school-based deworming one of the most effective means of improving children's health. All of these issues are explored.

The paper then examines the operational SHN model developed in Zambia and what made it so successful. The innovative CHANGES program was initiated in response to the Government of Zambia's request to test whether a SHN program would improve school performance, enrollment, attendance, and completion. Biomedical<sup>1</sup> interventions included annual

<sup>1</sup> When the word "biomedical" is used in this paper it refers to the administration of deworming medication and micronutrients, stool, urine and blood testing, or measurements of nutritional status.

treatment of intestinal worms and schistosomiasis, annual Vitamin A supplementation, and 10 weeks of weekly iron supplementation.

For planners concerned that management of a combined health and education project might be too complex, the CHANGES SHN Program offers a model that is relatively easy to understand and implement. The SHN project model as it has evolved, has three core principles: 1) intersectoral collaboration with stakeholder involvement; 2) systems strengthening and capacity development; and 3) community empowerment. Although these are not new concepts, it is the way in which these three guiding principles have been operationalized that makes the Zambia project different from other combined education and health programs and has ensured its success.

In the Zambia combined health and education model, the education and health components do not remain as separate vertical programs; nor do implementers try to truly integrate managerially at all levels. Instead, the success of the model lies in the participation and collaboration among sectors and partners. Intersectoral committees and working groups at all levels plan, implement, supervise, and monitor activities. Teachers, health workers, and community development workers are trained together in SHN. Existing NGO forums, community health committees, PTAs, and other civic organizations include membership and representation from both health and education interests.

Systems strengthening (at all levels) includes training, strengthening of the EMIS, development of a SHN drug delivery system, and regular intersectoral monitoring. In the Zambia pilot, the existing Ministry of Health (MOH) drug delivery system was adopted and worked very well, with few interruptions in supply. A SHN EMIS or information system is now in place, with educators at all levels trained to input, analyze, and report data. Districts and provinces can now monitor and track SHN progress. Intersectoral monitoring teams visit sites regularly and demonstrate a good understanding of SHN and what to monitor.

For community empowerment, the third core principle of the CHANGES program, communities form committees, receive management skills training, develop action plans, and write proposals to receive grants to improve their local schools. The community is consulted and informed at every step of the process. Their sense of ownership of the SHN program from the beginning enabled even the initial blood, urine, and stool testing to be implemented with no resistance. Moreover, health needs identified by the community are heard and often implemented.

The program has been considered a great success. Data collected during the pilot found the health impact of deworming was pronounced: the prevalence (number of children infected) of parasitic worms after two years was one quarter of the rate at baseline, and the intensity of infection (number of worms per child) was greatly reduced. In addition, the combined impact of deworming and micronutrient supplementation on educational ability was substantial, and children who received two years of interventions performed better than those who only received one year of interventions. Further, cognitive scores of girls receiving interventions increased significantly more than those of boys, thus simultaneously improving equity. Other benefits of implementing the CHANGES SHN model include increased community participation, stronger links between the health and education sectors at all levels, strengthened role of PTAs and community-based organizations, increased teacher motivation as they perceive they have contributed to increased learning, increased gender equity, improved coordination of programs on several levels, the demonstrated value of intersectoral cooperation, and increased donor and stakeholder support in a multifaceted program.

In short, SHN is a relatively easy program to implement. It requires few resources, and gives the MOE a strong program that shows immediate evidence of impact.



# I. A CASE STUDY OF A SUCCESSFUL SCHOOL HEALTH AND NUTRITION MODEL IN ZAMBIA

The CHANGES Program, a USAID-funded program awarded to Creative Associates International Inc. from 2001-2005, has just completed four years of successful school health and nutrition interventions in the Zambia primary schools. This was in response to a request from the Government of Zambia to test whether a School Health and Nutrition (SHN) program would improve enrollment, attendance, performance, and completion of school. Health-related interventions in project schools included annual treatment for intestinal worms and schistosomiasis, annual vitamin A supplementation, ten weeks of weekly iron supplementation, and health education, all delivered by school teachers with oversight by health workers.

A study conducted by two CHANGES Program partners, the Partnership for Child Development (PCD),<sup>2</sup> and Successful Intelligence (SI),<sup>3</sup> was designed to measure the impact of these interventions. The study found that the health impact of deworming was pronounced: the prevalence (number of children infected) with parasitic worms after two years was one quarter of the rate at baseline, and the intensity of infection (number of worms per child) showed large reductions. The combined impact of deworming and micronutrient supplementation on cognitive performance was substantial, and children who received two years of interventions performed better than those who only received one year of interventions. Further, cognitive scores of girls receiving interventions increased significantly more than those of boys.

Researchers drew the following conclusions:

- teachers are highly effective in delivering these basic health interventions;
- regular deworming and micronutrient interventions have more impact than a one time intervention;

<sup>2</sup> Ministry of Education, Zambia, Partnership for Child Development & Successful Intelligence. (2004). Impact assessment of school health and nutrition interventions: Key findings. Produced by the Partnership for Child Development, University of London and Successful Intelligence, Yale University. Washington DC: Creative Associates.

<sup>3</sup> Successful Intelligence is based in the Center for the Psychology of Abilities, Competencies, and Expertise at Yale University.

- the impact on children's cognitive ability was significant and substantial, even when there was no observable health and nutrition impact; and
- SHN interventions benefit girls more than boys, thus having a positive effect on gender equity.

The success of the pilot program supported by the positive biomedical and cognitive research has given confidence to the Ministry of Education (MOE) that SHN is viable and can be scaled up. The MOE recently announced that SHN, including deworming, school action plans, and the use of MOE data, is now a national priority and must be included in all district and national plans.

For those countries considering launching school health and nutrition programs, the SHN model developed by the Zambia CHANGES Program can serve to inform their programs. The Zambia model for health and education working together was workable and cost-effective, and convinced the MOE to adopt and expand the SHN to national scale. Other countries can easily replicate this SHN model and take it to scale, as a strategy to achieve universal education and improve health outcomes.



## II. THE RATIONALE FOR SCHOOL-BASED HEALTH AND NUTRITION PROGRAMS

Poor health and malnutrition have been shown to be important underlying factors for poor school performance, early dropout from school, low enrollment, and absenteeism, and are constraints on both "Education for All" and the second and third Millennium Goals of achieving universal primary education and gender equality in education access.

### WHY LINK HEALTH AND EDUCATION?

In Africa, more than half of all school children are anemic, stunted, and in many countries the school-aged children are chronically infected with worms. Stunting, illness, and worm infestations all have a negative effect on a child's ability to learn.

Until the last few years donor-funded health interventions often ignored the school-aged population, partly because it was believed that those children who survived to age five had passed the most dangerous years of birth to five years and were now examples of "survival of the fittest". The emphasis in foreign aid for health was on child survival and early childhood development with the focus on the child from the fetus during pregnancy through five years of age, and later, on the reproductive-aged woman of 15 -45 years. Thus programs addressed the two groups most vulnerable to malnutrition, illness and death: children from birth to five years and reproductive-aged women. Little was actually known about health and nutrition of children from 6-15 years, and much still remains to be learned. Further it was generally assumed that stunting acquired by age three from suboptimal breastfeeding practices and food of insufficient nutrient density, could not be reversed, so it was futile to be concerned about stunting after the age of three years.

Research now shows that risk of poor health continues throughout childhood and children's health status, especially of girls, actually worsens from

age 5-15 years. Carefully monitored school programs in health and nutrition have shown that stunting continues to occur during the school years and that this stunting can be reversed by appropriate health and nutrition interventions.<sup>4</sup>

After a number of efforts to incorporate school health into education projects over the years, particularly by NGOs, the health sector began in the 1990s to see the schools as a low cost/high value opportunity to increase access to health interventions. WHO, UNICEF, UNESCO, and the World Bank, joined to develop and launch the Focusing Resources on Effective School Health (FRESH) approach, which finally became official at the World Education Forum in Senegal, April 2002.<sup>5</sup> The FRESH framework, which includes school policies on health, safe water and sanitation, skills-based health education, and school-based health and nutrition services, has gained increased attention from bilateral and multilateral agencies.

There is now ample evidence that a very small investment in a few health interventions, particularly de-worming and micronutrients, along with skills-based health education, can have a big pay-off in terms of better educational and health outcomes for children.<sup>6</sup> Healthier and better nourished children stay in school longer, learn more, and become more productive adults.<sup>7</sup> Girl children and adolescents are the key to the health of future generations - girls who receive sufficient iron and grow adequately during adolescence have decreased rates of babies born with low birth-weight<sup>8</sup> and birth defects, and a greater number of their children grow up to become adults.<sup>9</sup> Girls who stay in school longer have been found to delay

4 Drake, L. J., Maier C., Jukes M., Patrikios A., Bundy, D. A. P., Gardner A. & Dolan, C. (2002). School-age children: Their health and nutrition. *School News*, 25.

