

Measuring and Assessing School Quality in Rural Malawi

Paul C. Hewett, Barbara S. Mensch, Joseph Chimombo, Sharon Ghuman, Cynthia Lloyd and Richard Gregory

In developing countries, the school is the main learning and socializing institution outside the family. Investments in schooling are thought to be critical for individual poverty alleviation, the achievement of gender equity and empowerment, and societal economic growth. In recent years, the push for universal schooling — a goal that has been embraced by the international community through the Millennium Development Goals — has led to the elimination of school fees in many African countries. Malawi, one of the poorest countries in the world, was an early pioneer in eliminating school fees at the primary level and has seen an enormous increase in enrollment. With limited resources and under-trained teachers, the quality of most schools is believed to be poor with the result that students in primary school are probably not acquiring basic competencies. Without adequate quality, the promises implicit in the achievement of universal schooling are not likely to be met.

In this paper, we will use the first wave of a longitudinal study being implemented in primary schools in two districts of southern Malawi to describe the levels and distribution of school quality, as well as to evaluate the association between various indicators of school quality and two educational outcomes 1) aggregated scores on administered literacy and math exams, and b) current school attendance. We begin by reviewing the literature on school quality in developing countries, discuss the limitations of conventional conceptualizations, while in turn proving a broader definition of school quality. We then describe the research setting, the study design and the sample, with the results and conclusions following.

School Quality: Conceptualization and Identification of Critical Dimensions

Education researchers have typically conceptualized school quality by enumerating those dimensions of the schooling environment that are potentially associated with the development of cognitive competencies namely 1) time spent learning, 2) material resources, 3) the content of the curriculum and 4) teacher qualifications and pedagogy (Lockheed and Verspoor, 1991). Many empirical analyses have operationalized these dimensions with readily accessible data using measures such as student/teacher ratios, or teacher qualifications or even proxy measures such as expenditures per student (Case and Deaton, 1999; Schultz 1987; Fuller, 1986). Because data on test scores are more available than comprehensive data on individual inputs, school quality is often defined by educational outputs such as cognitive tests or examination scores (see Hanushek and Lavy 1994; Harbison and Hanshek 1992; Hanushek, 2006). Given the benefits of education for the individual and the larger society, however, identifying the specific elements of the school environment most salient for achieving literacy and numeracy is seen to be an

important goal, albeit one that has proven somewhat elusive to capture empirically (Hanushek, 1995; Glewwe, 2002?).

As economists have emphasized, one difficulty in determining the relationship between educational inputs and school outcomes in studies that rely on retrospective data is that the inputs are potentially endogenous (Case and Deaton, 1999; Glewwe and Kremer, 2006). A positive association between resources and test scores may simply be due to the fact that where educational achievement is highly valued, more resources may be invested in schools and more community oversight and involvement may exist. In addition, the association between inputs and test scores may be upwardly biased if more committed parents enroll their children in better schools and are more inclined to assist their children with schoolwork. Alternatively, if communities with inferior performance receive more external assistance, then the association between school inputs and outcomes may be underestimated. Recently economists have elaborated on strategies to overcome some of these analytic weaknesses. Kremer and Glewwe (Kremer, 2000; Glewwe and Kremer, 2006) suggest that researchers use randomized experiments and search for exogenous sources of variation in the school environment through natural experiments in order to more accurately estimate the effect of educational inputs on outcomes.¹

Limitations of the Conventional Conceptualization of School Quality

Over twenty years ago, Behrman and Birdsall (1983) called attention to the potential biases that arise in estimating labor market rates of return to years of schooling when information on the quality of schooling is omitted. Since then, economists have explored the connection between aggregate measures of school quality and various outcomes, including grade attainment, and adult wage rates (e.g. Psacharopoulos 1989; Murnane et al. 1995, 2000; Grogger and Eide 1995). Betts' (1996) review of the literature identifies 23 studies that have examined the relationship between school inputs and students' later job-market success in the United States. Only six of these studies had data linking the individual student to the actual school attended, and none examined more than a few standard indicators. Moreover, none of these six studies found significant effects of school inputs. Seeking to explain this finding, Betts (1996) argues that, over time, the conventional set of school quality variables has exhibited less variation across U.S. schools. In concluding his review he suggests that it is time that the school-quality literature search for a richer paradigm than the education production function linking specific school inputs to test scores, noting that "education is much more than an assembly line... the literature could progress by examining more closely the human interactions within schools. From a

