ABSTRACT

Against All Odds: A Comparative Study of Student Success in Four Schools in Rural Western Kenya

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In a Kenyan student's life, poverty often brings with it malnutrition, disease, death of parents, and poor education. This study compared four primary schools in rural Kenya, one scoring an average of 492 out of 500 on the important Form 6 national examination. Administrators, teachers, parents, and the students who took the test were interviewed from the two highest- and the two lowest-achieving schools in the district. Participants were blinded to the outcome of interest. Predictor variables included school facilities and supplies, provision of a mid-day meal, student variables, and teacher variables. Findings showed that the school with the poorest facilities scored the highest. However, this school was the only one where students were provided with a mid-day meal. Highest test scores also were associated with the lowest class size and the highest attendance by both students and teachers. Successful students had teachers who spent at least twice as much time with their students one-on-one outside of the classroom. Other characteristics most common among the highest-achieving students were living with two adults, being happier, and being more future-oriented in their understanding of the purpose of school. These findings indicate a sustained commitment of the community to help these children succeed against all odds. A school with scrap-metal buildings and dirt floors led their students to overcome the many challenges they face by providing nourishment and highly invested teachers and instilling hope within a caring environment.

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AGAINST ALL ODDS: A COMPARATIVE STUDY OF STUDENT SUCCESS IN FOUR SCHOOLS IN RURAL WESTERN KENYA

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CHAPTER ONE

Introduction

"Education is a fundamental right which must be provided to every Kenyan, according to the following principles: political equality; national unity; social justice and human dignity; freedom of religion and conscience; freedom from ignorance and disease; equal opportunities for all citizens, irrespective of race, religion, sex or colour; equitable distribution of the national income; and the promotion and preservation of the cultural heritage" (World Data on Education, 2010, p. 1). From this strong statement of values by the writers of World Data on Education, one might hope that all, or at least most, Kenyans are educated. However, poverty is so entrenched in that country, as it is in much of sub-Saharan Africa, that major barriers to universal education include things like the demanding and often competing need for individuals, even children, to join the labor force instead of going to school. On a broader level, Buchmann notes that, "the coupling of a fragile state and vibrant civil society often means that African states are forced to react to the demands of local communities in ways that are politically expedient in the short-term, rather than pursue initiatives that are in the long-term national interest" (Buchmann, 2000). The problem in Kenya is deeply rooted in many of their cultural systems, and improvement in education is not easy for that society.

The Institute of Policy Analysis and Research (IPAR) in Kenya states that school dropout rates are at alarming levels (Abagi & Odipi, 1997). The report also points out that Kenya strongly promotes the benefits of an education to its citizens,

but rarely provides the means for them to attain one. At the same time that the Kenyan government is working toward free and universal primary education, the country's economic shortcomings have hurt the education system by reducing the amount of available funding. Paradoxically, this causes higher tuition rates for students in private schools and less funding for educational development and investment in supplies like textbooks. Decreased funding has also led to less teacher training.

In the context of this social experiment to shift costs away from families by eliminating tuition, while at the same time diminishing government contributions to schools, there are many opinions about how Kenya should run its education system. Studies have examined a number of factors that are intuitively important and may have been influential in other settings, including such things as socioeconomic status of students, educational facilities, and student-teacher ratio (UNAIDS, 2016). But in a country where textbooks and basic school supplies are scarce, the indisputably important factor of teacher quality is surely even more crucial as a determinant of school quality and eliminating dropouts.

In a country devastated by HIV/AIDS over the last two decades, the circumstances of poverty, poor health, malnutrition, and death of parents are still affecting many children. As a setting for their education, this discouraging scenario

makes success even more elusive for these children. Even for children who are not orphans, poverty and its consequences dominate the life experience for millions. With increased awareness of global health and education disparities, individuals from around the world, non-governmental organizations, and governments other than in Kenya are seeking to know how best to help make a fine education a reality for children in sub-Saharan Africa. A growing emphasis on evidence-based interventions (Famer et al., 2013; Huitt, 2007) has set the stage for this current study. A close look into a microcosm of these issues on the Nyakach plateau of rural western Kenya may shed light, not only on the problems, but also on factors that have contributed to one small school flourishing against all odds.

CHAPTER TWO

Review of Literature

Universal Free Education in Kenya

The Kenyan government began a concerted effort to make public schools free for children all over the country in 2003 (Kristoff, 2003) .The move toward universal free education is being watched carefully to see if it is working in areas where it has been put into effect. Research has revealed that motivation and intent are not enough to make this plan a simple reality. One study (Svensson, 2010) points out an unanticipated consequence for the public schools: when the public schools became free to all, many of the wealthier private school students moved to the public schools. Government officials had hoped to bring more of the impoverished children to school so that they could get an education by eliminating the cost. However, when the children from the private schools moved to the public schools, facilities became more crowded, and the wealthier students expressed dissatisfaction with the government schools. This posed another problem for the government because the comments drew attention to the fact that the government-run public schools were not performing at the level of the private schools and were not providing a solid education for students, regardless of socioeconomic status (Svensson, 2010).

Even with a free education program there are still communication problems to be solved (Deininger, 2003). A study done in 2003 (Deininger, 2003) examined a

free education program in Uganda that had impressive results for getting more children to school. However, with financial pressures relieved, the problems that arose were then related to lack of parent's knowledge about free tuition and erroneous impressions about when a child should begin attending school. The top two responses to their surveys asking why a student ages 6-12 were not enrolled were answered with "not yet school going age" and "can't pay school fees."

Teacher Incentives

In the midst of increased demand for teachers coming from this expansion, there has been new appreciation for the training and incentivizing of good teachers. One article states three reasons why quality teachers are so vital. These reasons include: "High-quality teaching is key to the development of the principal attitudes towards learning and self-image of the learners; it determines the foundation on which subsequent learning will be built; and it is central to the improvement of the quality of schooling" (Victor, 2007).

Providing a positive environment for teachers is a key to retaining quality teachers. Studies show that improving teacher salaries based on performance (incentive-based pay) increases the quality of the school (Gewa et al., 2009; Tooley, Dixon, & Stanfield, 2008). Another study's results show this improvement only in combination with decreased student-teacher ratios (Deininger, 2003). Many schools in Kenya have implemented incentive-based pay, and, when done correctly, this strategy is associated with great improvements in the students' learning. One study (Victor, 2007) that researched this intervention concluded by developing guidelines

for making incentive-based pay programs effective. If the incentive is to produce high test scores, the authors insist that the performance of the students must still be aligned with ultimate outcomes instead of just geared toward the upcoming national tests. Also, incentive-based pay must be monitored closely to eliminate fraud and to foster a unified and cooperative school culture for teachers and administration. All teachers must be eligible for the rewards, but only few should receive them so that it remains a special reward. As long as there is an ongoing effort to maintain a good system for the program, good results should come. However, there are major downsides if the system goes wrong. The common downside to this kind of teacher incentive is that it often causes teachers to teach only the material on the test and not to strive for the long-term learning of their students. This makes for higher test scores but often less happy students, along with producing students who have not learned much (Gewa et al., 2009; Tooley, Dixon, & Stanfield, 2008). However, with Kenya's meager and diminishing funds for education, the money for such research-based strategies to improve teacher quality is disappearing.

Other Financial Aid: Supplies, Books, and Uniforms

An additional financial consideration to impact the success of Kenyan primary schools is providing free school supplies and textbooks to the students. Two studies agree that textbooks are beneficial only for already high-achieving schools or students (Glewwe, Kremer, & Moulin, 2000; Glewwe, Kremer, & Moulin, 2007). Specifically, textbooks benefit those who are already doing well in English, but they do not change outcomes for schools or students who are average or poor in

English language skills. Lower-achieving students in these studies were unable to read the textbooks because they were written in English, which is the third language of many of these children.

A commonly suggested solution for reducing the cost of school, aside from eliminating tuition, is providing school uniforms. School uniforms are required at all Kenyan schools. If a child shows up for school and is not in the correct uniform, it is likely that he or she will be sent home from school. School uniforms are expensive for families in extreme poverty, and when they are unable to afford a uniform, their child is unable to attend school. This can be a harsh reality for many families in Kenya. A study done in Kenya to assess the impact of giving out school uniforms found astonishing improvement in both attendance and test scores when uniforms were provided (Evans, Kremer, & Ngatia, 2009). The families equated the receiving of a uniform with winning the lottery. The study found that after a child received a new uniform, absenteeism decreased by 44%, and it decreased by 62% if the child did not previously own a uniform. In Kenya, the cost of a school uniform is the biggest cost aside from tuition. This means that once a uniform is provided, the parents have very little remaining cost for sending their child to school and attendance rises. Also, because the uniform is new, the child is proud to wear it and is more likely to attend school on a regular basis. There are some schools in Kenya that try to raise attendance by providing free meals and sometimes even free medicine, but if the cost of tuition or even just uniforms is not covered, the parents are unable to utilize these extra free services that the schools may provide.

Orphans

The United Nations AIDS organization highlights another daunting issue that Kenya faces—the fact that approximately 1.1 million children have been orphaned due to AIDS in Kenya as of 2014 (UNAIDS, 2006). One complicating issue about student attendance and performance concerns the unique problems of these children. In sub-Saharan Africa where AIDS is most prevalent, other family support is completely absent for the many orphans who have been left behind when parents die. Only the most fortunate children have some extended family or neighbors willing to care for them after the death of a parent. The families that take on this responsibility are left with the financial burden for the child's education as well as the cost of their daily care. Tuition seems to be only the first of the families' worries; rather, they are burdened with the costs of textbooks and uniforms, testing costs required in order to advance, and other things. These things quickly add up for the impoverished families of Kenya who also take on the care of orphans.

Financial barriers are not the only problem for orphaned children. Other common problems that orphans face in attending school include presence of disease in the child or family and also political violence. The most common belief in the past was that the biggest impact on the child's absence from school comes from the death of the mother (Evans, 2007). There is, in fact, a small drop in attendance shortly before the parental death and a bigger drop after the death because of increased responsibilities. The first drop is thought to be potentially because the child has to attend to the parent. However, this is not a simple association. No significant difference has been found in school attendance of children who have lost one parent

compared to those losing two parents (Evans, 2007). The emotional and logistical complexities of orphans are not clear in their impact.

Food Insecurity

Even for children with parents, poverty can reveal itself in the most fundamental of needs. In the poorest areas, people struggle even to have enough to eat. In contexts where food insecurity is common, the impact of malnutrition on educational success has long been a major area of research interest, and this problem is especially applicable to sub-Saharan Africa where poverty is common. Many schoolchildren have poor diets deficient in key nutrients, and many come from households where food insecurity is high. It is not surprising that this problem has a major impact on children's growth and their performance at school. For example, one study included children who were growth-stunted at 9-24 months of age and were followed up at 11-12 years of age (Shariff, Bond, & Johnson, 2000). When compared with non-stunted children, the smaller children had more trouble in most school subjects and more behavioral problems in school and at home.

Other studies have drawn attention to quality as well as quantity of food, such as analyses of the impact of micronutrients or of supplementation with foods rich in protein from animal sources. The most commonly studied micronutrients are iron, zinc, vitamin B, and riboflavin (Gewa et al., 2009). Gewa et al. (2009) tested students and their cognitive functioning after two years of extra intake of each of these substances. After adjusting for other associated variables, higher iron levels were associated with higher scores on Ravens Coloured Progressive Matrices, which

measure problem solving in a nonverbal format. Higher zinc levels were associated with gains in the digit span-total test score, which measures problem-solving ability, and vitamin B and riboflavin were positively associated with digit span-forward test scores, a similar measure (Gewa et al., 2009). This study showed the impact of these extra nutrients in a very tangible way. In another study assessing the effects of iron on eighty-seven primary school children, it was shown that higher levels increase growth and appetite as well as energy levels (Lawless et al., 1994).