5 Focusing resources on effective school health: A fresh start to improving the quality and equity of education. *School Health - The World Bank in partnership with The Partnership for Child Development*. Retrieved June 25, 2005 from <http://www.schoolsandhealth.org>.

6 Del Rosso, J.M., & Merek, T. (1996). *Class action: Improving school performance in the developing world through better health and nutrition*. Directions in Development Paper. Washington DC: World Bank.

7 Ibid.

8 Low birth-weight babies tend to become stunted children; stunted children who survive tend to become stunted adults; and stunted adult females give birth to low birth-weight babies, thus creating a vicious cycle.

9 Lower birth-weight babies tend to have lower survival rates.

childbearing longer than girls who drop out of school, which results in lowered birth rate, better birth outcomes, and better child health.<sup>10</sup> School-age children with lower levels of disease and infection also have the effect of reducing the transmission of disease in the wider community.

With these findings in hand, the education sector is now focusing on incorporating targeted health interventions into school-based programs, to improve children's learning as well as their health.

## WHY SCHOOL-BASED HEALTH INTERVENTIONS?

The health system in most African countries has much less "reach" than the educational system—for every health facility there may be as many as 25 schools, and there are many more teachers than there are health personnel. Recent efforts to achieve universal primary education have begun to increase the proportion of school-age children now enrolled in school. It is now clear that the schools provide access to a much greater proportion of the population than do the health facilities and schools provide a low cost, effective vehicle for a broader range of health interventions. School health and nutrition programs have been shown to make the greatest difference in terms of both health and cognition, with girls and the poorest, most disadvantaged children, and recently more of these children are enrolled in school.<sup>11</sup> Further, teachers can reach beyond the school facility and educators often work closely with parents and surrounding community. Programs in Guinea provide evidence that schools and teachers can effectively treat both in-school and out-of-school children for worms and micronutrient supplements.<sup>12</sup>

With the advent of HIV/AIDS, the health sector is now considering the enormous potential to reach children in the schools before they become

10 Del Rosso, J.M., & Marek, T. (1996). Class action: Improving school performance in the developing world through better health and nutrition. Directions in Development Paper. Washington DC: World Bank.

11 Drake L.J., Maier C., Jukes M., Patrikios A., Bundy, D.A.P., Gardner A. & Dolan, C. (2002) School-age children: Their health and nutrition. SCH News (25).

12 Del Rosso, JM, and Marek, T. (1996). Class action: Improving school performance in the developing world through better health and nutrition. Directions in Development paper, the World Bank: Washington, DC.

sexually active and before their adult attitudes and habits are completely formed. Currently, school-age children are the age group still largely free of HIV infection and are therefore referred to as the "window of hope".<sup>13</sup> The HIV prevalence and rate of spread among teens in many African countries, however, is very high, and the rate of infection among girls and young women is usually five times the rate of males due to physiological and cultural factors.<sup>14</sup> These factors may include the vulnerability of vaginal tissue to small tears during sex from lack of lubrication or unwanted sex, allowing the HIV virus to enter the body. Often the lack of empowerment of females to control their own bodies and negotiate for safer sex exacerbates the problem,<sup>15</sup> both issues that can effectively be addressed with carefully designed life skills classes in schools.

Ranking among the most cost-effective of all public health interventions, school health programs are increasingly seen as the best delivery system for certain health interventions and the ideal platform from which to launch HIV/AIDS prevention education and care for orphans and vulnerable children.<sup>16</sup> School health programs are increasingly viewed as essential components of the education program.<sup>17</sup>

13 The World Bank. (2002). Education and HIV/AIDS: A window of hope. Prepared by Don Bundy and Manorama Gotur, with support from Lesley Drake and Celia Maier (Partnership for Child Development, U.K.). Washington D.C.: The World Bank.

14 Ibid.

15 Ibid.

16 UNAIDS Interagency Task Team on Education and HIV/AIDS. (October, 2003). Discussion paper for the Global Partners Forum for Children Orphaned and Made Vulnerable by HIV/AIDS, in Geneva, October, 2003. Geneva: UNAIDS Interagency Task Force on Education and HIV/AIDS.

17 Drake, L.J., Maier, C., Jukes M., Patrikios, A., Bundy, D.A.P., Gardner, A. & Dolan, C. (2002) School age children: Their health and nutrition. SCH News (25).

### III. THE SCIENCE OF DEWORMING AND LEARNING

Since around 1985 a number of studies have shown that regular school deworming is among the most effective means of promoting child health.<sup>18</sup>

#### WHY FOCUS ON DEWORMING?

Deworming improves children's health and nutritional status, which in turn, increases school enrollment, attendance, and school achievement and decreases grade repetition. Because girls and the most disadvantaged children benefit more than other children, deworming also contributes to equity. Worms infect over one third of the population of the world, but they are particularly a disease of the poor. For boys and girls aged 5-14 years in low-income countries, intestinal worms account for an estimated 11 percent and 12 percent respectively, of the total disease burden and represent the single largest cause of illness to the school-age child population.<sup>19</sup> WHO estimates that 75 percent of all school-age children in endemic countries are infected with worms, and often the prevalence rate is over 90 percent.<sup>20</sup> Experts measure and monitor both the prevalence, number of people in the community with worm infections, and "intensity", the number of worms in one person's body. School-age children have the highest "intensity" or "worm load" of any population group, and a study in Kenya found that among school-age children, younger children have the highest worm loads.<sup>21</sup>

Worms seldom kill, but they cause chronic infection in children from the time they start crawling and continuing through the rest of their lives. Worms can damage the kidneys and liver, cause complications that require surgery, and lead to bladder cancer. For school-age children, however, one of the most important effects is that worms interfere with a child's nutri-

18 School deworming. Retrieved June 25, 2005 from [http://PH @ a Glance](http://PH@aGlance): <http://www.WbIn0018.worldbank.org>.

19 Ibid.

20 Ibid.

21 Miguel, E. & Kemer, M. (November, 2000). Child health and education: The primary school deworming project in Kenya. Funding provided by the World Bank and the Partnership for Child Development. London: Partnership for Child Development.

tion and micronutrient absorption. Worms cause some blood loss and compete with their host for micronutrients, so worm treatment has the effect of decreasing anemia rates and increasing the child's micronutrient levels.

The cognitive effects are decreased ability to focus, pay attention, concentrate and remember what they have learned. One study found that children with heavy worm infections, scored lower than uninfected children on short-term memory and reaction test times.<sup>22</sup> A number of studies have shown a strong association between heavy worm infestation and decreased cognitive function and educational achievement, but clear evidence of the causal link has not yet been found. Some studies suggest that removing the causes are not enough; in addition to worm and micronutrient treatment, children may need remedial work to help them catch up.<sup>23</sup> The childhood years between ages 5 and 15 are years of rapid physical growth which makes the nutritional needs even more critical. Consequently, worms, especially heavy infections, and their negative association with cognitive and physical development, take a terrible toll on children's health and learning.

## HOW WORMS SPREAD AND THE EFFECTS OF TREATMENT

The common intestinal worms are hookworm, roundworms, and whipworms, and in many countries schistosomiasis<sup>24</sup> is widely spread. Intestinal worms are picked up through the skin from the soil, particularly by barefoot children. Schistosomiasis enters the human body from still fresh water dams and ponds. None of the worms multiply in the human body, but their eggs are expelled either through feces (intestinal worms) onto the soil or through urine and feces (schistosomiasis) into bodies of water. This means that killing large portions of the worm infestation in children prevents the eggs from being disbursed, thus slowing the reproduction and spread of the worms in the entire community. When school chil-

<sup>22</sup> Ibid.

<sup>23</sup> Ibid.

<sup>24</sup> Also called "bilharzia."

dren in Kenya were treated, untreated adults in the community showed reduced worm load and prevalence because of the reduced opportunities for the worms to go through their complete life cycle, exposing fewer community members to infection.<sup>25</sup> This spillover effect led to reduced pupil absenteeism in untreated neighboring schools by 3.4 percent.<sup>26</sup> One study found that treating only school-age children can reduce the total burden of disease due to intestinal worms by 70 percent in the community as a whole.<sup>27</sup> Thus the potential to positively affect productive labor during adulthood and consequently, to improve a country's development, is great.