¹ While Glewwe and Kremer (2006) caution that it is premature to generalize from the few studies that have taken advantage of such strategies, they suggest that the most effective means of improving school quality may not be through increasing inputs that depend on teachers, such as text books or flip charts, but rather through technologies that bypass the problem of weak teaching such as computers and radio instruction.

sociological and psychological perspective, such work would involve attempting to identify the teaching methods, attitudes, and styles that characterize the best teachers (Betts 1996: 183).”

To date, there is little understanding of how school experiences, beyond the usual measures of school and teacher resources, affect the acquisition of competencies, other educational outcomes, or a broader set of outcomes. Furthermore, it is not known whether the salience of different elements of school quality differs across outcomes. While school quality has been linked with shorter term outcomes, such as achievement and retention, and years of schooling have been linked with longer term outcomes, such as wages, health, the timing of marriage, fertility, and investments in the next generation, it is not known how school quality influences longer term transitions to adulthood. In particular, little is understood about the dynamics of subsequent schooling, the acquisition of marketable skills, gender role attitudes, timing and terms of marriage, the timing and terms of entry into the labor market, and the acquisition of pro-social values and behaviors.

Finally, while much has been written about schools as socializing institutions, rigorous studies on gender differences in school experiences, and the academic and non-academic effects of these differences are lacking. Our research in Kenya, though limited by a cross-sectional design, is an exception (Mensch and Lloyd, 1998; Lloyd, Mensch and Clark, 2000; Mensch et al., 2001). Qualitative data from Africa suggest that the school environment undermines girls’ achievement and can also be abusive. Teachers are reported to have negative attitudes towards and lower expectations of girls. They are also reported to view boys as more intelligent than girls, as showing greater interest in school, and as being more participatory in the classroom (Davidson and Kanyuka, 1992; Chimombo et al., 2000; Hyde, 1997; Lloyd, 2005; Lloyd and Mensch, 1999). While reliable information on gender-based violence in schools is generally not available, anecdotal evidence suggests that sexual, physical and psychological abuse of girls is common. Researchers were told stories of girls being required to do classroom chores, being bullied and touched in inappropriate ways by their male peers, being pressured to have sex by boys and by their teachers, and exchanging sex for grades or money (Leach et al., 2003; Chimombo et al., 2000; DevTech, 2004; World Bank, 1995; Hyde, 1997; Prouty, 1990). While abuse of boys is believed to be much less widespread, corporal punishment by teachers is also an issue for boys who report being hit more than girls (DevTech, 2004).

Our Definition of School Quality

The definition of school quality used in this paper incorporates a broader array of dimensions than much of the economic literature and builds on our previous research in Kenya and Egypt (Mensch and Lloyd 1998; Lloyd et al. 2000; Mensch et al. 2001; Lloyd et al. 2003). It encompasses those elements that improve cognitive competencies — the focus of the school effectiveness literature — as well as those that have the potential to increase grade attainment, improve reproductive health, facilitate labor force transitions, create pro-social and gender-

equitable values, enhance community participation, and build agency for responsible decision-making. That is, our definition not only encompasses elements of the educational process that are recognized in the literature as good practice and presumably lead to better test scores, but also incorporates dimensions of the school and learning environment that are not traditionally captured, such as inequitable treatment of boys and girls and gender based harassment and violence that potentially affect school participation and attainment as well as many of the other outcomes listed above including gender equitable values and agency.

In measuring school quality, we distinguish inputs from outcomes. We define four major dimensions of school quality: (1) material inputs such as the availability and physical condition of facilities, desks, teaching manuals and text books, as well as the certification, experience and commitment of teachers, (2) opportunities to learn including variables that capture, directly or indirectly, time devoted to instruction such as length of school day, teacher absenteeism, and the student teacher ratio; (3) classroom dynamics and pedagogical practices including teacher treatment and support of students, punishment and chores (4) gender treatment and attitudes including teacher attitudes and treatment of boys and girls, as well as the prevalence of various anti-social behaviors such as harassment, intimidation and violence within schools.