Other studies examine the impact of animal-source foods on improvement, including one in particular that studied the impact on Kenyan children (Neumann et al., 2003). At the study baseline, the subjects were assessed on factors that might confound the relationship between malnutrition and school performance, and alarming rates of these factors were found. One-third of the children had growth stunting, one-third tested positive for falciparum malaria, thirty percent had micronutrient malnutrition, and intestinal worms were widely prevalent. The children's intake of animal-source foods and fat was minimal. This baseline data clearly outlines the multiple problems that many children in Kenya face daily. Another study of animal-source foods tested the differences between milk, meat, and fat to determine the specific effect of each substance (Neumann et al., 2003). The researchers studied the effect of food supplementation on children from multiple schools. In three groups, animal-source foods were added to food that the children normally ate. The fourth was a control group. The group with additional meat had the steepest growth in cognitive function. They also had the best scores on arithmetic tests and the greatest improvement in physical activity and inactive

leadership behaviors. The growth-stunted children who received milk showed the greatest gain in overall growth, and the meat-supplemented group showed the greatest gain in mid-upper arm circumference (Neumann et al., 2007). The greatest improvement was in adding the protein source of meat to the children's daily intake of food. Other studies also have demonstrated similar findings (Wolfe, 1985).

Over the years, many people have found the solution to helping malnourished, impoverished children to be the institution of feeding programs at school. One study analyzed at least eighteen different schools' feeding programs and determined what makes them effective or ineffective (Greenhalgh, Kristjansson, & Robinson, 2007). Positive effects of these programs included: improved nutrition for genuinely malnourished children, social time during eating with their friends, feeling cared for by the school, higher attendance in low- and middle-class countries, improved diet at home, and higher school success rates leading to the breaking of the cycle of poverty. Reasons found for why some feeding programs do not work include misguided theory (i.e. a community starts a program for a reason that does not actually exist), lack of overall food consumption or eating food with inadequate nutrients, low bioavailability of the food, eating less at other meals because of substantial nutrition at a previous meal, or the nutrition coming too late to benefit the child in a significant way (Greenhalgh et al., 2007). This study provides realistic guidelines for developing school feeding programs and emphasizes the good that can come from doing them in the right way.

Student Health

There is considerable evidence that having intestinal parasites also significantly impacts the growth and cognitive function of children. There have been tests of deworming programs in schools to see how many treatments would be effective and exactly what it takes to get an improvement. One study suggests that a deworming program in conjunction with improved diets would be particularly effective, especially for younger children, to get them on an appropriate growth track from the beginning (Svensson, 2010). The group in this study had some success with just deworming two or three times a year, but the authors showed that there would have been more success with other added efforts such as clean water, more frequent deworming, and monitoring food for cleanliness. Other studies also show improved growth and physical fitness after deworming treatments (Stolzfus et al., 1997), which is significant to children's education because healthy children perform better in school (Wanzare, 2002).

Other Approaches to Achieving Success

Other approaches to achieving school success include elimination of school fees, improved curriculum, and easier access to the school by students (Bedi, 2004). Other non-monetary resources from the students themselves are also important. Family background and the parent's ideas about the child's future may play a part in the success of the school (Bedi, 2004; Brchmann, 2007). Another source lists factors such as speaking the language of instruction at home as a very important element of success in reading (Hungi, 2010). Most Kenyan schools teach exclusively in English,

though many families of poor children may speak only Swahili or their tribal language (Hungi, 2010). These factors may all play their own part in contributing to the success of primary schools in Kenya.

Theoretical Framework

The Institute of Policy Analysis and Research (IPAR) is a private organization based in Nairobi with the goal of improving the country's capability for analysis and research that will improve policies and create systemic change in Kenya. In the area of education, IPAR takes a perspective that emphasizes processes at the school level that may decrease dropout rates and increase completion rates (Abagi & Odipi, 1997).

The IPAR framework summarizes its discussion of educational improvement by identifying four types of *input* and five important *processes* seen as central to bringing about the desired *outcome* of keeping students in school. The inputs are textbooks, teachers, school physical resources, and money (Abagi & Odipi, 1997). Obviously, the first three of these factors are highly tied to money and are therefore extremely vulnerable in a struggling economy. They are valuable assets, but are they essential for students to persevere and succeed in school?

The five areas identified as "process variables" by IPAR are education policy, school administration, classroom dynamics, student-teacher ratios, and contact hours. IPAR draws attention to these processes as crucial to a school's success, over and above material and human resources. In reality, these processes happen at different levels of organization. Theoretically, educational policy dictates what the

school administration puts into place to enhance classroom dynamics, improve student-teacher ratios, and optimize contact hours. What is the relative importance of these factors, and can they make a difference in a setting without facilities and supplies?

Finally, IPAR's outcome focus of keeping students in school, though necessary for success, is not a sufficient metric. Much more important are the national test scores that totally determine the ability of a Kenyan student to move forward to the next level of education. Students take the national test, which covers five different school subjects, and these scores are used to determine who receives invitations to move on to the next level of education. In addition, the scores are the only criterion that determines the quality of the secondary school the student can attend. The best opportunity for a good education is to attend a boarding school, but these schools are very competitive and are attractive to talented students who live far away. A high quality secondary education can completely change the direction of the life of a child from a poor rural part of Kenya.

The IPAR concepts are useful in synthesizing the data about successful education in Kenya and other economically and culturally similar environments. The inputs and processes listed above can be expanded into an organizing framework and can be applied to the achievement of high national test scores as the measure of success. Table 1 lists the inputs, processes, and outputs specified by the IPAR framework, along with the expansion of these constructs as adapted in this study.

Table 1: INPUTS, PROCESSES, AND OUTCOMES IN KENYAN PRIMARY SCHOOLS

	IPAR FRAMEWORK	THIS STUDY
INPUTS	Money Teachers Physical Resources Textbooks	Teachers Years of Experience Physical Resources Quality of school building Desks Textbooks for teachers Textbooks for students School Supplies Mid-day Meal Students Live with 2 adults Food Insecurity
PROCESSES	Education Policy School Administration Student-Teacher Ratio Contact Hours Classroom Dynamics	TEACHER Teacher Attendance Passion for Teaching STUDENT Student Attendance Happiness Future-oriented purpose TEACHER-STUDENT INTERACTION Student-Teacher Ratio One-on-One Time After School
OUTCOMES	Decreased dropout Increased completion	National Test Scores

Types and Sources of Input

Regarding inputs, money is clearly important, but the more important measures are the *results* of investing that money in teachers and physical resources, including adequate buildings, desks, textbooks, and school supplies. Excellent, experienced teachers are likely to bring better teaching techniques to the classroom, but in a place with few resources, it may also undermine a teacher's motivation to work year after year without a sufficient infrastructure.

In addition, the children themselves bring input variables to the table. In very poor environments, food insecurity is a basic factor that sets up a child for success or failure. In responding to this context, a school administration that puts in place the things needed to provide a feeding program, such as a mid-day meal for students, is contributing another significant input to the structural environment for learning.

Many children in this kind of environment are orphans or are living in homes where one parent is absent. Some orphans are incorporated into homes with stable caregivers, and sometimes there are even two adults present to care for the child. So, the presence of two adults in the home, whether the child is an orphan or not, is an important input from the child's context that deeply influences his or her preparation for school.

Processes

The processes involved in educating children certainly start at the administrative and policy level, but they end in the classroom itself. It is necessary to extend the emphasis on students and teachers beyond student-teacher ratio and

classroom contact hours to include teacher and student attendance level at school as well as the amount of one-on-one time that teachers spend with students over and above the time spent in classroom teaching. Some of the less objective variables that influence classroom dynamics are elusive and difficult to measure. However, it is important to bring into the discussion of student success both the teachers' and the students' level of investment and belief in the importance of learning. Indeed, a happy child who has hope for the future and sees her time at school as leading to a better life is likely to be a better learner, especially when paired with a teacher who has a deep sense of passion for the educational success of students and sees her teaching as crucial for the student's future success in life.

Outcome

Finally, although the goal is to keep children in school for as long as possible, the more important issue is what they are learning while they attend and, in Kenya and other African countries, how they perform on key examinations. Kenya has standard national examinations for all students near the end of the Form 6 (equivalent of sixth grade in the U.S.), providing an important gateway to further success. Although there is legitimate controversy over test scores as the best measure of learning, in Kenya these scores are the sole indicator used to promote students on to secondary school. A low score bars them from attending school at all, whereas a very high score allows them the opportunity to go to one of the best schools.

The Current Study

Aid organizations have sometimes answered the problems of Kenyan public schools by helping to build private schools in areas of extreme poverty, utilizing some of the strategies discussed above such as providing free uniforms and mid-day meals for students. One such school is the Bethlehem Home Academy on the Nyakach Plateau in rural western Kenya. This Luo community represents the poorest of the poor in a traditional, tribal group of subsistence farmers whose population has been decimated and debilitated by HIV/AIDS and other diseases, the unpredictable droughts and floods caused by climate change, the lack of clean water, and the absence of capital investment that would promote industry.

This school was started in October of 2010 by a collaboration between a local NGO (non-governmental organization), Bethlehem Home, and an American NGO, Straw to Bread, to help provide quality schooling for the poorest Luo orphans in this region. Straw to Bread is a non-profit organization that sponsors a team that works for two weeks each year on the Nyakach Plateau. This annual activity is part of ongoing development projects and research solely to serve this particular community, encompassing health care, food and sustainable agriculture, safe water sources, education, and small business development. Many of these orphans do not have shoes, and most have little or no food other than the simple meal that is provided at school. Students at this school can attend only if a benefactor is willing to pay ten dollars for the school uniform and thirty dollars per month for tuition.

Based on studies of what causes students to drop out, this school had a significant chance of failure. Despite these reasons for failure, the Bethlehem Home

Academy received first place out of the seventeen schools in the local district on the published national exam scores for Form 6 students in 2012. When this study began, it was unknown how the other schools compared to Bethlehem Home Academy in school inputs, processes, and outcome. The literature cited above indicates that facilities and supplies, student-teacher ratio, student attendance, food provided, and the presence of two parents can make a difference in the success of students at school. In addition, there may be other factors that could be contributing to the school's success, including teacher attendance, the level of passion that teachers bring to their work, the amount of one-on-one time that teachers spend with students. Finally, regarding the students themselves, it is important to examine the impact of students' attitudes. Is it important if students report that they are happy at school and that they have a long-term vision of the importance of going to school?

The present study explores all of these issues by means of careful analysis of data about the reasons for this school's extraordinary success compared to other nearby schools with a similar level of poverty. The goal was to shed light on factors that can be reinforced and replicated in other poor areas of developing countries, contributing to our knowledge about student success and to the improvement of Kenyan education as a whole. A second goal of this study is to provide data to guide future interventions in this particular school, Bethlehem Home Academy. In that regard, this is both a process and an outcome study that gives helpful information to this community and its organizers that will guide the immediate and long-term investment of resources.

With the general objective of providing additional data about student success and Kenyan education, the current study adapted and enlarged the IPAR perspective as an organizing framework for identifying the key strengths associated with high national examination scores in an environment of dire poverty. In developing countries it is difficult for schools to optimize all of the factors that can make children successful. To elaborate on the influence of various factors with regard to national test outcomes raises the bar significantly in the conversation about improving education in Kenya. To combine a number of these variables, including variables that have demonstrated importance as well as others that are still only supported by theory, and to examine all of them in one study is a additional step that can move research and policy discussions to a new level.