Both the intestinal worms and schistosomiasis can be treated with just two pills: Albendazole (or others in this drug family) for the intestinal worms; and Praziquantel to treat schistosomiasis. Both of these treatments are safe for young children and for the uninfected, which means that once a community or region has been determined to be heavily infected with worms, the treatment can be given to all school-age children with no individual testing and diagnosis. This makes the treatment very inexpensive, since the individual diagnosis would cost 4-10 times the cost of the treatment.<sup>28</sup>

Albendazole costs US \$0.30 annually per child,<sup>29</sup> and in most cases, once per year is sufficient. Only in the most highly infected communities is treatment required more than once a year.<sup>30</sup> Praziquantel for schistosomiasis costs US \$.20 annually,<sup>31</sup> and the number of pills given in a single dose

25 Miguel, E., & Kremer, M. (November, 2000). Child health and education: the primary school deworming project in Kenya. The effect of deworming on primary school student health and attendance in rural Kenya. International Christelijk Steunfonds Africa. Retrieved June 26, 2005 from [www.icsafrica.org](http://www.icsafrica.org).

26 Ibid.

27 Bundy DAP, Wong MS, Lewis LL & Horton J. (1990). Control of geohelminths by delivery of targeted chemotherapy through schools. Transactions of the Royal Society of Tropical Medicine and Hygiene, 84: 115-120.

28 School Deworming. Retrieved June 25, 2005 from [http://PH @ a Glance](http://PH@aGlance): <http://www.Wbln0018.worldbank.org>.

29 The cost of both deworming drugs was reported by CHANGES to be \$.50 per child. CHANGES Programme Team. (June 2005). Final technical report: The CHANGES programme. Prepared for Basic Education and Support (BEPs) Activity, U.S. Agency for International Development, Contract No. HNE-1-00-00-00038-00. Washington DC: Creative Associates International Inc.

30 School Deworming. Retrieved June 25, 2005 from [http://PH @ a Glance](http://PH@aGlance): <http://www.Wbln0018.worldbank.org>.

31 Ibid

is determined by the child's height measured with a "dose-pole."<sup>32</sup> This is a stick marked by teachers with the appropriate dosage indicated next to the corresponding child's height. Deworming pills are heat-stable and do not require the refrigerator storage needed by many immunizations, so they can be purchased in bulk and stored.

There is also substantial evidence that iron deficiency anemia in children is associated with poor growth and decreased physical development, poor immune function, increased fatigue, and decreased cognitive function and school achievement.<sup>33</sup> Although there is much we do not know about the interaction of micronutrients, studies suggest that giving iron folate and Vitamin A supplements at the same time as deworming greatly improve the positive effect, and that the combined effect is greater than when iron folate is given without Vitamin A.<sup>34</sup> Recent studies have also associated decreased immune function brought about by insufficient micronutrient intake and illness, with greater susceptibility to the HIV virus and more rapid progression to full blown AIDS.<sup>35</sup>

32 CHANGES Programme Team. (June 2005). Final technical report: The CHANGES programme. Prepared for Basic Education and Support (BEPS) Activity, U.S. Agency for International Development, Contract No. HNE-1-00-00-00038-00. Washington DC: Creative Associates International Inc.

33 Drake, L. J., Maier C., Jukes M., Patrikios A., Bundy, D. A. P., Gardner A. & Dolan, C. (2002). School age children: Their health and nutrition. *School News*, 25.

34 Ibid.

35 Ibid.



## IV. SCHOOL HEALTH AND NUTRITION IN ZAMBIA

Concerted efforts to revitalize the long neglected health of school children in Zambia began in early 2000. First the concept was introduced as part of World Bank support through the Basic Education Sub-Sector Investment Programme (BESSIP).<sup>36</sup> The Five-Year MOE/SHN Draft Strategic Plan (2000-2005)<sup>37</sup> then guided the ministry's activities. The MOE had established a National SHN Steering Committee to mobilize expertise and resources, begun sensitization of policy makers, and appointed "focal point" persons in the nine provinces to direct and manage SHN activities.

The MOE had in mind to revitalize some school activities that had existed in the past, such as school gardens, basic health services, pupil screening, and teacher involvement in health promotion. They also envisioned an innovative approach to school health using teachers to deliver deworming drugs and micronutrients, based on the Ghana and Tanzania models and the FRESH program being advocated by the World Bank, WHO, UNESCO, and UNICEF.

USAID asked Creative Associates International Inc., through the Basic Education and Policy Support (BEPS) Activity, to design a pilot project in Eastern Province, an area with particularly low health and education indicators. The design team began in July 2000, working closely with the MOE, the MOH, and The Ministry of Community Development and Social Services (MCDSS), to design a program to address the MOE's needs and goals. The program was to be community-based and intersectoral, and would address key issues of capacity and systems strengthening.

In order to provide convincing evidence that SHN is worthy of investment, a longitudinal biomedical research component was carefully designed using sample and control schools, with interventions phased in over three years, allowing comparison of one year with another.

<sup>36</sup> CHANGES Programme Team. (June, 2005). Final technical report: The CHANGES programme. Prepared for Basic Education and Support (BEPS) Activity, U.S. Agency for International Development, Contract No. HNE-1-00-00-00038-00. Washington DC: Creative Associates International Inc.

<sup>37</sup> Ministry of Education, Republic of Zambia. (1999). Five Year (2000-2005) MOE/SHN Draft Strategic Plan. (2001). Lusaka, Zambia: Ministry of Education, Republic of Zambia.

A project extension (2004 and 2005) focused on scale up, community empowerment including workplans and grants, strengthening of intersectoral links, strengthening of the drug procurement and distribution system, and monitoring. By the end of the project, 128,974 pupils in 201 schools in project districts were receiving deworming drugs and micronutrients. Based on the biomedical and cognitive evidence, the soundness of the CHANGES Program SHN model, and success in scaling up during the extension period, the Zambia MOE decided to continue the CHANGES Program and scale it up to national-level coverage.

## V. THE CHANGES PROGRAM SHN MODEL AND CRITICAL COMPONENTS

The Zambia SHN model evolved over the life of the project. The resulting model is dynamic and flexible and appropriate for replication in other settings.

### DEVELOPMENT OF THE SHN MODEL<sup>38</sup>

The original CHANGES Program SHN concept was based on ministry collaboration, capacity building and community involvement, with specific health interventions for all children through the schools, health education for children and communities, and advocacy at all levels of government.

As the pilot was implemented in Eastern Province, various approaches and methods were tested, including community sensitization techniques, training approaches for teachers, health workers, and managers, health-related tools, health education materials, school health cards, and HIV/AIDS prevention strategies. Through these efforts, the project team learned which elements were critical to the process and which were peripheral. SHN is a complex concept involving many components - but this simple phrase served to unify all elements and partners in Zambia: "A Healthy Child in a Healthy School Environment."<sup>39</sup>

### THE CHANGES PROGRAM SHN MODEL

The CHANGES Program attempted to put into place a model of intersectoral collaboration that would address key factors associated with children's performance in school: e.g., girls' access to education, community participation, educational system effectiveness, and health and nutrition through deworming and micronutrients. Deworming and administration of micronutrients are important but CHANGES wanted to also address community problem-solving and skill building, equity issues, and systems

<sup>38</sup> The WHO FRESH program, the School Health and Nutrition concept, and the Health Promoting Schools idea all consist of essentially the same elements. The Zambia model is built upon the FRESH model, but it called "The Zambia SHN Programme".

<sup>39</sup> Robinson, W. (2004). A healthy child in a healthy school environment: A look at the CHANGES program in Zambia. Basic Education and Policy Support (BEPS) Activity, Contract No. HNE-1-00-00-00038-00, Task Order No. 807. Washington DC: Creative Associates International Inc.

strengthening. The SHN model that led to CHANGES' success was guided by three core principles:

- Intersectoral ministerial collaboration with stakeholder involvement
- Systems strengthening and capacity development
- Community empowerment.

The main operational components of the program:

- Initial assessment of health status, attitudes and behaviors
- Sensitization of community and advocacy among policy makers
- Training of teachers, health personnel, MOE staff, and community
- School-based health interventions
- Education management information system (EMIS) using SHN data
- Drug delivery system development
- Community action plans and grants to improve school infrastructure and teaching materials
- Monitoring
- Evaluation

HIV/AIDS education and prevention activities and behavior change communication and advocacy strategies were cross-cutting components that interacted with all other components.