Research Setting

Nowhere are the challenges faced by young people greater, and the benefits of schooling more important, than in countries struggling with the problems of persistent poverty, malnutrition, adverse health, and the devastation of the HIV/AIDS epidemic. Malawi has one of the world's lowest gross national incomes per capita (GNI-PPP), at \$570 in 2002 (World Bank, 2004). Further, 85 percent of Malawi's population lives in rural areas without access to proper sanitation, potable water, electricity, and all-weather roads (National Statistical Office and ORC Macro, 2005). Age at marriage among women is early, even relative to other Southern African countries, with nearly half of girls marrying before the age of 18. Malawi also has one of the highest HIV prevalence rates in the world, estimated at 14 percent of the adult population, with women and girls increasingly affected (UNAIDS, 2004). AIDS morbidity and mortality have a significantly adverse impact on children by forcing them to cope with the loss of close adults (parents, family members and teachers) and to assume adult roles and responsibilities earlier in life.

Malawi has embarked on a broad multi-sector approach to address these challenges through a Poverty Reduction Strategy whose primary goals are sustainable pro-poor economic growth, human capital development, improving the quality of life for the most vulnerable, and good governance (Government of Malawi, 2002). As noted above, in 1994 Malawi eliminated all

school fees at the primary level, increasing enrollment from 1.9 to 3.1 million pupils and achieving near universal access to primary school (DevTech 2004).² Although effective in increasing access, this policy change has had little impact on other critical schooling outcomes, namely retention, grade repetition, attainment, and competency.³ Additionally, although policies and interventions to encourage girls' school enrollment have contributed to near gender parity in primary school entry (Anzar et al., 2004; Chimombo et al., 2000), girls are still more likely to drop out of school than are boys and do so at a younger age (National Statistical Office and ORC Macro, 2003).

Our study is being conducted in two rural administrative districts, Machinga and Balaka, located in the southern region, the area of the country with the highest rates of HIV (UNAIDS, 2004), teenage childbearing, risky sexual behaviors and earlier sexual initiation. Neither Machinga nor Balaka contains classified urban areas, with the largest population concentrations located in district administrative centers or encompassing central markets. In Machinga, there has been significant donor and government investment in primary education. From August 2003 through December 2005, as part of a broad USAID multi-country initiative entitled Educational Quality Improvement Program (EQUIP), the Malawi Education Support Activity (MESA) has focused on teacher professional development through training programs designed to improve the continuous assessment of pupils, enhance the pedagogical practice of teachers, and integrate lifeskills and HIV education into the social studies curriculum.⁴ These teacher and school-based initiatives are supplemented by community level outreach to promote the value of schooling (particularly for girls), the importance of effective schools, and enhanced awareness and response to HIV risk.⁵

In 2006 and 2007, USAID narrowed its education sector financial support to pre and in-service training of primary teachers through a new initiative entitled Malawi Teacher Training Activity (MTTA). Pre-service training is being conducted in Malawi's six teacher training colleges, while in-service training is focusing on existing teachers in the four districts previously reached through MESA. MTTA is seeking to enhance teachers' subject specific skills in English,

² In response to a sudden need for more teachers, the Ministry of Education was forced to hire inadequately trained and non-certified teachers.

³ According to the results of numeracy tests administered in Standard 6 in Malawi, no students scored in the "competent" range or above (UNESCO, 2005). Indeed, Malawi had the lowest numeracy scoring of 14 countries in the Southern and Eastern African Consortium for Monitoring Educational Quality (SACMEQ).

⁴ USAID MESA activities are located in 4 of the 30 districts of Malawi; besides Machinga, MESA is being implemented in Mzimba South (Northern region), Kasungu (Central region) and Phalombe (Southern region).