CHAPTER THREE

Hypothesis

This study investigated the reasons for primary school success in rural western Kenya by comparing the two highest-achieving schools and the two lowest-achieving schools in the district based on national test scores. The specific objective of this study was to determine the reason for the difference in success of these schools, with Bethlehem Home Academy, the top school in the district, being of particular interest. Through questioning the administrators, teachers, parents and students at each of the four schools, the researcher examined factors that were related to differences in achievement scores. The following hypotheses reflect the theoretical model found in Figure 1 as it applies to these four schools on the Nyakach Plateau: Bethlehem Home Academy, Soko, Pap Ndege, and Kibwon.

Research Questions

Research Question One: Are quality of facilities and access to school supplies (books, textbooks, paper, pencils, etc.) associated with higher national test scores for students in primary school?

Hypothesis 1A: Permanent brick buildings and access to school supplies are associated with higher national test scores for students in primary school.

Null Hypothesis: Permanent brick buildings and access to school supplies are not associated with higher national test scores for students in primary school.

Research Question Two: Is the presence of two adults in the homes in which students are living associated with higher national test scores for students in primary school?

Hypothesis 2A: Living with two adults is associated with higher national test scores for students in primary school.

Null Hypothesis: Living with two adults is not associated with higher national test scores for students in primary school.

Research Question Three: Is teacher passion and higher teacher attendance associated with higher national test scores of students in primary schools?

Hypothesis 3A: Having a more passionate teacher is associated with higher national test scores for students in primary school.

Null Hypothesis: More passionate teachers are not associated with higher national test scores for students in primary school.

Hypothesis 3B: Higher teacher attendance is associated with higher national test scores for students in primary school.

Null Hypothesis: Higher teacher attendance is not associated with higher national test scores for students in primary school.

Research Question Four: Is having a mid-day meal at school associated with higher national test scores of students in primary school?

Hypothesis 4A: Consistently receiving a mid-day meal provided at school is associated with higher national test scores for students in primary school.

Null Hypothesis: Consistently receiving a mid-day meal provided at school is not associated with higher national test scores for students in primary school.

Research Question Five: Is higher student attendance at school associated with higher national test scores for students in primary school?

Hypothesis 5A: Higher school attendance is associated with higher national test scores for students in primary school.

Null Hypothesis Higher school attendance is not associated with higher national test scores for students in primary school.

Research Question Six: Is student happiness at school and understanding that school has a strong influence on their future associated with higher national test scores for students in primary school?

Hypothesis 6A: Student happiness at school is associated with higher national test scores for students in primary school.

Null Hypothesis: Student happiness at school is not associated with higher national test scores for students in primary school.

Hypothesis 6B: Students' understanding of the strong influence of school on their future is associated with higher national test scores for students in primary school.

Null Hypothesis: Understanding of the strong influence of school on a student's future is not associated with higher national test scores for students in primary school.

Research Question Seven: Is lower student-teacher ratio associated with higher national test scores for students in primary school?

Hypothesis 7A: A low student teacher ratio (less students to one teacher) is associated with higher test scores for students in primary school.

Null Hypothesis: A low student teacher ratio (less students to one teacher) is not associated with higher test scores for students in primary school.

Research Question Eight: Is teachers spending more one-on-one time with students working outside of class associated with higher national test scores for students in primary school?

Hypothesis 8A: Teachers spending more one-on-one time with students working outside of class is associated with higher national test scores for students in primary school.

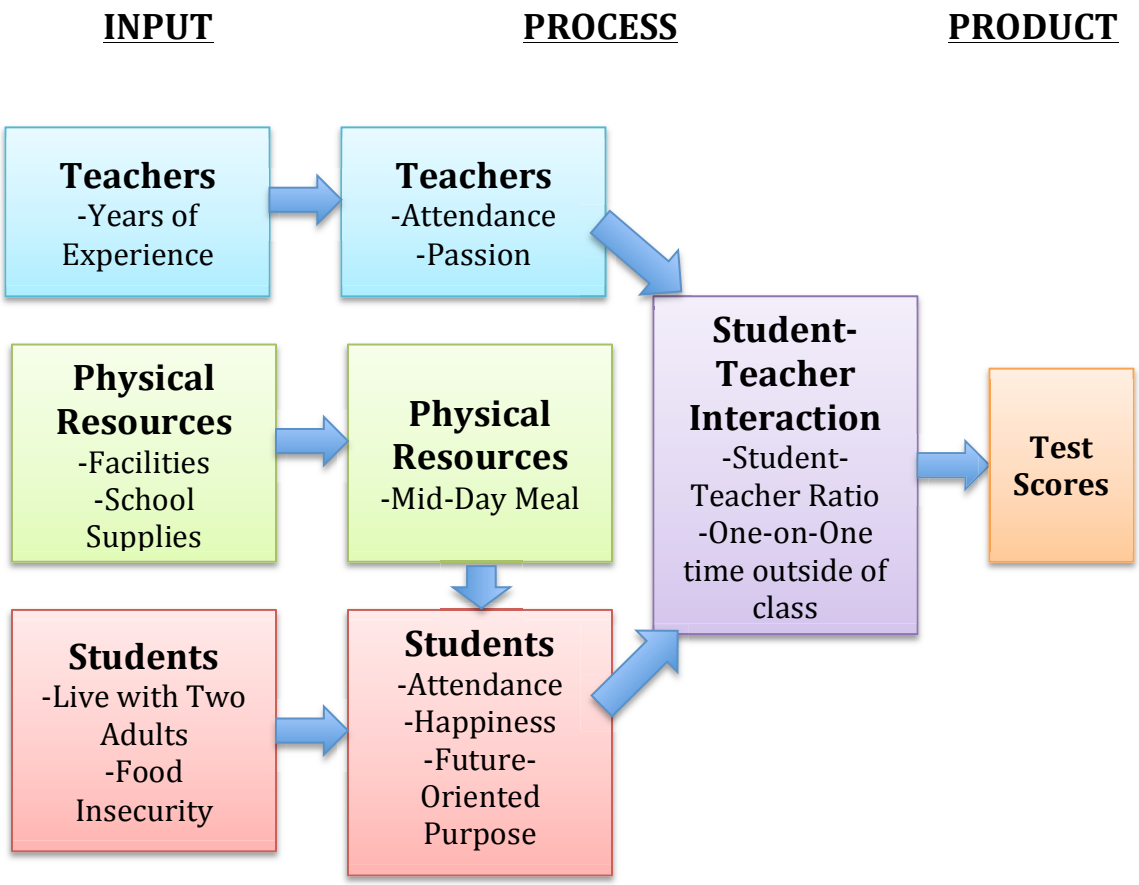
Null Hypothesis: Teachers spending more one-on-one time with students working outside of class is not associated with higher national test scores for students in primary school.

Research Question Nine: Do teacher and student variables outweigh quality facilities and access to school supplies in their influence on national test scores?

Hypothesis 9A: Teacher and student variables outweigh the presence of permanent brick buildings and access to school supplies in their association with higher national test scores for students in primary school.

Null Hypothesis: Teacher and student variables do not outweigh the presence of permanent brick buildings and access to school supplies in their association with higher national test scores for students in primary school.

FIGURE 1: THEORETICAL MODEL



CHAPTER FOUR

Methods

Setting

The Nyakach Plateau is a remote area of western Kenya made up of small villages largely composed of subsistence farmers from the Luo tribe. This area of Kenya has the highest rate of HIV/AIDS, maternal and infant mortality, and child mortality in the country (UNAIDS, 2016). There is a large population of orphans, high food insecurity, and poor health in this area of dire poverty. There are seventeen primary schools in the district, one of which is Bethlehem Home Academy, the main interest of this study. Primary schools in this area have few resources, but Bethlehem Home Academy is particularly poor, with scrap-metal buildings, dirt floors, and wooden benches, compared with the brick buildings with concrete floors and desks in the other schools. Nevertheless, the students of this particular school have ranked first in their district on Form 6 exams since the school opened in 2010. In order to assess variables related to school success, the two highest-scoring schools (BHA and Soko) and the two lowest-scoring schools (Pap Ndege and Kibwon) were compared in this exploratory study.

The local founder and director of Bethlehem Home, Habil Ogola, is a well-known and influential community leader who works closely with the U.S.-based non-profit 501(c)(3) organization, Straw to Bread, founded as a collaborative,

comprehensive development project (including Bethlehem Home Academy) to care for this community's orphans and destitute adults. Since the inception of the ongoing Straw to Bread research program to evaluate these efforts, Mr. Ogola has been an advisor and consultant at every step.

For this study, Mr. Ogola contacted the four schools' administrators and explained that the researcher would like to meet with them to discuss their possible involvement in a study to see what factors are involved in the success of their school. He explained that the purpose of the study was to discover things about the schools of the district that could help them to be more successful. Mr. Ogola explained that the school was chosen for the study because it is representative of the Sigoti Zone schools, knowing that all of the schools have strengths in different areas. In going over the informed consent forms and the surveys, Mr. Ogola ensured that the administrators understood the provisions for the confidentiality and anonymity of the information. He told the administrators that the results would be made available to them and explained that, although all school teachers and administrators speak English, an interpreter would be present when the information was gathered to ensure that participants understood the questions. All four of the school administrators chose to participate in the study and to invite their schools' teachers, students, and parents or guardians to participate.

Sample

The sample was composed of the students in the Form 7 classes (that is, the students who were tested in Form 6 during the previous year), their parents or

guardians, their Form 6 teachers, and the head administrators of the four designated schools on the Nyakach Plateau within the Sigoti Zone. Form 6 is the equivalent of the sixth grade in the U.S. and is the time that national tests are given as the sole determinant of future education potential for students.

All communications with the subjects in obtaining adult informed consent and child assent were done with the aid of a qualified interpreter who repeated all the information (including the entire consent form) in Luo, the first language of people in this community. This was done even if the subjects spoke English in order to ensure that there was complete understanding of the request for participation and the activities involved in the study.

The school administrators asked the teachers who taught Form 6 the previous year if they would like to participate. Students for the study were those who were in Form 7 in 2013 at one of the four designated schools and who were tested as Form 6 students in 2012 at the same school that they were attending at the time of the study. The parents or guardians of these Form 7 students were invited to come to the school to give consent for their children to participate in the study. Participants were told that the information gained from the study would be used to help the administrators and teachers better understand the challenges faced by the students so that more success could be gained. Then the teachers, students, and parents or guardians were asked to participate and sign the consent/assent forms if they agreed.

Research Design

This exploratory comparison used survey methodology that elicited both qualitative and quantitative responses from Form 7 students and their parents or guardians, teachers, and administrators from four schools in the Sigoti Zone of the Nyanza Province of western Kenya. The two highest scoring and the two lowest scoring schools in the Sigoti Zone were identified using publically available national exam scores for Form 6 (equivalent of U.S. sixth grade) students tested in 2012. Since school test scores are public information, no informed consent was necessary to access that information. The respondents were blinded to the outcome of interest.

Data Collection

Data collection took place during May of 2013. At the time of data collection, Mr. Ogola accompanied and introduced the researcher to the administrators of the four schools. Subjects were recruited, and the researcher then administered the survey questions. Participants were given study ID numbers, and no names were associated with any of the data.