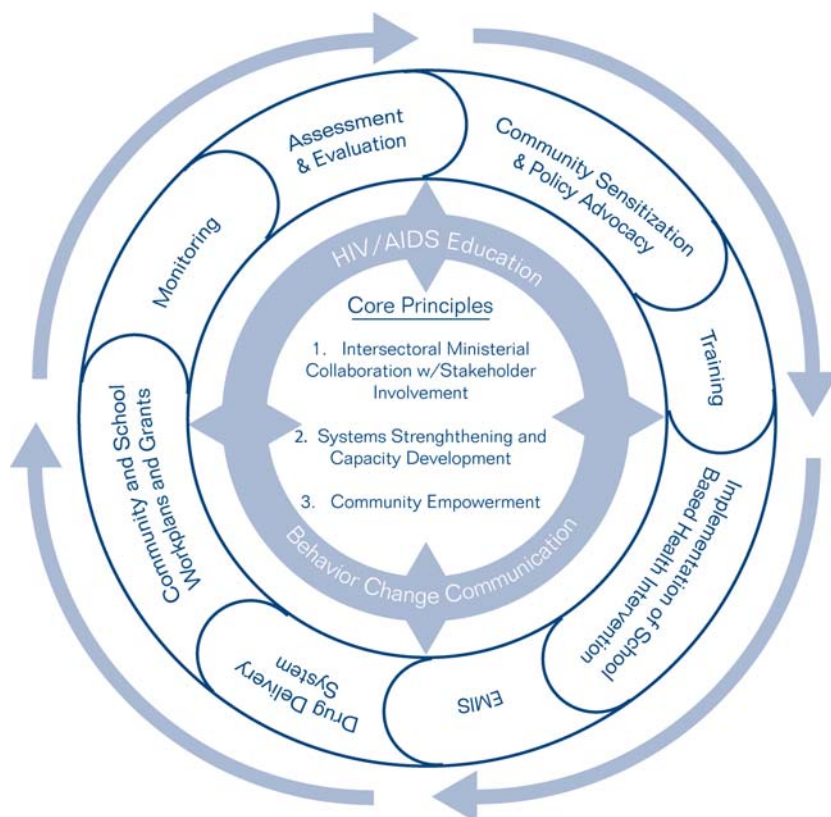
After two years of the pilot program, CHANGES and the Zambia USAID education team developed an SHN operational framework that delineated inputs, outputs, and short- and long-term outcomes (Appendix A). The framework was specific to the CHANGES Program pilot activities but provided sufficient detail to enable evaluation of the success of the SHN model. Similar frameworks can be developed in other countries implementing SHN programs.

The model accommodates various levels of ministry resource availability so that different options may be added as desired and feasible (Appendix B). Regardless of the resources available, it is important to understand

that SHN cannot be implemented immediately as a national program, or even a localized blanketing of all schools within a district or province. It is vital that the SHN be implemented slowly in a phased manner to ensure that the concept is accepted by the community, that teachers gain confidence, that health workers are on board, and that a monitoring system is in place to ensure smooth implementation. To position the activities for long-term sustainability, it is also important to utilize as many local resources as possible.

The graphic below illustrates the CHANGES Program SHN model with core principles listed in the center, key operational components overlapping around the outside of the circle, and cross-cutting elements interacting with all other elements. As the arrows suggest, the process is cyclical but the stages often overlap and several may be ongoing at the same time.

**FIGURE 1**  
**ZAMBIA CHANGES SHN MODEL**



The three core principles and their relationship to the other elements of the model, serve as the framework for this discussion.

## INTERSECTORAL MINISTERIAL COLLABORATION AND STAKEHOLDER INVOLVEMENT

Intersectoral ministerial collaboration and involvement of stakeholders of all types, is what ultimately made the Zambia SHN model unique and assured its success. It is vital that a successful SHN program work with all relevant partners. In addition to the three ministries (MOE, MOH, MCDSS), the CHANGES Program works with agriculture, water, local government, and youth and sport ministries. Representatives of each of these sectors are included on SHN intersectoral committees at provincial and district levels. NGO participation is equally important to share concerns and lessons learned, and to avoid duplication of effort. Intersectoral collaboration shaped all of the activities in the outer circle of the model.

Intersectoral coordination and strengthening health center/school links depends upon all individuals and entities understanding their respective roles and responsibilities. During the pilot phase, coordinating committees were established at provincial and district levels, consisting of representatives from each line ministry (MOE, MOH, and MCDSS), NGOs, teacher training colleges, provincial education officers, and district SHN focal point persons, planning officers and gender and equity and HIV/AIDS focal point persons. Job descriptions were changed to require collaboration between the three line ministries. The coordinating committees review all SHN activities and district and provincial officers provide written and verbal reports on pupils receiving drugs, water/sanitation, trainings, HIV/AIDS school-based activities, school feeding, action plan achievements and constraints and monitoring. The success of these coordinating committees helped convince the national level MOE that intersectoral committees do work and that they contribute to an effective program.

Existing Neighborhood Health Committees at the level of each health center are part of the Zambia MOH system; teachers in the SHN program are encouraged to serve on these community level health committees. Similarly the school-based SHN health promoting committees include health workers.

The SHN program revitalized the school health card that had been used in Zambia until the 1970s. The new SHN student health card includes information on physical screening results and referral by teachers to the health center, an assessment of academic progress, and sections on treatments provided by health workers. The student health cards have been very effective in linking health workers and teachers.

## SYSTEMS STRENGTHENING AND CAPACITY BUILDING

Throughout the pilot phase the CHANGES Program focused on systems strengthening and capacity development at all levels. These included training, strengthening the EMIS, developing a SHN drug delivery system and monitoring.

### TRAINING

Teachers, health workers and community development workers are trained together to ensure understanding of each others roles and to enable them to work as a team rather than become distrustful of one another. Teachers are trained on the rationale of SHN, use of the instruments, tools and drugs, record keeping, community sensitization and action plan development, coordination, and monitoring. The teacher's role in the CHANGES SHN program includes determining schistosomiasis prevalence, administration of selected drugs, and conducting health screening and referring pupils to health centers for treatment. The use of teacher training institution staff as master trainers lowered training costs while enhancing sustainability.

The health centers are responsible for storage and dispensing SHN drugs, and health workers supervise drug administration by teachers. Training manuals were developed and frequently revised using input from community members, PTAs, and health workers. A three day training course for district and provincial administrative and managerial staff greatly enhanced their support for SHN activities and their skills in monitoring the program. The management manual includes the rationale for SHN, tools used, coordination, and roles and responsibilities of each cadre of manager. All of the training manuals have been officially adopted by the MOE and will be used in going to scale.

In order to reach more schools as SHN expands, a zonal training system was implemented. A zonal school is a school that is generally larger and better staffed that acts as a training center for four to five smaller schools or cluster in their area. The CHANGES Program worked with the Schistosomiasis Control Initiative (SCI) to develop a one day training course and manual focused on the technical aspects of SHN (i.e. determining prevalence for schistosomiasis, drug administration, record keeping, action plans, and monitoring). A training of trainers (TOT) for zonal master trainers was held to provide the necessary skills to trainers who are responsible for training other zonal heads who would in turn train teachers from the schools in their respective zones.

#### EMIS

There is ever growing awareness among policy makers that well managed and responsive statistical information services are essential to viable policy formulation and efficient investments in education. In the case of SHN, tracking and monitoring the impact of interventions is essential to future planning and monitoring at district and provincial levels. The CHANGES Program developed and piloted an SHN management tool. Using this tool to collect data, district/provincial planning and statistical staff and teachers in selected schools were trained in data entry, analysis and report generation. The SHN EMIS was not intended to be a parallel system but one that would be integrated into the national program. Although incorporating



such data into the national system was very difficult, the collection and use of SHN data at the local level was extremely useful. This included data collected through the pupil record cards, treatment forms and routine monitoring of SHN activities. District and provincial planners are now able to utilize such data for forward planning and in responding to school needs more effectively.

#### DRUG DELIVERY SYSTEM

The ultimate success of the SHN program depends on the drugs reaching their intended targets in a timely manner. Zambia already had a well-organized and effective drug delivery system upon which the SHN program could build, rather than set up a parallel structure. A drug request form is designed and approved by the MOH for use by teachers to access the drugs from their nearest health center. The amounts are based on the number of schools in a particular health center catchment area and enrollment in those schools. The Central Medical Stores responsible for all drugs in the country, and district pharmacies, are provided with lists of participating SHN schools. As the SHN drugs arrive in Medical Stores they are sent out to districts and from districts to health centers where they are stored until requested by teachers.