⁵ According to a USAID monitoring and evaluation report (USAID/AIR 2004: 64), teacher training activities in Machinga district reached all 158 primary schools and 80% of teachers (947 of 1,180) in 2004; of Machinga's total population of 369,014, approximately 12,300 (3%) participated in community-based activities directed toward village chiefs, school committees, parent-teacher associations and the general population. MESA also broadcasts a weekly radio program.

mathematics, science, social studies, as well as the new lifeskills and HIV/AIDS curriculum.⁶ MTTA's in-service training is utilizing a cascading training model in which head teachers and identified 'mentor-teachers' are trained in district Teacher Development Centers (TDC), with one training session in each of the three school terms. Designated teachers are then supposed to conduct school-based workshops with other teachers on the subject of their training.⁷

Machinga is also the site of the "Safe Schools" Project, a USAID funded pilot intervention designed to reduce gender-based violence (GBV). The implementation of the Safe Schools Project began in late 2006 in a random selection of 30 of the district's 158 primary schools. The Safe Schools program includes pre-service and in-service gender training for teachers, institutional support and referral mechanisms to services for GBV victims, and integration of GBV and gender issues into the curriculum (DevTech, 2004). By conducting our project prior to and concurrently with the Safe Schools intervention, we have an opportunity to assess whether this particular effort has had an impact on the attitudes and behavior of students and teachers, and whether such activities improve girls' attendance and academic performance, as well as encourage healthier sexual and reproductive behavior among adolescents.

Balaka District, which is contiguous to Machinga has not had a broad history of donor support and serves as a comparison district. Although we would expect considerable variance in quality across schools in Machinga alone, drawing on a sample of schools in Balaka potentially provides additional leverage for assessing and evaluating the impact of investments in school quality on adolescent outcomes. In this sense, Balaka serves as a contextual baseline for the provision of schooling in rural Malawi without significant donor involvement or intervention.

Schooling in Malawi

Malawi has an 8-4-4 system of education with "compulsory" schooling consisting of the first eight years, and divided into infant, standards 1-2, junior, standards 3-5, and senior, standards 6-8. Primary schools are government financed and controlled although they can be affiliated with religious missions. At the end of standard 8 students sit for the Primary School Leaving Certificate (PSLCE). If they pass, students have the opportunity to apply to secondary school, which consists of forms 1-4. Students in secondary school sit two exams, the Junior Certificate of Education (JCE) after completion of form 2 and the Malawi School Certificate of Education (MSCE) after completion of form 4.

⁶ As part of the Ministry of Education's recent primary curriculum and assessment reform (PCAR), a new lifeskills and HIV education curriculum was planned to be rolled out in Standards 1-5 in 2006 and Standards 6-8 in 2007.

⁷ Teachers in Machinga district should also be exposed to supplemental pre and in-service training funded by the German development agency Gesellschaft für Technische Zusammenarbeit (GTZ). The program of activity was scheduled to be piloted in 2006, followed by full national implementation in 2007 and 2008.

Tertiary education includes two universities as well as technical colleges, polytechnics and teacher training colleges. Training of primary school teachers takes place in the six teacher training colleges, with certification generally taking 1 year of study. Students with the MSCE may obtain certification for senior primary school (T2) whereas those with the JCE may obtain certification for junior primary (T3). In 1989 the Malawi Special Distance Teacher Education Program (MASTEP) was established to train primary teachers on-the-job through distance learning, short residential courses and local seminars. Several years later, in response to the massive demand for new teachers resulting from the establishment of free primary education, a crash training program, the Malawi Integrated In-Service Teacher Education Program (MIITEP), which consists of 4 months of training at college followed by 20 months of supervised teaching in schools, was created (Kunje, Lewen and Stuart, 2003).

Study Design and Sample

The data come from the first round of a longitudinal study of 1,762 in-school and 893 out-of-school adolescents aged 14–16, in the two districts. Note that neither Machinga nor Balaka contains classified urban areas, with the largest population concentrations located in district administrative centers or encompassing central markets. In total, 59 primary schools were visited in the second term of the 2007 school year, 30 in Balaka and 29 in Machinga. The schools visited in Machinga represent nearly 20 percent of the primary schools in the district, whereas those in Balaka represent nearly 25 percent of the primary schools in that district. The probability of a particular school being included in our study was proportional to its enrollment in 2006.⁸

Note that the majority of school-going adolescents in Malawi attend primary school. Estimates from the most recent household survey indicate that 76, 71, and 46 percent of those aged 14, 15 and 16 respectively in the southern region are in primary; the remainder being predominantly school dropouts (National Statistical Office and ORC Macro 2003).⁹ The prominence of older students in primary school is due to late entry, grade repetition, and intermittent attendance.