All administrators and teachers were expected to be fluent in English and filled out the answers to the questions on their own. Form 7 students were expected to be fluent enough in English to fill out the survey (in English) on their own. Nevertheless, the researcher read each question aloud to the parents or guardians and to the Form 7 class, and the interpreter repeated the question in the Luo language. Time was given for the subjects to write their answers before moving on

to the next question. The interpreter went through each survey after all of them were completed. When a parent or a student answered the questions in Luo, the interpreter listened to the responses, translated them into English, and wrote the English response.

The questions were worded and explained in a way that aimed at eliminating any discomfort that the participants might have felt with respect to their school's level of success.

Measurements

Outcome Variable

The outcome variable for this cross-sectional study is the 2012 composite Form 6 test score for each school in the study as an indicator of school success.

Predictor Variables

As indicated by the theoretical model (see Figure 1), the predictor variables are organized into four categories: physical resources, teacher variables, student variables, and student-teacher interaction variables. The physical resources are: quality facilities, access to school supplies, and a mid-day meal being provided. The teacher variables are years of experience, attendance, and passion. The student variables include living with two adults, food insecurity, attendance, happiness, and having a future-oriented purpose for attending school. Finally, the student-teacher variables are student-teacher ratio and one-on-one time spent working outside of class. The operationalization of these variables is explained below.

The researcher developed all of the questions with the exception of the food security questions (see below). See Appendix A-C for all the individual questions of the survey. Note that not all of the questions were analyzed for the purposes of this study.

Facilities and School Supplies. Measurement of facilities was based on the researcher's observations of the kind of building structure, which were either permanent brick buildings with concrete floors or scrap-metal buildings with dirt floors. The availability of school supplies was assessed by having the administrators answer "yes" or "no" for a list of supplies in Table 4.

Student Questions. The students were asked who lived in their household, and responses were summarized based on whether students lived with two adults or less than two adults. Also, students were asked an open-ended question about what they thought the purpose of school was.

Student happiness in school was assessed based on student answers to the question, "How do you feel when you are at school most days?" Students were given a checklist of choices of emotions that being at school might elicit in them, including "happy", "bored", "mad", "having fun", "confused", "sad", and "stressed". Students then marked one or more of the emotions that that they feel when they are at school on most days. (See Appendix A.)

Parent or Guardian Questions. Parents or guardians were asked questions about the food insecurity of their household (see below for details).

Administrator Questions. Administrators were asked about student-teacher ratio, teacher and student absences, availability of school supplies, and whether the school provided a mid-day meal for the students (see Appendix B). Administrators checked school records to determine the number of absences of the Form 7 teacher and the average number of absences of the Form 7 students.

Teacher Questions. Teachers were asked open-ended questions about how much time they spend one-on-one with students outside of school, what they like about teaching, their motivation for being a teacher, what they thought was the most important job of a teacher, and about the food insecurity of their students. (see Appendix C).

Food Insecurity. Food insecurity was measured using the instrument developed by the Community Childhood Hunger Identification Project (Wehler, 1995) and was included in the questions for teachers and for parents or guardians (see Appendix D). Teachers answered the questions in reference to the average household of the participating students in their class. Parents or guardians answered these questions for their individual student's household.

Food insecurity was analyzed based on the number of times parents or guardians and teachers said yes to one of the sixteen questions on the CCIP Food

Security Survey. The teachers were chosen to answer food security questions because they know their students well, and the parents were chosen because of the direct knowledge that they could contribute. There are eight questions, such as "Do you ever skip meals because there is not enough food in the house?" and "Does your household ever run out of money to buy food?" The respondent was asked to answer the question for the last week and again for the last month to measure current short-term and longer-term insecurity, respectively.

Readers might be concerned about the participants' discomfort when asked questions about food insecurity that indicate extreme poverty (such as, "Do your children go to bed hungry at night?"). It is useful to understand that the geographical context of this study is the poorest region of Kenya. The Bethlehem Home organization was started in response to the starvation and death of children and older adults who had no one to care for them, so the acknowledgment of food insecurity and hunger by a study participant was labeling something that is at the forefront of this region's daily struggles for survival. Nevertheless, the community is also aware that, in partnership with the U.S. non-profit Straw to Bread, food has been provided for almost ten years for the very poorest people in this region, and these efforts continue to expand every year. The partnership of the two organizations is known in the region for its efforts in sustainable agriculture, among other things. Every year, workers from both groups provide milk goats and chickens to some of the poorest households and plant gardens and fruit trees all over the Plateau. They have also installed large water tanks at more than fifty homes and brought in water filters as well to enable residents of the Plateau to have

clean, dependable drinking water. Since the data collection for this study, a permanent water well has been dug providing a new source of health and sustainability. Therefore, the ubiquitous nature of food insecurity, combined with the knowledge that there are ongoing, practical efforts to bring sustainable agriculture to the area, mitigated any discomfort that participants might have felt from describing their household situation.

Data Analysis

With a larger number of schools and more students, it would have been possible to use inferential statistics to analyze the data. However, with only four schools and a maximum of 10 students in each class, the sample size justifies using only descriptive statistics. For that reason, this study is framed as an exploratory comparison that could be expanded in the future.

Content Analysis

Content analysis was done for the questions related to teacher's passion level, student's happiness, and student's future-oriented perspective on the purpose of school. See the Results chapter for details of this analysis.

Summary Statistics and Ranking

From recorded responses with categorical answers and from qualitative answers summarized by content analysis into categories, frequencies for each variable (and percentages for interval-level variables) were calculated. The four

schools were rank-ordered from one (best) to four (worst) on all of the variables using a Microsoft Excel spreadsheet.

IRB Approval

This study was approved by the Baylor University International Review Board before data collection began. Informed consent was obtained from adults for themselves and for their children before a subject provided data for the study. In addition, children signed an Assent Form.

CHAPTER FIVE

Results

This study compared four schools in the Sigoti Zone in Kenya: Bethlehem Home Academy (BHA), Soko Primary, Pap Ndege, and Kibwon. The two schools with the highest scores and the two schools with the lowest scores on national exams for Form 6 taken in October 2012 were chosen for the study.

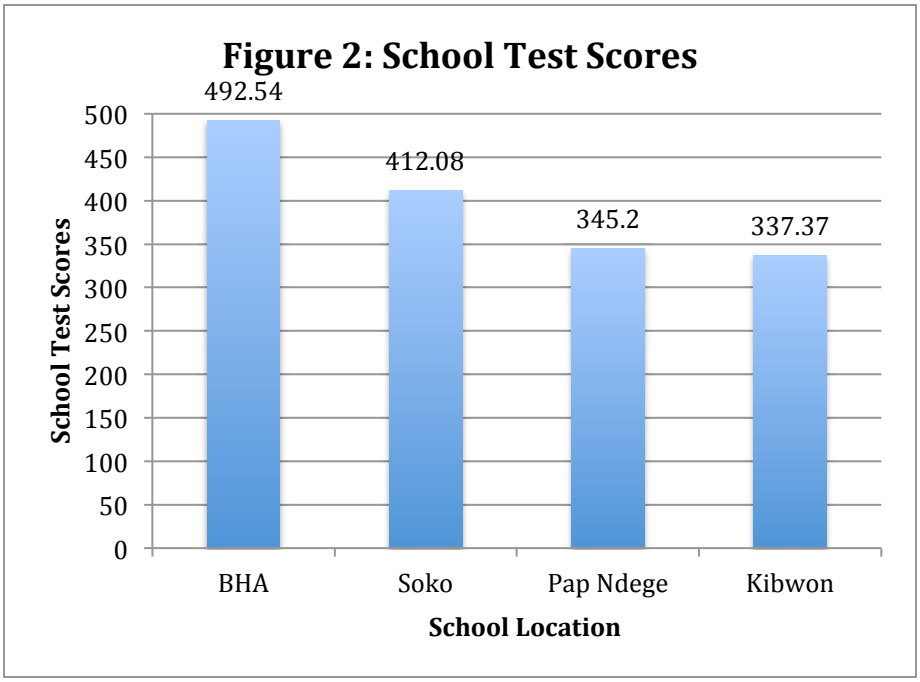
Sample

Students from Class Seven were chosen from each school along with their parent or guardian, teacher, and the head administrator of the school. At BHA there were six students in class seven, and five were included. Soko and Pap Ndege each had ten students, and all ten were included from both schools. At Kibwon there were also ten students, and six were included. The reason that some students were left out of the study was the inability to contact the parent or guardian to get consent. This has the potential to confound data, because there is no information on 40% of the class from Kibwon. BHA included four males and one female, Soko included three males and seven females, Pap Ndege included four males and six females, and Kibwon included one male and five females. BHA is the only school with a Form 6 class that has more males than females. Extrapolation shows that even if the missing students at Kibwon were all male and the missing student at BHA was female, the male to female ratio at BHA would still be double that of Kibwon and stronger than

any other school. These schools are all within 10 miles of one another in a rural part of western Kenya.

Outcome Variable: School Success on Form 6 National Exams

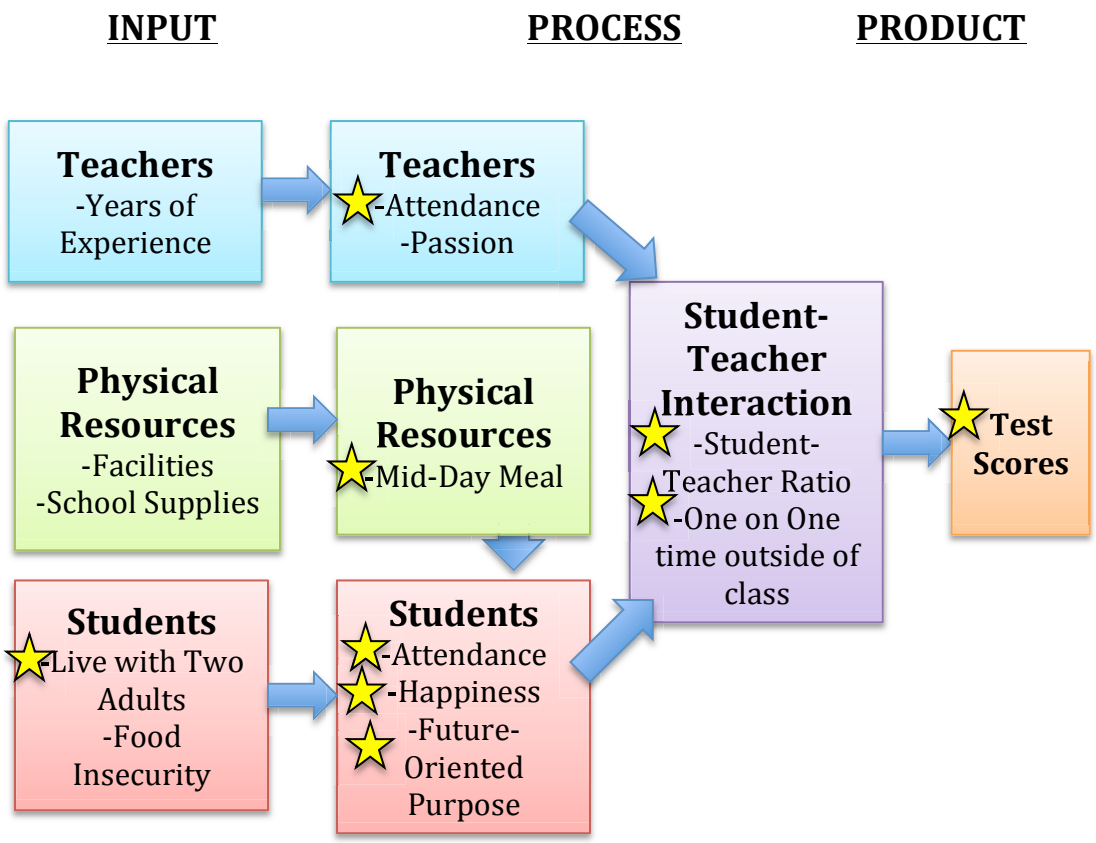
The outcome variable that determined school ranking for comparisons was scores on the national examination taken at the end of each calendar year, which is the Kenyan school year. On this exam there are 5 subjects scored at 100 points each, giving a ceiling score of 500. The five subjects are English, mathematics, Kiswahili, science, and social studies. The test questions are kept confidential until the time of the test. This test is a ranking tool for schools, but it also determines if the primary school students are invited to attend secondary school and even determines the quality of the school they are allowed to attend. Figure 2 shows the scores of each of the schools' Class 6 students from 2012. Scores ranged from 337.37 to 492.54, with a mean score of 396.80 and a standard deviation of 72.097. Not only was BHA's score almost perfect (492 out of possible 500), but it was 19.5% higher than the next highest school's score (Soko) and 46% higher than the lowest school's scores (Kibwon). It is notable that the difference between the top one and two schools (BHA and Soko) is greater than that of the number two and number seventeen school (Soko and Kibwon).