This drug distribution system has worked well with few interruptions of supply, but sustainability of a sufficient and continuous supply of drugs in the long term, will depend on the MOH accepting the responsibility for procurement. SHN drugs were initially provided to the MOE through Japan International Cooperation Agency (JICA) funds and more recently through the Schistosomiasis Control Initiative (SCI) funded by the Gates Foundation. The existence of SCI drug supplies assures sufficient drugs for SHN scale up to additional provinces and even to begin community-wide treatment in future phases of the SHN program. A more ideal situation, however, would be for the MOH to procure the drugs themselves, as they already have the mechanisms in place. Fortunately, the cost of drugs has fallen dramatically for Praziquantel and eventually the cost of

Albendazole will also decrease, making SHN programs even more cost-effective.

## MONITORING

The intersectoral monitoring teams consist of representatives from all three ministries: education, health and development and social services. Visits by regular district level monitoring teams ensure that teachers are accessing SHN drugs and administering them according to established protocols. Regular use of the collaboratively developed monitoring tool, also allows district and provincial officials to assess how well schools are performing in terms of their action plans and what constraints they may be facing.

There are, however, two requirements if intersectoral monitoring is to succeed: the monitoring teams must have an in-depth understanding of the SHN elements they are supposed to monitor; and district budgets must include a line item for monitoring to provide sufficient resources to conduct regular monitoring visits. As the SHN program expands it will become even more important to ensure through regular monitoring that key elements of the SHN model are being faithfully implemented.

## COMMUNITY EMPOWERMENT

The community activities around the outside of the circle (on page 15) include the community sensitization component that began early in the project, and later in the implementation, the community action cycles, workplans, proposal writing and award of small grants to community groups. These activities reinforced the third core principle of community empowerment.

## COMMUNITY SENSITIZATION

Community sensitization is an important first step before the SHN program can be implemented. The innovative approach of using teachers to

administer drugs makes it imperative that parents and communities have confidence in teachers' competence to carry out this responsibility and that the drugs they will be using are safe. Drama was used extensively to sensitize communities and parents, as theater is widely accepted in Zambia, and is culturally appropriate and effective. The drama troupes were also trained to collect valuable information from a wide variety of groups within communities on factors that might affect program success.

The success of drama for community sensitization was demonstrated when the blood, stool, and urine sampling was completed without any resistance. Hiring professional drama groups was eventually found to be expensive and time consuming. Approaches such as rapid participatory appraisal techniques, public meetings, and the use of Theatre for Community Action were found to be equally effective and more sustainable. This community action theater model involves teachers and community members working together to organize drama and other SHN and HIV/AIDS sensitization techniques within their respective areas rather than using outside theatre groups.

#### EMPOWERMENT OF COMMUNITIES

Collaborative planning and empowering community members to make informed decisions about their children's health and education was at the heart of the Zambia SHN program. A framework for the process of empowerment through community partnerships has been developed by academics in the field of community psychology.<sup>40</sup> According to this line of thinking, communities can become empowered and strengthen their own capacity to effect positive change by engaging in collaborative planning, community action, community change, capacity building, and eventually institutionalization of these processes. In the long run, the SHN program would not be sustainable if the community were not empowered to make decisions and support the improvement of their schools.

<sup>40</sup> Fawcett, S.B., Paine-Andrews, A., Francisco, V.T., Schultz, J.A., Richter, K.P., Lewis, R.K., Williams, E.L., Harris, K.J., Berkley, J.Y., Fisher, J.L., et al. (October, 1995). Using empowerment theory in collaborative partnerships for community health and development. *American Journal of Community Psychology*, 23 (5): 667-97.

The "health promoting schools" concept, borrowed from WHO,<sup>41</sup> emphasizes the use of available resources, both human and material, and focuses on communities (PTAs, CBOs and local community members) and schools working together to take action to solve health problems, using the school as the focal point. Early in the pilot, training included forming SHN committees and teams at the school/community level. Both the community and the school conducted problem-solving cycles and developed and implemented action plans. These plans were used to develop proposals for small grants,<sup>42</sup> which schools and communities used to improve their schools. Some examples of the products of the small grants were latrines, rehabilitation of classrooms, girls' dormitories, HIV/AIDS sensitization, school feeding, and activities to improve girls' education. The term, "health promoting schools" was adopted to provide intersectoral committees, parents and educators a rallying point and allow for communities to add to the model a range of health interventions determined by them to be needed and feasible.

Other health interventions, all supported by community involvement, included water/sanitation and hygiene, skills-based health education, and school-based nutrition services. SHN schools in Zambia initiated school gardens and several times a week, snacks or porridge made from soya or maize were provided. These nutrition interventions yielded immediate dividends in terms of increased enrollment and observable pupil alertness in class. When combined with deworming and micronutrient supplementation, teachers observed a dramatic improvement in their students' ability to pay attention and concentrate. Once the deworming program had been implemented, the CHANGES Program worked with FAO and The World Food Program to provide food for schools. Working with other organizations on the ground to provide these additional services served to further strengthen SHN and its attractiveness as a useful program.

41 CHANGES Programme Team. (June 2005). Final technical report: The CHANGES programme. Prepared for Basic Education and Support (BEPs) Activity, U.S. Agency for International Development, Contract No. HNE-1-00-00-00038-00. Washington DC: Creative Associates International Inc.

42 The small grants program was administered by CHANGES partner, CARE International.

The three fundamental guiding principles, intersectoral collaboration, systems strengthening and capacity building, and community empowerment, together made the Zambia model successful and sustainable.

## CROSS-CUTTING COMPONENTS

HIV/AIDS prevention education and behavior change communication were the two cross-cutting components of the model.

### HIV/AIDS PREVENTION EDUCATION

The impact of HIV/AIDS on the Zambia education system cannot be overemphasized as it has affected both the supply of teachers and quality of education and the lives of children inside and outside of school.

Teachers have an important role to play with primary school children, as this population remains largely free of the HIV virus and therefore constitutes a "window of hope".<sup>43</sup> Teachers need the knowledge and skills to capitalize on this educational opportunity to change children's attitudes and behaviors before they become the set patterns of adulthood.

SHN in Zambia has integrated into its program, various HIV/AIDS prevention strategies and activities including the sensitization of teachers, training of anti-aids club leaders as described in the community problem-solving cycles, the development of HIV/AIDS resource centers in schools, sensitization of communities, development of a counseling manual and training of school counselors, and the use of media to disseminate HIV/AIDS preventive messages. The CHANGES Program experience reinforces the lessons learned elsewhere: that in order to be good facilitators of life skills, school teachers must be skilled in the use of participatory techniques and must have already dealt with their own stigmatization and weak negotiation and communication skills. Thus, increased emphasis on

<sup>43</sup> The World Bank. (2002). Education and HIV/AIDS: A window of hope. Prepared by Don Bundy and Manorama Gotur, with support from Lesley Drake and Celia Maier (Partnership for Child Development, U.K.). Washington D.C.: The World Bank.

choosing teachers with the greatest potential to help children face HIV/AIDS, and experiential learning packages to enable teachers to face their own biases and personal experience, are crucial to implementing effective prevention education for children.

#### BEHAVIOR CHANGE COMMUNICATION

Policy advocacy and awareness-raising on SHN with all sectors were particularly important in the early stages of program development. An Information, Education, Communication Specialist was identified early on, and the CHANGES Program worked with the MOE and other agencies to implement a broad-based media campaign that included theatre, public meetings, radio, newspapers, television, use of local musicians to produce audio tapes, posters, calendars, and newsletters. The audiences for these media strategies included teachers, parents, community, and district, provincial, and national decision makers in all relevant sectors. Advocacy with decision makers also included a national symposium, NGO meetings, and presentations at meetings of headmasters and other organizations.

## VI. BIOMEDICAL AND COGNITIVE EVIDENCE OF SHN SUCCESS<sup>44</sup>

In recent years, many studies<sup>45</sup> have shown that deworming and micronutrient supplementation can improve both children's health and cognition. Most of these have been relatively small, usually including no more than a few hundred children. The results have begun to build the case for the routine delivery of school health and nutrition interventions at scale.

The CHANGES Program's large-scale study of the impact of school health interventions on the health and educational ability of Zambian children provides a strong evidence base for the implementation of school health and nutrition activities among the entire nation's school children.

The Zambia CHANGES Program subcontracted with two groups to conduct the impact assessment, the PCD, and SI. PCD was responsible for measuring the impact of interventions on children's biomedical indices, and SI, in collaboration with the University of Zambia and the Zambia Examination Council, developed the Z-CAI cognitive tool to measure the impact on educational ability.<sup>46</sup>

### STUDY DESIGN

The impact assessment was conducted in the Chadiza and Chipata Districts of Zambia's Eastern province. Of the 155 schools in the two districts, 80 were randomly selected for inclusion in the study. The schools were randomly divided into four groups of 20 schools each. In the first year, pupils from 20 schools served as the intervention group that received SHN treatment, while those from another 20 formed a control group. In the second year, the pupils from 20 schools that had constituted the con-

44 This section contains large excerpts from the document: The Republic of Zambia, Ministry of Education, in collaboration with Creative Associates and funded by USAID. (unpublished, 2004). Impact assessment of school health and nutrition interventions: Key findings. Produced by the Partnership for Child Development and Successful Intelligence, Yale University. Washington, DC: Creative Associates International Inc.