Our in-school adolescents were randomly selected from registers that recorded enrollment at the beginning of the 2007 school year. At each school our goal was to interview 30 students attending standards 4-8, the last 4 years of primary school; five girls and five boys at each of three ages 14, 15, 16.¹⁰ While the target number of 1,770 school-going adolescents was nearly

⁸ The number of schools in each district was based on estimates of (1) the proportion of students in the age group attending primary school, (2) estimated attendance rates (3) estimated attrition rates, (4) estimates of transitions to secondary school and school dropout. Note: the data were not weighted in this analyses, and hence, no conclusions should be drawn regarding their representativeness of schools in the district.

⁹ We did not sample from the estimated 4% of 14-16 year olds attending secondary school.

¹⁰ The overwhelming majority (93%) of 14-16 year olds attend standards 4-8 (National Statistical Office and ORC Macro 2003).

reached, the distribution by age was not as even as expected, reflecting the fact that not all schools had 30 students aged 15 and 16 in attendance. Moreover, the distribution by gender was also uneven. While we achieved our target of 885 boys — interviewing 895 — only 867 girls were interviewed. The deficit was particularly notable at age 16, reflecting girls' increased likelihood of dropping out during later adolescence or their increased likelihood of completing primary at a younger age.¹¹ Adolescents were identified as out-of-school if they had not attended in the second term of the school year. Out-of-school adolescents were identified through key informants in the villages and at the school and were sampled from 4 to 5 randomly selected school catchment villages.¹²

The adolescent instrument included an extensive set of questions on household and family characteristics, educational attainment, schooling history and experiences, household labor and employment, sexual behavior, marriage, and health (including anthropometrics). In addition, all sampled adolescents were evaluated as to whether they were able to read two sentences in Chichewa (the national language) and two sentences in English, tasks at which they should have been proficient by standard 4. Adolescents were also asked to complete a mathematical evaluation consisting of 12 questions drawn from the Malawi Institute of Education achievement tests for standard 3.¹³ Although the mathematical evaluation is for a lower standard, wide variance in performance is expected, even among students attending higher standards. To obtain more accurate reporting from students on issues of gender-based attitudes, teacher practices, harassment and violence in school — key dimensions of our school quality conceptualization — and other sensitive issues, we employed audio computer-assisted self-interviewing (ACASI). With ACASI, the respondent hears both the question and the response categories through headphones connected to a handheld computer. The respondent answers each question by pressing a number on the computer screen associated with a response option. The advantage of ACASI over face-to-face interviews is that the respondent is afforded greater privacy and confidentiality when answering questions and interviewer influence in the survey is minimized. Computerized interviewing has been used successfully by the investigators in household-based surveys in Kenya and Malawi (Hewett et al. 2004; Mensch et al. 2003; Mensch et al. 2006).

The head teacher, and teachers in standards 4 through 8, were also interviewed at each school, with 326 interviewed during the first round of data collection. Teachers were asked about their household characteristics, education, and training, as well as their classroom practices and

¹¹ For subsequent analyses linking school quality to outcomes where the unit of analysis is the adolescent, not the school, we will construct sample weights to reflect the probability of being included in our sample.

¹² This analysis focuses only on in-school adolescents and their teachers and hence the out-of-school adolescent data are not used.

¹³ The Malawi Institute of Education is a para-statal organization that is charged by the Ministry of Education with curriculum development, assessment and teacher training programs.

treatment of students, including punishments and assignment of chores. Head teachers at each school were asked additional questions regarding the characteristics of the school, including the availability of supplies and materials, administrative oversight, and donor activity. As with the adolescent questionnaire, all sensitive questions were administered using ACASI. A school facilities instrument collected information about the physical condition of the classrooms, offices and toilet facilities. At the community level, an instrument was administered in a random selection of villages that serve as the primary catchment area for the primary school visited. This instrument captured information on health facilities, the location of the nearest secondary school, religious and civic groups, and productive resources, e.g. maize mills, roads, and markets.