Summary of Findings

Figure 3 shows the theoretical model and identifies, with a star beside them, the areas in which the top school, BHA, was ranked number one. BHA was ranked number one in number of students living with two adults, teacher and student attendance, student-teacher ratio, one-on-one time outside of class, student happiness at school, and students' future-oriented perspective about the purpose of education. BHA was the only one of the four schools that served a mid-day meal to its students.

FIGURE 3: THEORETICAL MODEL



Hypotheses

Physical Resources—Facilities and Available Supplies

Hypothesis 1A: Permanent brick buildings and access to school supplies are associated with higher national test scores for students in primary school.

This hypothesis was not supported. As noted above, all schools except BHA had between five and eight brick buildings where classes were held. At the time of the study, BHA had three scrap-metal buildings with dirt floors (three brick

classrooms have been constructed since the time of the study). The highest-achieving school had the worst facilities. Poverty is a so much a part of daily life in the region of these schools that school supplies are limited at all four schools. The only supplies that all of the schools had were pens, blackboards, chalk, and glue (see Table 2). Only three schools had desks for all of the students. BHA was the only school without pencils, erasers, and paper. The advantage of BHA students having access to pencils, markers, and crayons is meaningless without having paper on which to write. Soko was also missing fundamental things, such as reading books and desks. Table 2 indicates that having supplies and better facilities is not necessary for success. The two schools with the most supplies were the two lowest-achieving schools, and the top two schools were missing fundamental supplies such as paper and desks.

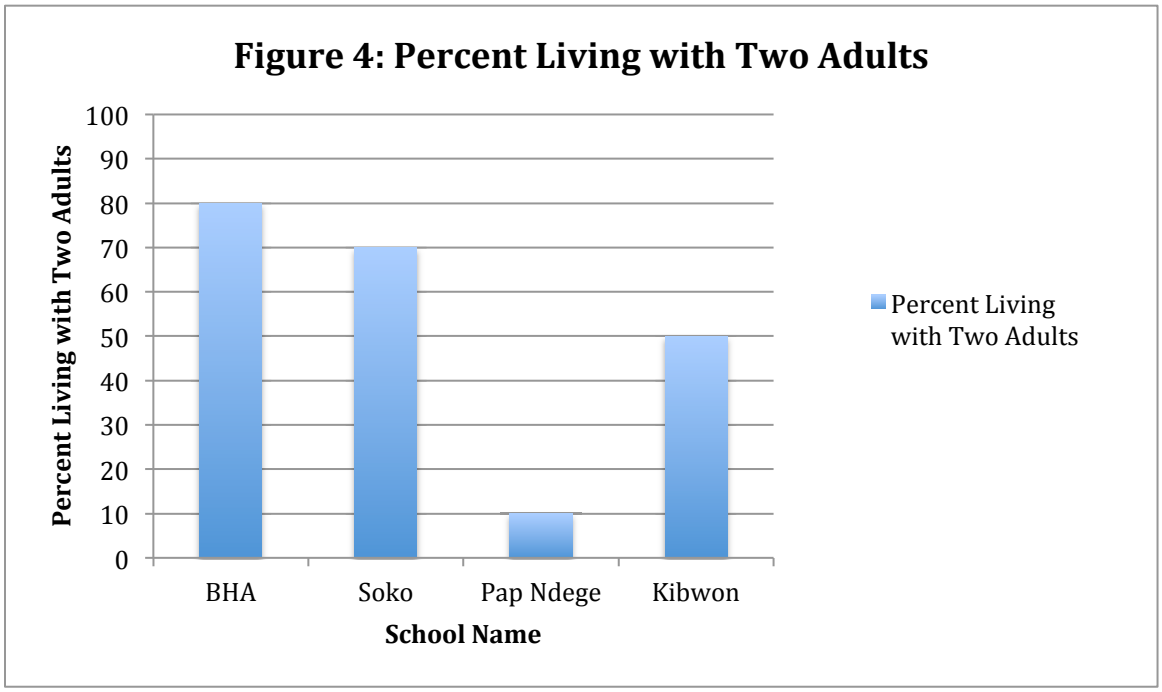
Table 2: Supplies Available At Each School				
Supplies Available	BHA	Soko	Pap Ndege	Kibwon
Pens	✔	✔	✔	✔
Blackboard and Chalk	✔	✔	✔	✔
Glue	✔	✔	✔	✔
Pencils		✔	✔	✔
Erasers		✔	✔	✔
Reading Books	✔		✔	✔
Paper		✔	✔	✔
Textbooks for Teachers	✔		✔	✔
Desks	✔		✔	✔
Markers/Crayons	✔		✔	
Scissors			✔	
Calculator				
Textbooks for Students				

Living with Two Adults

Hypothesis 2A: Living with two adults is associated with higher national test scores for students in primary school.

This hypothesis was supported. Figure 4 shows that the top school has the most students who live with two adults. It is important to remember the sample size for the Kibwon. There were ten students in the class but only six were interviewed

because of inability to contact parents for consent. Of the six children who were interviewed, half of them lived with two adults. Even if all of the other children in that class lived with two adults, the percentage of Kibwon students would still be lower than BHA. If none of the missing children lived with two adults, then the Kibwon percentage would drop to thirty percent.



Teacher's Passion for Teaching

Hypothesis 3A: Having a more passionate teacher is associated with higher national test scores for students in primary schools.

This hypothesis was only partially supported.

Content analysis of questions 2, 4, and 6 from the survey were used to determine the teacher's level of passion:

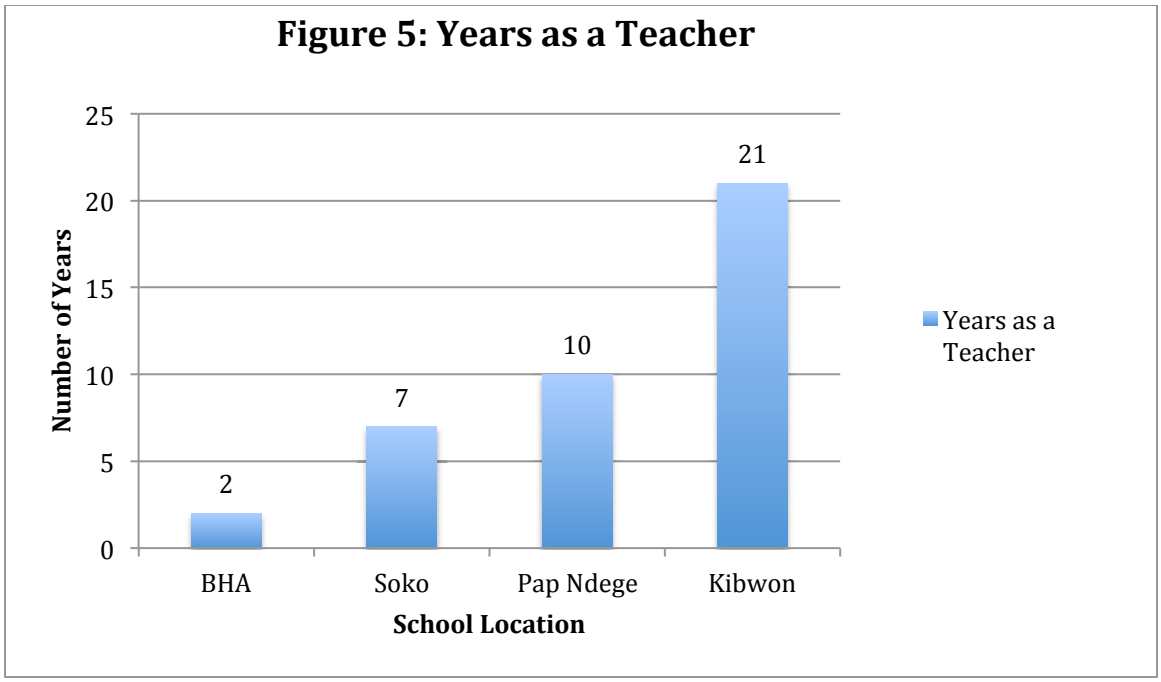
- *What made you want to become a teacher?*
- *What do you enjoy most about teaching?*
- *What do you think is the most important job of a teacher?*

The four teachers were ranked on this variable from highest to lowest based on depth of answers, indication of a future focus, and growth of students as the teacher's motivation. The answers were ranked first by the researcher and then by two other education professionals who were not aware of which school the teacher represented.

Table 3 gives the answers to three questions. The independent ranking of these responses by the three blinded education professionals is shown in Table 4. The clearest finding was that Soko was ranked lowest by all of the professionals. The other three ranking totals were within one point of each other for each school, making a meaningful distinction very unlikely. It is notable from Figure 5 that, in every case, the longer the teacher had been teaching, the worse the school's average test score. There is a stepwise increase from the best schools to the worst in years the teacher has been in the field.

Table 3: Teacher answers to questions concerning passion for their job			
School Name	#2 What made you want to become a teacher	#4 What do you enjoy most about teaching?	#6 What do you think is the most important job of a teacher?
BHA	I discovered true potential in me that drove to discovering new skills that I saw were better to impart to learners	Interacting with learners and discovering new skills and ideas	Imparting new skills and knowledge to the learners
Soko	My Ability to pass knowledge and skills to children	Interacting with pupils, sharing ideas and life experiences	To be a role model and the center of authority
Pap Ndege	I liked interacting with the children and wanted to have an opportunity to meet them all the time, and also for good job opportunity	I enjoy interacting with pupils and building them up socially, mentally, spiritually, and academically	To impart desired knowledge, skills, and attitudes to the learners
Kibwon	Teaching is more fulfilling because you see your students from a humble beginning, achieve in life. You are also able to change the society through teaching	Teaching becomes more enjoyable when my pupils achieve good results and succeed in life	Guiding learners in academic work and making wise/good choices in their lives for self-discipline

Table 4: Ranking of Questions Concerning Passion					
School	#2 Rank	#4 Rank	#6 Rank	Total	Final Rank
BHA	2	2	2	6	3
Soko	3	3	3	9	4
Pap Ndege	2	1	2	5	2
Kibwon	1	2	1	4	1



Food Insecurity

Hypothesis 4A: Consistently receiving a mid-day meal provided at school is associated with higher national test scores for students in primary school.

This hypothesis was supported. No other school besides BHA, the highest-achieving school, offered food to the students during the day.