45 Soemantri, Pollitt and Kim, 1985; Pollitt, Hathirat, Kotchabhakdi, Missell and Vlayasevi, 1989; Watkins and Pollitt, 1997; Stoltzfus et al. 1997; Beasley et al. 1999, Beasley et al. 2000; Jukes et al., 2002, (as cited by Ministry of Education, Zambia, Partnership for Child Development & Successful Intelligence. (2004). Impact assessment of school health and nutrition interventions: Key findings. Produced by the Partnership for Child Development, University of London and Successful Intelligence, Yale University. Washington DC: Creative Associates.

46 For full reports on the impact assessment see "MOE CHANGES Program School Health and Nutrition Impact Assessment: Collected Reports" (as cited by Ministry of Education, Zambia, Partnership for Child Development & Successful Intelligence. (2004). Impact assessment of school health and nutrition interventions: Key findings. Produced by the Partnership for Child Development, University of London and Successful Intelligence, Yale University. Washington DC: Creative Associates International Inc.).

control group received SHN interventions while an additional cohort of pupils from 20 new schools constituted a new control group. This "phased roll in methodology" continued through three years, so that the first group received the interventions for three years, the second group for two years and so forth. This study design was both statistically strong and acceptable to the ethics committee of the University of Zambia.

In each school, five boys and five girls were randomly selected from each grade for inclusion in the study. In total, 70 children were recruited from each school (7 grades x 10 children each = 70 children). Each study group contained 1,400 children (20 schools x 70 children = 1400 children).

**TABLE 1  
STUDY GROUPS**

YEAR OF PROJECT	GROUP			
	A	B	C	D
1	Intervention	Control		
2	Intervention	Intervention	Control	
3	Intervention	Intervention	Intervention	Intervention

The study was designed to measure the impact of interventions on children's health and educational ability. Children enrolled in intervention groups received annual treatment with Albendazole for intestinal worms, annual treatment with Praziquantel for schistosomiasis, Vitamin A supplementation, weekly iron supplementation, and health education. Children enrolled in control groups received health education only.

Interventions were delivered to children by teachers under the supervision of MOH staff. Since teacher delivery of drugs was a new approach in Zambia, one goal of the study was to assess the efficacy of the teacher's work.



## MEASURING HEALTH IMPACT<sup>47</sup>

Children's health and nutrition were measured during the study using a number of established indicators. Data were collected from intervention group children as follows:

- Measures of infection with helminths or worms (geohelminths and schistosomes)
- Measures of iron status (hemoglobin, serum ferritin, transferrin receptor)
- Measures of vitamin A status (serum retinol)
- Measures of protein energy malnutrition (stunting and underweight)

Data were collected from children included in the control group as follows:

- Measures of protein energy malnutrition (stunting and underweight) only

## MEASURING EDUCATIONAL ABILITY

While established indicators for measuring the impact of interventions on children's health and nutrition were easily identified, such indicators were not readily available for measuring impact on children's educational ability. In the light of this, the Zambian Cognitive Assessment Instrument (Z-CAI) was developed. The Z-CAI was designed to be grade appropriate and sensitive to educationally important basic cognitive processes affected by health and to discriminate well between children.<sup>48</sup> Thus the Z-CAI was used in preference to scholastic indicators such as Zambia's national assessment tests, which are not grade appropriate and which were not felt to be sufficiently discriminative or sensitive to measure the impact of interventions.

<sup>47</sup> Full details about the biomedical methods employed can be found in PCD's "Year 3 Survey Report", (as cited by Ministry of Education, Zambia, Partnership for Child Development & Successful Intelligence. (2004). Impact assessment of school health and nutrition interventions: Key findings. Produced by the Partnership for Child Development, University of London and Successful Intelligence, Yale University. Washington DC: Creative Associates International Inc.).

<sup>48</sup> The Z-CAI enables wide differentiation of children's abilities. It is free of effects of flooring (i.e., when most children score at the bottom) or ceiling (i.e., when most children score at the top).

The Z-CAI measured cognitive function by assessing children's ability to follow increasingly complex oral, written, and pictorial instructions. As such, it acted to mimic the dynamics of the educational process in the classroom with its components of attention, concentration, and persistence. An important feature of the Z-CAI was its administrator-friendly structure, which enabled it to be quickly and easily administered to groups of students by their teachers in an examination setting. This is in contrast to most other tests of cognitive ability which are time consuming, complicated to administer, and must be administered individually.

In addition to assessment using the Z-CAI, students were also assessed using the Mill Hill Vocabulary Test (considered an indicator of verbal intelligence) and the Grade 5 National Assessment tests in English, Mathematics and Nyanja (which measures their knowledge of the school curriculum). The validity of the Z-CAI as a test of children's education-related ability was demonstrated by the partial correlation shown between children's Z-CAI scores and their achievement scores on both the additional tests used.

The Z-CAI is a valuable new test that can possibly be used to monitor the cognitive impact of a range of interventions including school feeding programs, and the disease control program.

## IMPACT ON HEALTH<sup>49</sup>

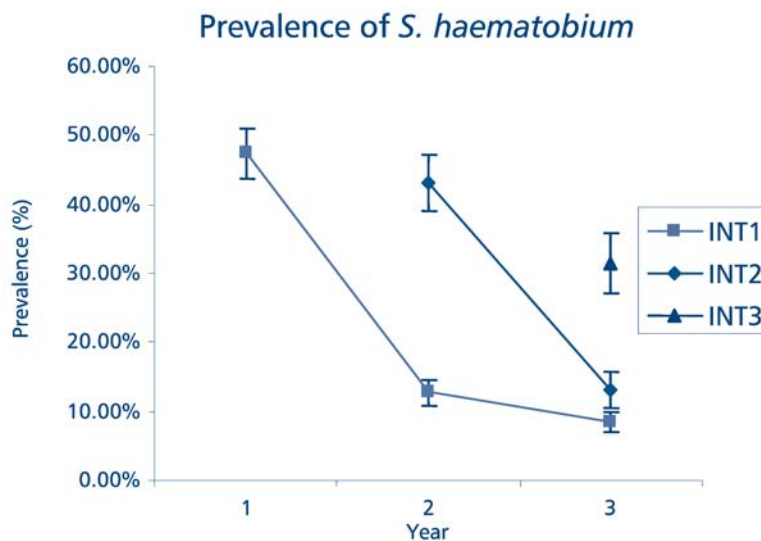
The impact of interventions on children's parasitic worm infections was pronounced. Among children who had received deworming for one (2002 only) or two years (2001 and 2002), the prevalence of infection (number of children infected) with parasitic worms was approximately one quarter of the rate at baseline and was much lower than that of children in the control group ( $p < 0.001$ ).<sup>50</sup> Treatment also resulted in large reductions in

<sup>49</sup> Nutrition results have been omitted to save space, as little improvement in nutritional status was found in such a short time.

<sup>50</sup> The probability that convincing results would occur due to chance alone; if  $p$  is less than .05 (often written " $p < .05$ ") the results are accepted as "statistically significant."

intensity of infection (numbers of worms in a child) ( $p < 0.001$ ). Treatment was most effective when delivery was sustained; children who received two rounds of treatment (2001 and 2002) were less heavily and less commonly infected than those who had received treatment only once (2002 only). The impact assessment also demonstrated that teacher delivery of interventions was highly effective. An example of the impact observed is shown in Figure 2.