Analysis

Based on our conceptual framework we first present indicators of school quality aggregated to the school level. Results are shown separately by district to explore the potential impact of differential exposure to donor investments and interventions. Given that both our adolescent and teacher instruments asked similarly worded questions about student experiences and treatment, we also compare data generated by these two instruments to evaluate the consistency of responses. Where applicable, we also differentiate school quality by gender to assess whether an equitable learning environment exists for girls and boys. In particular we investigate whether our measures of teacher treatment and support of students, including attitudes towards academic aptitude, views about adult roles, pupil punishment, tasks assigned to students, teacher harassment of students and acts of intimidation and violence, differ for male and female students. We then preliminarily investigate the association between school quality, at the school level, and educational outcomes.

Results

[Table 1 about here]

Table 1 provides a basic descriptive overview of the schools in our study. There were 29 schools sampled in Balaka and 30 schools in Machinga; one school in Balaka could not be reach given that the bridge providing access was washed away during the rainy season. The sample schools are predominantly full primaries, having all eight standards, while a few schools in each district are junior primaries. Given the historical role of missionary groups in the Malawi education sector, the schools are largely operated by various religious denominations, with only 5 of 29 schools in Balaka and 9 of 30 in Machinga run by local education authorities (LEAs). Although there are some differences in operational control, given a highly centralized administrative structure, the assignment and training of teachers, curriculum requirements and financing are managed by the Ministry of Education and are standardized across types of schools. Approximately, a quarter of the sample primary schools have been built since formal schooling fees were eliminated in 1994, with the rest roughly evenly split between those established prior to and after national independence in 1964. The remaining indicators provide some measure of

the school's isolation. Although the government tries to limit the distance between primary schools in rural areas to 5km or less, to assure access for all potential students, approximately a third of the sample schools, are greater than 5km away from another primary. This is also reflective in the schools farthest catchment village, which for the majority of schools is greater than 5km and in 6 schools is greater than 10km. Distances to the nearest secondary schools are even greater with two thirds being 5km away from the primary school.¹⁴

[Table 2 about here]

Table 2 provides an overview of the distribution of the first two dimensions of schooling quality outlined in our conceptual framework: material inputs or resources to education and students' opportunities to learn. These dimensions have been found elsewhere in the schooling quality literature to be linked to educational outcomes and the development of cognitive competencies. It is expected that students that have access to basic schooling facilities, including classrooms, toilets, safe drinking water, and playing fields will have a more positive and productive educational experience, leading to greater attachment to school, better attendance and superior performance. This is not to imply that all aspects of schooling quality will directly affect all adolescent outcomes similarly, rather it is the purpose of this research to ultimately parse out the effects of different dimensions of school quality on a selection of adolescent outcomes and to assess the potential impact of interventions to improve schooling.

As is clear from Table 2, rural Malawian schools still struggle with providing some of the most basic provisions within the schooling environment. Less than half of the schools in Balaka and slightly more than half in Machinga have the necessary number of physical classrooms to accommodate each of the schools' classes. Insufficient physical space leads to classes being taught outside or shared classrooms during the rainy season. A smaller percentage of schools lack toilet facilities. Although the ratio of students to toilets has not yet been calculated from our data, an indication of the capacity of the toilets is how clean they are; approximately 50% in Balaka and 65% in Machinga were considered quite dirty or filthy.¹⁵ Further, the availability of potable water – typically provided via boreholes – is available at slightly more than half the schools in our sample. Insufficient sanitation and lack of a clean water supply could potentially have a disproportionate affect on adolescent girls attempting to manage their menstrual periods.

[Figure 1 about here]

¹⁴ Although not presented here, information was also collected from each student regarding the amount of time it takes for them to get to school each day.