Food insecurity is a common problem in this region of Kenya for nearly everyone. Table 5 below shows just how severe the problem of food insecurity is in these schools. The parents and teachers answered questions about long-term (during the last month) and short-term (during the last week) food insecurity that indicated how often they are without food in their home. Two scores were calculated by adding up the number of "yes" responses for each time period. The two totals were then added for an overall food insecurity score. The percentage of food insecurity refers to the number of "yes" responses out of the total number of

sixteen questions asked. Results show that the level of food insecurity at all of these schools approaches the highest possible level, ranging from 92.5% to 100%, referring to the last week and the last month before the questions were answered. This astounding description of abject poverty is reinforced by the agreement of parent/guardian and teacher responses, which suggest that students from all of these schools live with the highest possible level of food insecurity. The responses show that the lower percentages of food insecurity were, in fact, in the top two schools. If the difference between 92.5% and 100% is a meaningful difference, then the trend is as expected. However, this difference represents an average of less than one question (out of sixteen) per parent answered "no". The much more striking message of these results is the overwhelming food insecurity, hunger, and malnutrition that all children in this area experience. With this level of need, a mid-day meal provided at school would be notable for children at all of the schools.

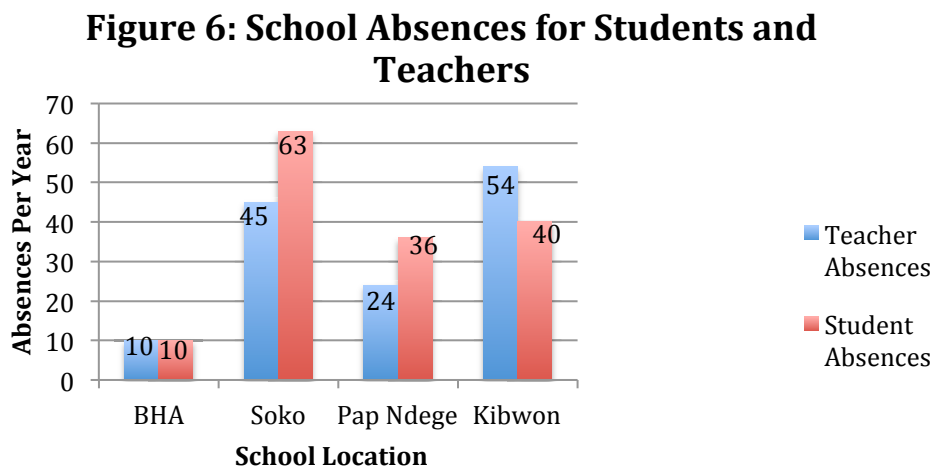
Table 5: Food Insecurity				
Name of School	BHA	Soko	Pap Ndege	Kibwon
Number of parents	5	10	10	6
Long Term number of Positive Responses	39/40	74/80	64/64	48/48
Percent Insecure	97.5%	92.5%	100%	100%
Short Term number of Positive Responses	39/40	77/80	64/64	48/48
Percent Insecure	97.5%	96.3%	100%	100%
Teacher Response	100%	100%	100%	100%

Absences

Hypothesis 3B: Consistent teacher attendance is associated with higher national test scores for students in primary school.

Hypothesis 5A: Consistent school attendance is associated with higher national test scores for students in primary schools.

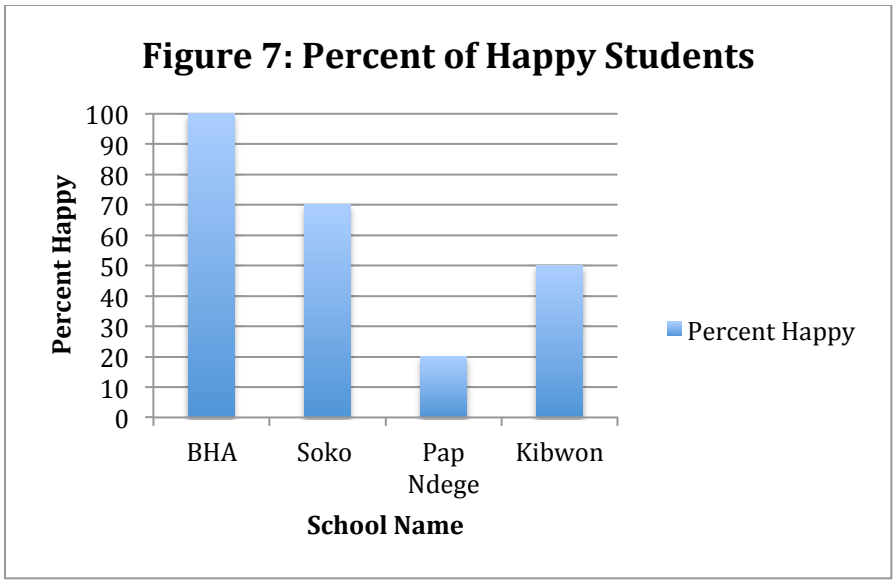
These hypotheses were supported. The average absences per student and per teacher on an annual basis are shown below in Figure 6. The two schools with the lowest annual absences were BHA and Pap Ndege. The highest annual teacher absences were at Kibwon, which was more than 5 times higher than BHA. The highest student absences were at Soko, and that number was over six times higher than BHA. The marked difference between schools can be summarized in this way: the average number of student and teacher absences at each of the three lower-achieving schools was more than double the average number of absences at BHA.



Happy Students

Hypothesis 6A: Student happiness at school is associated with higher national test scores for students in primary school.

This hypothesis was supported. Figure 7 makes a powerful statement about the happiness of students at each of the schools as measured by the interview question. It is vital to notice that there is a huge range in the responses to this question. BHA has 100% of responses indicating happy students, while Pap Ndege has only 20%. There is a 30% drop in percent of happy students between the number one and number two schools, BHA and Soko, where responses indicating happiness drop from 100% to 70%. In the same way, the drop between Soko and Pap Ndege was also large, going from 70% to just 20%. Pap Ndege had the lowest happiness at 20%. Again, a sensitivity analysis of Kibwon responses would indicate that, if all of the absent students had a positive response, this would bring their percentage only up to 70%, far short of the 100% at BHA. If all of those children had had negative responses to the happiness questions, the Kibwon percentage would be 30%, in line with the other low-achieving school, Pap Ndege. If the BHA missing student had had a negative response, the percentage of positive responses would still be 86%, considerably higher than the next highest school.



Students' Understanding of Purpose

Hypothesis 6B: Students' understanding of the strong influence of school on a their future is associated with higher national test scores for students in primary school.

This hypothesis was supported. The below Table 6 shows the exact responses of the students that were interviewed at each of the schools when answering the question "What do you think the purpose of school is?" It is notable that 100% of the answers from students at BHA are future-oriented and discuss how school will prepare them to be successful later in life. The answers from students in the other schools are simpler, stating that the purpose was to learn or to be educated. At Soko and Pap Ndege only 10% of the answers were future-oriented. At Kibwon, one out of the six students answered with a future-oriented response.

Regarding the question, "What do you think the purpose of school is?", if students wrote something that referred to school preparing them for the future,

then they were considered by the researcher to have a future-oriented view of the purpose of school. If their answers were simpler and more present-oriented, then they were not considered to be future-oriented.

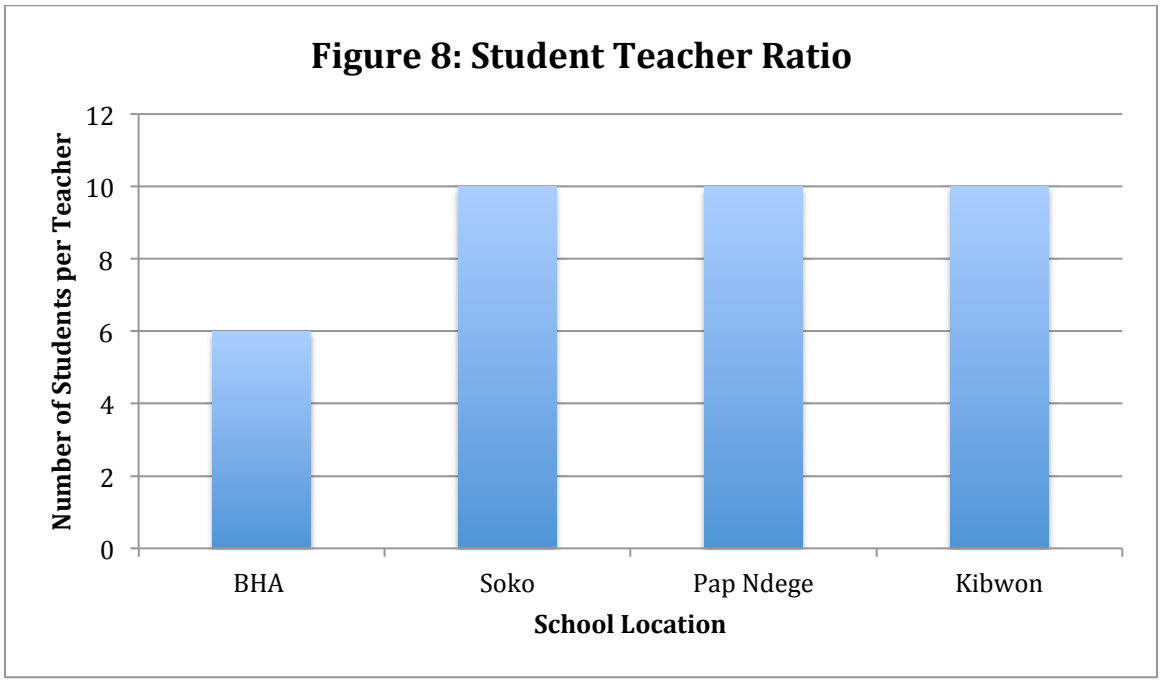
Table 6: Student answers to the question, "What do you think the purpose of school is?"

BHA	Soko	Pap Ndege	Kibwon
For better future life	It is a place where we can learn to get high marks	To learn	To prepare my future
That after learning I shall have prepared my future	I come to school to learn	To learn	To make us learn
To achieve my goals	Is good	To learn	To learn
To help me in some years when I am big	Good	To learn	To learn
To have a well life	To look for my gold	To learn	To learn and be educated
	To learn	So that I will be better for my future	To learn
	To learn	To learn	
	Is good	To learn	
	Help us to avoid strange things that may affect our life	To learn	
	Your good with the life	To get knowledge	

Student-Teacher Ratio

Hypothesis 7A: A low student-teacher ratio (less students to one teacher) is associated with higher test scores for students in primary schools.

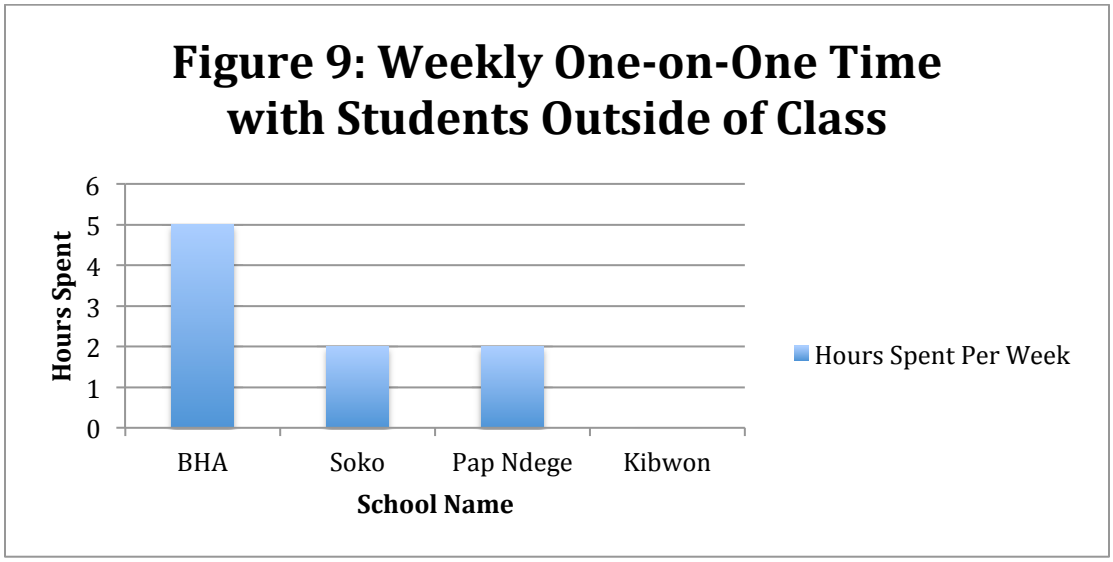
This hypothesis was supported. Figure 8 shows a striking difference between the student-teacher ratios of BHA and the rest of the schools. BHA is 40% lower than the other schools, all of which have the less desirable 10:1 student-teacher ratio.