**FIGURE 2**  
**IMPACT OF SHN INTERVENTIONS ON WORM PREVALENCE**  
**DURING THREE YEARS OF THE PROJECT**



## IMPACT ON EDUCATIONAL ABILITY<sup>51</sup>

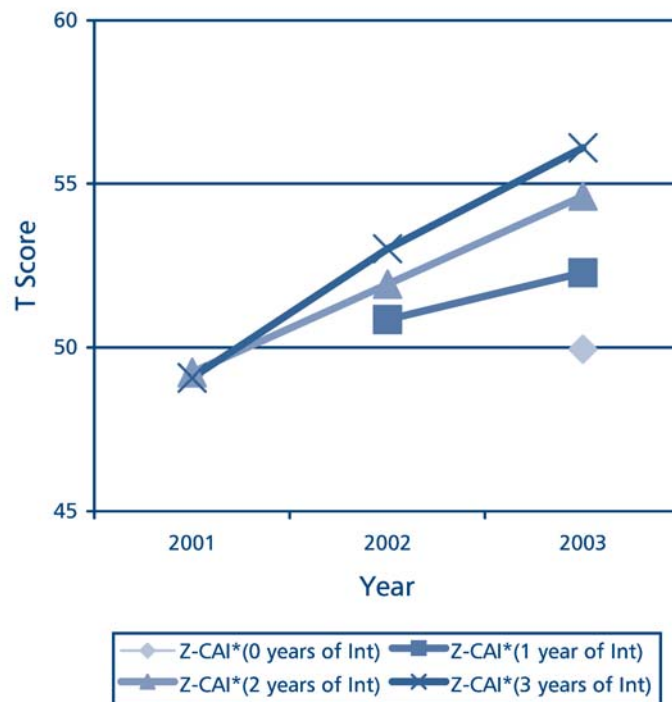
The impact of deworming and micronutrient supplementation on educational ability was substantial. Figure 3 below shows the impact of interventions on children's overall Z-CAI scores during the study.<sup>52</sup> It shows that

<sup>51</sup> For further information about the educational impact of interventions and statistical evidence see Successful Intelligence (2004). Final report for the school health and nutrition program in Zambia's Eastern Province. New Haven, Connecticut: Successful Intelligence (SI), Yale University.

<sup>52</sup> The results of the Z-CAI were transformed into "T scores" which are often used in literature on testing and assessment. With T scores, a score of 50 represents the mean level of performance in a given population and difference of 10 from the mean is equal to one standard deviation. Children participating in the study were scored with reference to the population tested during the piloting of the Z-CAI.

when data were controlled for differences such as age and sex, the overall Z-CAI scores of children at baseline (2001), in control and intervention groups, were much the same. After one year (2002), children who received interventions performed significantly better than those who did not ( $p < 0.001$ ). Further, in 2003, children who had received interventions for two years (2001 & 2002) were found to perform better than those who had received only one (2002 only). The results show that the impact of deworming is cumulative. Regular deworming has a greater impact on children's educational ability than one time activities.

**FIGURE 3**  
**IMPACT OF SHN INTERVENTIONS ON Z-CAI PERFORMANCE**  
**DURING THREE YEARS OF THE PROJECT**

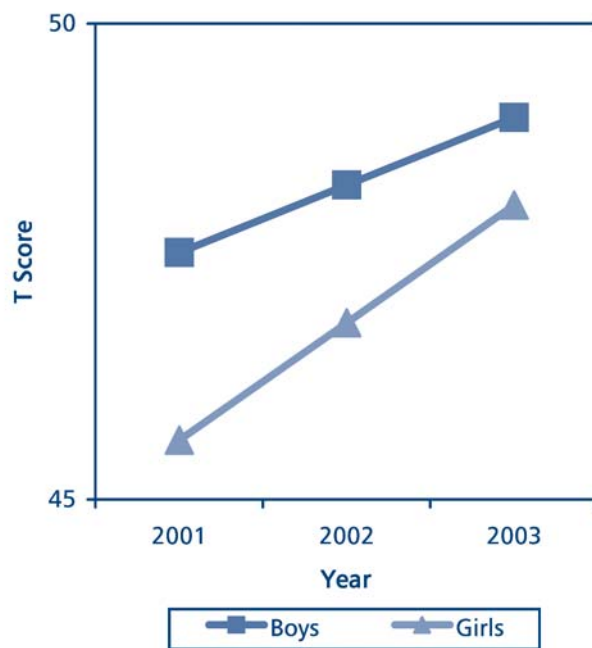


At baseline, the Z-CAI consistently showed girls to perform less well than boys ( $p < 0.001$ ). This finding reflects the deficit faced by girls with respect to factors that affect cognitive function such as attention, opportunity,

53 Jukes et al. 2002 and Jukes et al., (as cited in Ministry of Education, Zambia, Partnership for Child Development & Successful Intelligence. (2004). Impact assessment of school health and nutrition interventions: Key findings. Produced by the Partnership for Child Development, University of London and Successful Intelligence, Yale University. Washington DC: Creative Associates International Inc.).

investment, and value.<sup>53</sup> The results showed that the interventions acted to help correct this imbalance: the cognitive scores of girls receiving interventions increased significantly more than those of boys ( $p < 0.05$ ) (Figure 4). This reflects the potential of school health interventions to provide greatest benefit the most disadvantaged children.

**FIGURE 4**  
**IMPACT OF SHN INTERVENTION ON Z-CAI PERFORMANCE**  
**OF BOYS AND GIRLS DURING PROJECT**



Conclusions of the impact study were the following:

- teachers are highly effective in delivering these interventions;
- regular interventions have more impact than a one time intervention;
- the impact on children's educational ability was significant and substantial, even when there was no observable health and nutrition impact;
- SHN interventions benefit girls more than boys, thus having a positive effect on gender equity.



## VII. LESSONS LEARNED

The success of the pilot program backed by the positive biomedical and cognitive research has given confidence to the Zambia MOE as well as other donors, that SHN is viable, relatively easy to carry out, cost effective, and worthy of long-term investment. The MOE has declared that SHN is a national priority and provided a budget that is reflected in the national workplan. The ultimate goal according to the MOE is that every school shall have an SHN action plan, deliver deworming and micronutrients, and engage in other SHN activities using MOE resources. The success of the CHANGES Program pilot has contributed to the award to Zambia of a Bill and Melinda Gates Foundation grant for the Schistosomiasis Control Initiative that will provide sufficient deworming drugs for three years and ensure the SHN program's expansion to many more schools and communities. The CHANGES SHN model is also being examined and considered for programs in other countries.

While one measure of success is the extent to which the SHN model is funded and replicated, there are other positive effects gained from the Zambia CHANGES SHN program. These include evidence of increased community and school, and health worker and teacher cooperation. There is also increased parental knowledge and behavior change as evidenced by parents now sending their children to school with snacks and reporting having adopted improved health and hygiene practices at home.

The CHANGES SHN Program generated a number of valuable lessons that will enable Zambia and other countries to make evidence-based decisions about initiating, expanding, and/or improving existing SHN programs. The most important lessons are as follows:

- SHN is a cost-effective, worthwhile investment for developing countries wishing to improve the health and learning of school-aged children. Schools can be an effective vehicle for distributing deworming medications and vitamins, and launching HIV/AIDS prevention education.

- SHN is a relatively easy program to implement requiring few resources and showing immediate observable impact.
- Teachers can be both willing and highly effective in delivering basic health interventions.
- Many stakeholders, ministries, and organizations can work together successfully toward a common goal.
- Development of a jointly signed MOU between ministries is imperative, but not in itself sufficient. At the central level, implementation guidelines that clearly delineate everyone's respective roles in SHN must also be developed, interpreted, and disseminated to ensure a successful implementation of SHN.
- An SHN strategy and national SHN policy provides solid support for activities and ensures sustainability.
- Even when health interventions have no observable impact on children's health and nutrition, their impact on children's learning ability is significant and substantial.
- Regular deworming and micronutrient interventions have a greater impact on children's educational ability than one time activities. The results indicate that children benefit most when interventions are sustained.
- Health interventions may have a positive impact on student attendance, retention, and absenteeism.<sup>54</sup>
- Interventions benefit girls more than boys. This remarkable finding suggests that deworming not only has a beneficial impact on educational ability, but it can also have a positive effect on gender equity.
- Programs can begin with a few key interventions and gradually build to a more comprehensive program level as more resources become available (Appendix B).

<sup>54</sup> The project collected many anecdotal reports from schools, teachers, and parents suggesting that school attendance increased when parents learned about deworming drugs, and school feeding. The data about increased attendance, retention, and absenteeism, however, were difficult to obtain for a number of reasons. First, food provided at school led to increased enrollment during the famine in 2001-2002. Second, the MOE adopted a free education policy (dropped the previously enforced school fees), resulting in an explosion in grade one attendances over the past two years. Finally, the data from schools is not always reliable- even though many are registered, the school can handle only those that physical space will allow. As many as 20 percent of the children enrolled in school, therefore, are registered but not attending classes.



- Teachers and health workers should be trained together so they will work as a team, and managers and administrative staff at district and provincial levels need to be trained in SHN concepts and tools.
- Regular monitoring by intersectoral teams is crucial to SHN success, and the establishment of a national level intersectoral steering committee will ensure that the integrity of the SHN model is maintained.
- Advocacy and sensitization at all levels are effective in motivating teachers, strengthening PTAs, increasing community participation, and changing attitudes toward SHN at the national level by policy makers, managers and donors.
- Parents, communities, and teachers, in general, accept the SHN interventions because they can observe immediate visible results in their children.
- In order to effectively teach life skills classes, teachers must be skilled in the use of participatory techniques and have already dealt with their own stigmatization (around HIV/AIDS) and weak negotiation and communication skills.