¹⁵ Quite dirty was defined as having a noticeable odor, half of buildings damaged, some litter, and/or staining on walls and doors. Filthy was defined as malodorous, most/all facilities in poor condition; staining on floors, walls and doors and much litter.

To provide a sense of the distribution of material inputs across our sample schools, an additive index of the number of school resources was constructed from the items in Table 2 and a box-and-whisker diagram generated from the index. The diagram's box represents – from the bottom up – the 25th, median or 50th percentile, and 75th percentile of schools. The width of the box is the inter-quartile range (IQR), or the middle 50%, and is a measure of the dispersion of the core of the sample; the wider the box the greater the dispersion. The whiskers either above or below the IQR represent the dispersion of the remaining cases and are equal to $\pm 1.5 \times \text{IQR}$, with outlier schools represented as individual dots.

Figure 1 illustrates that 50% of the schools are similar to each other regarding the number of resources; most schools have available a range of 5 to 7 of the maximum 9 resources measured. The similarity of schools in the sample was to be expected to a degree, given that the schools are largely centrally funded, with limited economic resources available from the local community to support the physical infrastructure. That said, for both Balaka and Machinga, there does exist a sub-set of schools that do have more or fewer resources available, with Machinga in particular having at least one school with only 2 of the 9. A further investigation of these differentials requires an evaluation of the determinants of schooling quality, including the influence of household, communities and donor involvement, which may vary at the school level. Although not implemented for this paper, this analysis will take place as the project develops.

In preparation for the massive influx of new students into the primary education system expected after the elimination of formal school fees, the Malawi Ministry of Education implemented two parallel teacher training programs in the years prior to UPE (1989-1993).¹⁶ In addition to those receiving the traditional two year pre-service training course at the national Teacher Colleges, a supplementary group of teachers was hired and provided 3 years of in-service training only. This latter group's training on teaching methods and subjects consisted of self-study, supervised teaching, workshops, and the assignment of projects. The latter group also was given a short two month residential training at one of Malawi's Teacher's colleges. This training program was modified shortly before UPE to a program in which untrained teachers would be hired and work for 1 year, starting a 1 year residential training program at the Teacher's college. Lasting only 3 years, Malawi teacher training was modified yet again to its current form of an integrated teacher education program (MIITEP), consisting of 1 year of untrained teaching, followed by a short 3 month residential program at the TC, followed by supervised teaching, workshops and self-study. All in all, Malawian primary teachers have received quite varied degrees of formal training, likely leading to a diversity of performance among teachers in the classroom regarding their pedagogical practices and mastery of subjects.

¹⁶ This discussion is based on Kunje and Chimombo 1999 and Kunje 2002.

These diverse patterns of education and training among Malawian teachers can be observed in Table 2. For instance, 76% of schools in the sample have one or more teachers with only a junior certificate, equivalent to only 2 years of secondary school, and more than half of the schools have teachers who volunteer or have non-permanent status at the school. Slightly less than half of the schools have teachers that did not receive any formal training prior to starting their teaching position. Of course, most schools have one or more teachers that have received MOE sponsored in-service training (83%), with a higher percent of schools receiving such training in Balaka than in Machinga. The latter observation may either be the result of, or the reason for, USAID sponsored training in Machinga, which has reached almost all of the schools in the form of MESA or MTTA teacher training programs.¹⁷ Although USAID has reached almost all schools in Machinga, in only 7 schools have all the teachers had either MESA or MTTA training.

The bottom section of Table 2 explores the range of experiences at the school level regarding the students' opportunities to learn. What is apparent is the large student to teacher ratios, particularly for female teachers. These numbers are roughly 30% higher than the national average prior to the initiation of UPE in Malawi. The student ratio is likely an over estimate of the exposure students have regarding direct contact and interaction with their teachers on an individual basis, given that a significant proportion of schools (67%) have at least one teacher absent in the previous school week. As is also indicated, on average, teachers miss on average 2 days of classes per week.