One-on-One Time with Students

Hypothesis 8A: Teachers spending more one-on-one time with students working outside of class is associated with higher national test scores for students in primary school.

This hypothesis was supported. There is a remarkable difference in the time spent between the top school, BHA, and the rest of the schools. Figure 9 shows that BHA spends more than double the amount of time on a weekly basis than Soko and Pap Ndege spend with students. At the lowest school, Kibwon, the teacher noted that there was just not enough time to spend one-on-one time with students, so they very rarely did.



Teacher and Student Variables vs. Physical Resources

Hypothesis 9A: Teacher and student variables outweigh the presence of permanent brick buildings and access to school supplies in their association with higher national test scores for students in primary school.

This hypothesis was supported. As seen above in Figure 3, all of the student-teacher variables were present at the top school and only one of the physical resources was present at the top school. The most common variables in which the top school ranked number one were the student-teacher interactions and the

individual student and teacher variables. Given that the physical resources were best at the worst schools, it is clear that teacher and student variables outweigh the presence of physical resources in their association with high test scores in these schools. Additionally, hypothesis one concerning quality buildings and access to school supplies was not supported in having an association with high national test scores.

CHAPTER SIX

Discussion

Against all odds, Bethlehem Home Academy on the Nyakach plateau in western Kenya is a successful school, not only in comparison with three other schools in its district, but compared to all primary schools in Kenya. Despite the lack of even the most basic physical resources, a poor school made it to the top.

When the analysis began, it was known that BHA had very poor facilities, that it was attended solely by orphans, and that there were minimal supplies available. However, it was unknown how these factors compared to other area schools or how well BHA students were achieving on a national level. When the school that ranked second in the district had examination scores that were twenty percent lower than BHA, and the lowest-achieving school was almost fifty percent lower, it is hard to discount the BHA average score or the factors associated with it as being due to random error. The discovery that the students at BHA scored on average 492 out of a possible 500 on their national exams was a stunning indication of success. Further confirmation comes from the fact that the BHA Form 6 classes since this study was completed have continued to rank first in the district.

The fact that students performed so well in facilities that are considerably worse than the other schools made the outstanding performance even more inspiring. The lowest-achieving school had the best facilities and the most supplies,

and the highest-achieving school had the worst buildings and very few basic school supplies. According to the study's theoretical model based on the IPAR framework, this finding points to process variables as the exclusive predictors of success for these children. In fact, the lack of tangible resources serves to emphasize even more the crucial role of the other factors. What might those children achieve if they had textbooks, paper, and more than a leaky, scrap-metal building with dirt floors that turn to mud in the rainy season?

The dedicated administration at BHA mitigated the deficit of facilities and supplies by meeting the students' most basic need of having food. This practice is something unique to BHA in this district, and the effects of providing a mid-day meal cannot be underestimated. Given the backdrop of this maximum level of food insecurity in the general area, the provision of a mid-day meal may be the single most important factor in the success of the BHA students compared to their peers in other schools. Maslow's hierarchy of needs (Huitt, 2007) frames the need for food as foundational for everything else. Food is essential for students to have the opportunity to succeed.

The data from this study cannot answer the question of whether the students would have succeeded equally well if food were the only advantage that they had, because there were a number of other positive factors that put BHA above the rest. Seven out of the nine factors addressed in the study's research questions were highest at the number one school. Additionally, the majority of the variables mirror the rank order that the schools' test scores have, supporting even more the belief that BHA is indeed special for reasons that were identified. BHA had the highest

number of students who lived with two adults, the most time spent by students with teachers one-on-one outside of class, and the least absences from school by both teachers and students.

BHA is a school specifically for orphans. The high proportion of their students who are living with two adults is due to consistent efforts by the local community leaders to arrange for these children to live in homes where two adults care for them. The findings suggest that two adults who are not biologic parents can provide the necessary support that children require to be successful. The association of this home situation with student success stimulates more questions about the social structure of these homes. How stable are these arrangements? Do the children have to move often? What is the family structure of these new homes? Are the adults married couples or two women? Are they from the extended family of the orphan, such as grandparents or older siblings? It would be useful to know more about the Luo kinship system in order to learn about the meaning, stability, and intensity of these relationships and how extended family and other caregivers play a part when a parent passes.

Test scores concretely measured student success in this study, but the students' happiness in school and their future-oriented understanding of its purpose, originally considered predictors, can also be construed as measures of success. When students with an unimaginable home life have joy and hope that comes from school, the school has been a success. There is much to be said about a school that has one hundred percent of the students asked report only positive emotions concerning school, especially considering the life experience of losing both

parents and living in poverty. When a school can instill hope for the future and joy in a child like this, it is worthy of noting the factor as both a predictor and also an outcome measure of success. Relative to the other schools, the results are astoundingly clear in this matter. The top two schools had at least twenty percent higher happiness than the lowest two schools, and BHA was at least thirty percent higher than any other school.

The passion and commitment of a teacher for her work was measured in this study through several questions answered in writing. BHA's teacher was ranked in the middle between the lowest and highest schools, though the answers from all but the lowest-achieving school's teacher were very similar. The teacher at BHA was quite new to the field and young, while the others had more experience and were older. This could help explain the fact that the BHA teacher's responses were not as full of depth as those of some of the others. However, there were indeed thoughtful responses from the BHA teacher, who said that she discovered true potential in herself that drove her to discover new skills that she saw were more valuable when imparted to learners. The actual behavior of this teacher as evidenced in her far superior attendance and amount of one-on-one time with students points to the fact that BHA has a highly invested teacher who is passionate about her job. In a future study it would be more effective to complete an in-depth structured interview with the teachers to gain richer information and to eliminate possible sources of error intrinsic to questionnaire methodology.

Figure 5 displays the years each teacher has been in the field: the longer a teacher has been working, the worse the school scores are. This stepwise increase in

experience in the face of progressively lower examination scores could be interpreted as increased teacher burnout and may be a notable negative factor that hinders student success. This finding might also imply that quality teachers gradually leave this poor area for more attractive jobs if they have the opportunity. Perhaps after twenty years, only the less capable teachers are left.

Another important factor to consider about the number of years spent in the field is the one-on-one time that the teachers spent with the students in the study. At BHA it was this teacher's first year of teaching, yet she spent at least three more hours than any other teacher on a weekly basis. The newness to the profession could play a part in this number. It is also possible that this teacher had less home responsibilities or food insecurity. It is also important to consider the community that the teacher joined when she became a teacher at BHA. The culture at BHA may be a more supportive place to work, and this factor could influence the amount of time that was spent with students outside of class.

The student-teacher ratio was small at each school, with no more than ten students per teacher, which is wonderful. However, the teacher at BHA had even less students to be responsible for. There were only six students at BHA, five of whom were in the study. Fewer students make the job of meeting their needs easier. This may be another reason that the BHA teacher could spend more one-on-one time with students outside of school. More individual attention both during and after school may be a major reason for higher test scores.

Student food security was analyzed, but the teacher's hunger level and socioeconomic status were not addressed. If teachers are experiencing high levels of

food insecurity themselves, they too cannot perform their job to the best of their ability. Furthermore, if teachers are women who are married and have children of their own versus men with different work responsibilities, then the quality of teaching could certainly be compromised. Whether the teacher is a man or a woman might also be important in influencing the achievement of the students, though it is unclear in which direction this factor might play a role.

A reflection of this teacher's investment is lack of absences, but that consistency may be difficult to sustain over a number of years. The teachers at other schools had all been working much longer and all had two to five times as many absences that year. The worst school, Kibwon, had the highest teacher absences, and in that school, the teacher was absent even more than the students. Students are not shown that their teacher has dedication and investment in their future if they are present more than their leader.

These positive indicators regarding the BHA teacher—better attendance and more one-on-one time spent with students in the context of a very small class—make even more sense when it is noted that that teacher is working with markedly happier students who have a qualitatively different perception of the importance of school for their future. These factors are bound to be synergistic for teacher and student. The rewards for both only increase over time and, not surprisingly, lead to superior performance on national exams.

The students who attend Bethlehem Home Academy, do not have textbooks or paper, but they do have dedicated teachers who not only show up to school more than the other schools in the area, but who spend an average of five hours a week

with students outside of class time helping them to succeed. The students do not have parents, but they do have at least two invested adults at home who have chosen to sacrifice in order to care for them and contribute to their future. They do not have beautiful brick buildings, but they have an administration that provides a mid-day meal at school every day to meet their physical needs. BHA students are shown a consistency that is rare in the lives of many children in this area, especially those who have lost their parents. Consistency shows these students that they are not alone, and it provides them with hope in a world that has abandoned them.

Limitations of the Study

There are four major threats to sound inference that are applicable to this study: random error; systematic error; construct validity; and generalizability to other persons, settings, and times.

Random Error

The small sample size of this study is its largest limitation. Comparing more schools across a wider geographical area would have strengthened the conclusions for generalizability. Although the sample size was small, the fact that virtually all of the results were so strong and in the predicted direction lends credibility to the findings. In particular, a larger sample of schools might shed more light on the weight of the influence of a mid-day meal through frequency and variety of variables. It is clear that the mid-day meal is important but data does not determine

the importance of this factor in comparison with others that led to the success of BHA.

Missing data have a bigger effect in a small sample than in a larger sample, so this limitation is taken seriously as a possible source of random error. A sensitivity analysis was done to account for missing data by making assumptions that created different scenarios on both extremes of each variable. Even if we extrapolate to the "worst case" that is most unfavorable in support of the hypotheses, the trends are the same, and, in some cases, the results would be even stronger, as shown in the results.

Systematic Error

One unmeasured factor that may be influencing the results is the health status of the students, including their HIV status and frequency of common acute and chronic problems like malaria and worms. These diseases are known to cause anemia and malnutrition, and the chronic nature and/or repeated occurrence (in the case of acute diseases like malaria) can have devastating long-term effects on cognitive development and school performance. Student health has the potential to influence results if it is highly variable between schools. If students at the low-achieving schools have a preponderance of illness, that difference may be an important explanation of why they are doing poorly. On the other hand, if the high-achieving schools have students with more illness, then it would add even greater significance to the factors associated with success that would be outweighing the negative impact of illness.

BHA had a higher percentage of males in the sample than any other school. With a larger sample, it could be important to investigate gender as a factor influencing success, because traditional cultures put more pressure on boys and have higher expectations of them than they do of girls in school. The gender of students in each class who did not participate in the study (because parents or guardians did not come to school to give consent) is unknown. Even assuming that all missing students were females at BHA and were males at Kibwon were males, BHA was still the only school that had more males than females. In a traditional society, males are encouraged more and held to higher expectations than girls are, and this can create a self-fulfilling prophecy. Further research could examine this difference to see if it is meaningful in this school by studying subsequent BHA classes with more females in them.