The CHANGES Program in Zambia developed a workable and replicable model for education and health working together based on intersectoral collaboration, systems strengthening, and community empowerment. The model is inexpensive and cost-effective for countries to implement. The program demonstrated, both through measurable indicators and anecdotal evidence, that deworming and micronutrient interventions in the schools can effect significant improvement in health and cognition of children.



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## ANNEXES

**ANNEX A**  
**SHN OPERATIONAL FRAMEWORK**

INPUTS	OUTPUTS
<ul style="list-style-type: none"> <li>■ Training Module for teachers and health officers on SHN student health interventions.</li> <li>■ CHANGES interventions to facilitate ongoing collaboration between Zambia MOE and MOH.</li> <li>■ Training of popular theatre troupes/ scripts for nutrition and health dramas.</li> <li>■ CHANGES Program staff facilitate collaborative relationships between MOE and MOH district staff.</li> <li>■ Development of protocols for measurement of Schistosomiasis and worm presence, cognitive ability, and stunting levels.</li> <li>■ Baseline testing of a sample of students for Shistosomiasis/worms prevalence, stunting, and cognitive ability.</li> <li>■ Training and development of health focal leaders.</li> <li>■ Small grants program conceptualized and announced.</li> <li>■ USAID, MOE, MOH budgets committed to SHN activity in Eastern Province.</li> <li>■ Contributions of other donors.</li> </ul>	<ul style="list-style-type: none"> <li>■ Numbers of teachers, health workers, school principals trained in administration of de-worming medicine and micronutrients.</li> <li>■ Number of health focal point teachers trained.</li> <li>■ Numbers of affected students given de-worming medicine and supplements.</li> <li>■ Development of health charts for recording data.</li> <li>■ Number of students tested on post-treatment cognitive ability.</li> <li>■ Number of popular theatre performances held to raise consciousness about HIV/AIDS.</li> <li>■ Number of HIV/AIDS information stations operating.</li> <li>■ Number of radio programs on AIDS created and broadcast.</li> <li>■ Number of parents or community groups sensitized.</li> <li>■ Number of small grants made.</li> </ul>
ANTECEDENT VARIABLES OF TARGET COMMUNITIES	
<ul style="list-style-type: none"> <li>■ Income level</li> <li>■ Literacy and education levels</li> <li>■ Infection rates of Shistosomiasis, worms and HIV/AIDS</li> <li>■ Knowledge of HIV/AIDS/prevention</li> <li>■ Cultural beliefs that impede/support</li> </ul>	

**ANNEX A (CONTINUED)**  
**SHN OPERATIONAL FRAMEWORK**

SHORT-TERM OUTCOMES	LONG-TERM OUTCOMES
<ul style="list-style-type: none"> <li>■ Immediate changes, if any, in incidence of Shistosomiasis /worms infection.</li> <li>■ Immediate changes, if any, on attendance rates of medically treated students.</li> <li>■ Immediate changes, if any, in cognitive ability of students medically treated with de-worming, and nutritional interventions.</li> <li>■ Immediate changes, if any, in the school performance of treated students, including scores on classroom tests, verbal responses, and standard achievement tests AND opinions of teachers, administrators, and parents.</li> <li>■ Immediate changes, if any, in numbers and percentages of girls enrolled and retained.</li> <li>■ Immediate changes, if any, on the knowledge about, and attitudes toward, HIV/AIDS and infection routes.</li> <li>■ Immediate changes in the attitudes of parents and community groups on effects of interventions, including grants.</li> </ul>	<ul style="list-style-type: none"> <li>■ Extent to which higher attendance, better school performance, and improved cognitive ability continue after initial gains and after funding withdrawal.</li> <li>■ Extent to which immediate lower levels of Shistosomiasis/ worm incidence continue after project interventions end.</li> <li>■ Extent to which girls are enrolled and/or retained at same or higher rates after project ends.</li> <li>■ Extent to which HIV infection rates change, if at all, in treated communities.</li> <li>■ Extent of the teacher/health worker collaboration.</li> <li>■ Extent to which the SHN model can be effectively replicated elsewhere in Zambia.</li> <li>■ Extent to which the MOE continues funding for SHN.</li> <li>■ Extent of ongoing project interventions in project communities.</li> </ul>
MEDIATING VARIABLES	
<ul style="list-style-type: none"> <li>■ Policies of MOE, MOH or USAID that have unintended consequences on effectiveness of health and social awareness interventions.</li> </ul>	

**ANNEX B**  
**OPTIONS FOR SCHOOL HEALTH AND NUTRITION PROGRAMS<sup>55</sup>**  
 [NOTE: KEY ELEMENTS SHOULD BE INCLUDED, AND THEN OTHER ELEMENTS SELECTED AS  
 THE PROGRAM EXPANDS]

**MINIMAL SHN  
 COMPONENTS**

- *Deworming and micronutrient supplementation administered by teachers*
- Teachers and health workers trained (1 day orientation) some trained through zonal systems by using SCI model or a 2- day course that is more inclusive of SHN elements
- Administrative/managerial training for district and provincial staff (2 day)
- Intersectoral committees formed at district and provincial levels
- Health promoting committees formed at school level
- PTA members and communities sensitized by teachers and other means
- Some IEC use for advocacy and sensitization
- Some attention to water and sanitation issues (pit latrines) and keeping the environment clean
- Limited use of health cards
- School garden in place
- Monitoring by district and provincial MOE/MOH
- Involvement of Teacher's Training Colleges-inclusion of SHN issues in pre-service curriculum

<sup>55</sup> CHANGES Final Technical Report, 2005

**ANNEX B (CONTINUED)**  
**OPTIONS FOR SCHOOL HEALTH AND NUTRITION PROGRAMS**  
[NOTE: KEY ELEMENTS SHOULD BE INCLUDED, AND THEN OTHER ELEMENTS SELECTED AS  
THE PROGRAM EXPANDS]

**MODERATE LEVEL  
SHN**

- *Deworming and micronutrient supplementation administered by teachers*
- Teacher and health worker training (2-3 day course)
- Administrative/managerial training for district and provincial staff
- Written school health policy and SHN action plans
- Intersectoral committees formed at district and provincial levels
- Health promoting committees at school level
- FRESH Framework pillars (health policy, life skills, health services, access to water and sanitary facilities) implemented
- PTA/ community sensitization done using meetings/public or Theatre for Community Action Approach
- Local school garden with orchard and vegetables
- Small resource center in schools (HIV/AIDS, SHN) accessible to community members
- Strengthening of PTAs
- School Health cards in use and links established (Schools, Health centers and communities)
- Water source being checked and treated with chorine
- Adequate latrines
- Other environmental issues addressed such as hand washing facilities
- Monitoring by district and provincial planning office-integrated MOE/MOH/MCDSS
- Involvement of Teacher's Training Colleges-inclusion of SHN issues in pre-service curriculum



**ANNEX B (CONTINUED)**  
**OPTIONS FOR SCHOOL HEALTH AND NUTRITION PROGRAMS**  
 [NOTE: KEY ELEMENTS SHOULD BE INCLUDED, AND THEN OTHER ELEMENTS SELECTED AS  
 THE PROGRAM EXPANDS]

**COMPREHENSIVE LEVEL  
SHN**

- *Deworming and micronutrient supplementation administered by teachers*
- Training (4 days) of teachers and health workers in drug administration
- Managerial and administrative training for planners and managers at district and provincial level 2 day course
- All basic schools involved
- Teachers providing health education using flip charts on worm prevention
- Teachers using life skills interactive methodology
- School Health Cards being used-information recorded correctly and linked to health services
- Health policy written and an SHN action plan available
- Sensitization of communities using various methods
- Formation of inter-sectoral committees at National, provincial and district levels
- Formation of Health Promoting committees at school level
- Strengthening of PTA
- Pit latrines and water adequate
- Involvement of CBOs
- Local school gardens in place and producing food for pupils
- School Feeding program-pupils encouraged to eat snacks and in some schools provided with meals
- School has HIV/AIDS and SHN resource corner accessed by community members
- Implementation of Fresh framework
- (Health policies, life skills, water and sanitation and access to health services. Awareness of these issues by all SHN schools
- Inter-sectoral coordination committees in place at district and provincial levels. Active broad-based media campaigns using printed and broadcast media
- Coordination with Interactive Radio programs
- Regular monitoring by MOE/MOH/MCDSS





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