Construct Validity

Measurement of the variables of interest ranged from the objective and unequivocal national test scores to the self-report of happiness by the students and motivation by the teachers. Teacher passion was measured in a way that could have been biased towards someone who had been in the field for a long time and was better able to articulate the depth that was assessed in these answers. This cluster of ideas would have been better measured if there were multiple modes through which the measure was taken, using, for example, an in-depth interview with a variety of questions to get a deeper look into the attitudes, beliefs, and values of the

teachers. Administrators or other teachers could also be asked for their inferences about a teacher's motivation.

The same concern could be raised about the student variables of happiness and perception of school's purpose. While these questions had face validity, further questions would have added richness to the assessment. A behavioral assessment could be included in future research, measuring students' facial expressions, use of positive adjectives in their language, and positive interactions with their peers and teachers.

Key variables were recorded such as national exam scores, student-teacher ratio, absences, provision of a mid-day meal, and food, while others were observed directly or were fairly objective and easily observed by those who reported them such as school facilities. A subject's report of absences, one-on-one teacher time, living with two adults, or amount of school supplies might be inaccurate, but it is unlikely that there is a large systematic bias in these variables. The administrators, teachers, students, and parents were all blinded as to the outcome of interest, i.e. national test scores. It is doubtful, therefore, that reports of absences, one-on-one time, and school supplies would be altered in any way. The self-reported format of data collection does not invalidate the comparisons between schools, because all schools reported data in the same way using an identical form. The administrator verified absences and student-teacher ratio in school records.

Generalizability to other Persons, Settings, and Times

Generalizability is limited, given that this comparison includes only a small number of Luo children from four primary schools who have nearly 100% food insecurity in rural Kenya. This setting also adds factors that would not be as applicable or prevalent in other places, such as a high number of orphans. However, these findings are instructive as an exploratory study of some of the major factors, including the effect of supplies and facilities on the success of schools. If quality facilities do not contribute to success in this poor place in Kenya, it is doubtful that they would contribute in other settings that have more access to supplies.

Furthermore, one goal of this study was to understand this particular community, and, in that regard, these data are not a sample, but are the whole focus of interest. The comparison of schools in this district gives a comprehensive view of what primary education is like on the Nyakach Plateau. Concerning this goal, the findings are stunningly clear.

Future Research

There are a myriad of factors that contribute to the success of BHA, and it cannot yet be said which factors are the most important because they all work together. Future research may be able to compare more schools with the factors distributed in another way to determine the weight of each factor. For example, looking at more schools that offer meals but might not have dedicated teachers, or comparing schools that have a mix of orphans and non-orphans would also be helpful.

Future research could seek further information about test scores as they compare to other parts of the country in order to compare percentiles of schools on a national level for test scores. Comparing schools to one another gives complete information about a community but comparing the community on a national level would increase the strength of the data.

Conclusion

The factors associated with success in this study can best be understood as a product of an unusually caring and dedicated community. The findings indicate that continued outside support for this school should focus on people even more than on buildings and supplies. As attractive as it is to raise funds for bricks and mortar, the investment in tangible and intangible support of the teachers and students themselves is most important, because they make the biggest difference.

A beautiful picture was painted in a small community in rural western Kenya when it was decided that the education of their orphans held its place on the top of their priority list. In this picture is a school that was built when the only materials available were some scrap-metal and a lot of dedication. The founders of this school knew that it would not have the supplies that the other area schools did, but they also knew that they would each put their all into helping the students who attended.

When children are given hope and a community of people who believe in them, they believe in themselves as well. They are not passive recipients in the process of their education or in the success of their school. The consistent teachers, invested administration, food provision, and presence of two adults in their homes

gives them hope that fosters internal motivation for success. In turn, students attend school regularly, work their hardest, and understand that they are investing in their future along with everyone around them.

Bethlehem Home Academy is a school developed by a community to serve its neediest students. Community leaders hand-picked every staff member of that school to become a part of the goal of providing the students with hope for their future. When the teachers and administration became a part of the school, they became a part of the community and then in turn became invested in the goals of the community as well. This school succeeds because all members are dedicated to the process. Their achievement includes factors that are almost all related to internal motivation, such as attendance, happiness, future-oriented purpose, and one-on-one time spent with students outside of the classroom. The only factor related to external motivation in the process is the provision of a mid-day meal, and this gift to support its students is clearly more important than buildings or supplies, the other external motivation factors that were measured. A nice setting, books, and paper were not important because, when internal motivation is present, these external factors become much less of a need. The large presence of process factors related to internal motivation is telling of what truly works. When everyone involved is internally motivated, success is possible for anyone, even a poor orphan in rural western Kenya.

The factors involved at BHA are reinforcing of each other. The positive environment at the school attracts dedicated and consistent teachers. These teachers become a part of the hope and mission of the school. When they are a part

of this, they become invested and spend their time and energy in one-on-one time with students and consistently attend. The administration contributes to this positive cycle by providing leadership and the mid-day meal for students. When the students feel supported academically and physically in these ways, they consistently attend and try their best at school. They are happy and understand that they are there to improve their future, and that kind of student is easy and fun to teach. Thus, the cycle begins again. The teachers are motivated by the dedication of the students, and the students are motivated by the dedication of the school staff. To replicate the positive outcomes of BHA is desirable, but they are largely dependent on the depth and character of the local community. To support the students means to support the community—to offer hope and to bear witness to the incredible struggle that meets them every day. In a world where terror abounds, it is deeply satisfying to see that, against all odds on this remote, poor plateau, there is excellence, happiness, and hope.

APPENDICES

APPENDIX A

Student Questionnaire

School Name:_____ ID Number:_____

Age:_____ Grade:_____ Gender: Male_____ Female_____

Student Questionnaire

1. Who lives in your household?

2. What do you think the purpose of school is?

3. How do you feel when you are at school on most days? Check all that apply.
    a. Happy____
    b. Bored_____
    c. Mad_____
    d. Having fun_____
    e. Frustrated_____
    f. Tired_____
    g. Annoyed_____
    h. Confused_____
    i. Sad_____
    j. Stressed_____

4. What is your favorite school subject?

5. What do you want to do when you grow up?

6. What is the best part about going to school?

7. What is the worst part about going to school?

8. What are the things that you think make you do well in school?

9. Why do you think your school is a good one?

10. What do you think would make your school better?

APPENDIX B

Administrator Questionnaire

School Name:_____ ID Number:_____

School Administrator Questions

1. Average Pupil-Teacher Ratio: _____
    a. For the Form 7 class last year_____
2. Average number of teacher absences (how many days a year): _____
    a. For the Form 7 class last year_____
3. Average number of student absences (how many days a year): _____
    a. For the Form 7 class last year_____
4. What kind of school supplies did your school have available for last year's Form 7 class?
    a. Pens___
    b. Pencils___
    c. Reading books___
    d. Textbooks for teachers____
    e. Textbooks for all students____
    f. Computers____
    g. Blackboard and chalk_____
    h. Desks____
    i. Calculators_____
    j. Markers/crayons_____
    k. Scissors_____
    l. Paper____
    m. Glue___
5. Is there a lunch provided here at school? _____
6. If yes, what amounts and what kind of food is provided?
7. To what do you attribute your school's success?
8. What are the most important factors that keep your school from being more successful?

APPENDIX C

Teacher Questionnaire

School Name:_____ ID Number:_____

Teacher Questionnaire

1. How long have you been a teacher?

2. What made you want to become a teacher?

3. How much one-on-one time, if any, do you spend working with your students outside of class?

4. What do you enjoy most about teaching?

5. What is the hardest thing about teaching?

6. What do you think is the most important job of a teacher?

7. To what do you attribute your school's success?

8. What are the most important factors that keep your school from being more successful?

APPENDIX D

CCIP Food Insecurity Instrument: Teacher, Parent, and Student

HOUSEHOLD FOOD QUESTIONS—Teacher	**ID:**

YES (1)	**NO** (0)	**Answer these questions to describe the average family of the Form 7 children in your school:**
		1. Does the household ever run out of money to buy food?
		1a. Has it happened 5 or more days in the past 30 days?
		2. Do the adults ever rely on a limited number of foods to feed the household b/c they are running out of money to buy food?
		2a. Has it happened 5 or more days in the past 30 days?
		3. Do the adults ever cut the size of meals or skip any b/c there is not enough food in the house?
		3a. Has it happened 5 or more days in the past 30 days?
		4. Do the adults ever eat less than they should b/c there is not enough money for food?
		4a. Has it happened 5 or more days in the past 30 days?
		5. Do the children ever eat less than you feel they should b/c there is not enough money for food?
		5a. Has it happened 5 or more days in the past 30 days?
		6. Do you think that the children ever tell the adults at home that they are hungry b/c there is not enough food in the house?
		6a. Has it happened 5 or more days in the past 30 days?
		7. Do the adults ever cut the size of the children's meals or do the children ever skip meals b/c there is not enough money to buy food?
		7a. Has it happened 5 or more days in the past 30 days?
		8. Do any of the children in the household ever go to bed hungry b/c there is not enough money to buy food?
		8a. Has it happened 5 or more days in the past 30 days?

HOUSEHOLD FOOD QUESTIONS (PARENT)	**ID:**

YES (1)	**NO** (0)	**Please answer each question by checking one of the boxes.**
		1. Does your household ever run out of money to buy food?
		1a. Has it happened 5 or more days in the past 30 days?
		2. Do you ever rely on a limited number of foods to feed your household b/c you are running out of money to buy food?
		2a. Has it happened 5 or more days in the past 30 days?
		3. Do you ever cut the size of meals or skip any b/c there is not enough food in the house?
		3a. Has it happened 5 or more days in the past 30 days?
		4. Do you ever eat less than you should b/c there is not enough money for food?
		4a. Has it happened 5 or more days in the past 30 days?
		5. Do your children ever eat less than you feel they should b/c there is not enough money for food?
		5a. Has it happened 5 or more days in the past 30 days?
		6. Do your children ever say they are hungry b/c there is not enough food in the house?
		6a. Has it happened 5 or more days in the past 30 days?
		7. Do you ever cut the size of your children's meals or do they ever skip meals b/c there is not enough money to buy food?
		7a. Has it happened 5 or more days in the past 30 days?
		8. Do any of your children ever go to bed hungry b/c there is not enough money to buy food?
		8a. Has it happened 5 or more days in the past 30 days?

FOOD QUESTIONS--Student	**ID:**

YES (1)	**NO** (0)	**Please answer these questions about your household by checking one of the boxes.**
		1. Does your household ever run out of money to buy food?
		1a. Has it happened 5 or more days in the past 30 days?
		2. Do your parents ever rely on a limited number of foods to feed your household b/c you are running out of money to buy food?
		2a. Has it happened 5 or more days in the past 30 days?
		3. Does your parent ever cut the size of meals or skip any b/c there is not enough food in the house?
		3a. Has it happened 5 or more days in the past 30 days?
		4. Do you ever eat less than you should b/c there is not enough money for food?
		4a. Has it happened 5 or more days in the past 30 days?
		5. Do you or your siblings ever say they are hungry b/c there is not enough food in the house?
		5a. Has it happened 5 or more days in the past 30 days?
		6. Do you ever go to bed hungry b/c there is not enough money to buy food?
		6a. Has it happened 5 or more days in the past 30 days?

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