[Figure 2 about here]

The mean (in Table 2) and median (Figure 2) indicate that the lack of subject textbooks among students is a significant problem in Malawian schools. On average, fewer than a quarter of students have all their required textbooks. The box plot in Figure 2 further reveals that 75% of schools in Balaka have a maximum of 23% of students with all of their textbooks. This number is only slightly higher in Machinga where the 75th percentile reaches 33% of students with all their required textbooks. The distribution of textbook availability does vary, but only a small fraction of schools have a majority of students who have all their books. Although students may share textbooks in class, this indicator reveals a significant limitation in a student's ability to focus their individual learning efforts during the school day, as well as at home after school has ended.

¹⁷ The relationship between the USAID and MOE in-service training programs will have to be further investigated. The MOE may have reduced its in-service training activities in Machinga due to donor activity, alternatively, USAID may have selected Machinga specifically to compensate for the lack of training activities in the district. A project workshop with MOE and USAID officials will be held in May 2008 and these issues will be addressed more directly.

We computed a additive index measuring the nine resources shown in Table 2 and then computed correlations with, teacher education and training and selected measures of opportunities to learn.¹⁸ The empirical association between these indicators is marginal (see appendix Table 2a). For example, schools that score high on the availability of text books for students do not necessarily score highly on the material resources available at the school; the correlation between these two dimensions is only .07. The relatively weak associations in general suggest that there is no one underlying dimension of school quality that is defined by the material resources or opportunities to learn at the school. Rather, schools that score poorly on one component are likely to score better on others and vice versa.

[Tables 3 and 4 about here]

Table 3 examines classroom dynamics and gender attitudes as reported by teachers in Standards 4-8 by district, whereas Table 4 examines the exact same indicators from the perspective of the students, separately for girls and boys. To maximize the anonymity and confidentiality of the teacher's responses, the questions regarding gender attitudes as well as classroom treatment and equity were administered using ACASI. As can be observed in the Table 3, as reported by teachers the differences in chore assignments and positive/negative comments reported by gender is modest and, if anything, favors girls. The one dimension that shows a large difference by gender is reports of unruliness in class with teachers asserting that boys are much more likely to be disorderly than girls. Given that boys are reported by teachers as much more likely to misbehave in class, it is surprising that gender differences in punishment are as small as they are; this may reflect a hesitation on the part of teachers to report any gender differential treatment even within the ACASI interview.

To the extent that teachers think gender differences exist in the ability to learn, they report that boys are more capable than girls, except for learning to read and write Chichewe, the local language. This view advantaging boys is more common in Machinga than in Balaka. With the exception of the question on decision-making regarding number of children, most teachers report fairly equitable gender role attitudes; whether the opinions reported reflect actual or just idealized attitudes, however, is not clear. The vast majority of teachers report that a husband is not justified in beating his wife. Only having an extra marital affair exhibits some variability, albeit small. Overall, the results concerning gender treatment and attitudes among teachers are mixed, with less variability in the indicators than expected.

¹⁸ Note that for teacher education and training, and teacher absenteeism, the indicators are reversed by comparison with those shown in Table 2. For example, instead of teacher education, "JCE or lower" as in Table 2, the indicator in Table 2a is the percentage of schools with teachers who have more than a JCE certificate.

Table 4, is based on interviews with students in Standards 4-8 and reflects averages in student's opinions within and then across schools. In contrast to teachers, these questions were asked among students in the face-to-face portion of the interview. It was felt that students would be more willing, and less self-conscious, when reporting gender stereotypical responses to a same sex interviewer. The distributions in the tables seem to bear this hypothesis out, at least relative to the reporting among teachers.

As can be observed in Table 4, unlike reports by teachers, both boys and girls report that boys are assigned more chores at school. Boys also see themselves as receiving more positive feedback in class, while perceiving girls as receiving more negative comments. Girls on the other hand see little difference between themselves and the boys regarding positive comments, but feel the boys are much more likely to receive negative feedback, perhaps owing to their behavior in class. Both girls and boys, but particularly boys, indicate that male students receive more and harsher punishment in school. These gender differences in punishment are much larger and more consistent than those reported by teachers.

In terms of academic abilities, male students think that boys are universally better at learning all subjects; female students think that boys are better at learning English and lifeskills, but that girls are slightly better at mathematics. Interestingly, these patterns are very similar to those reported by teachers. To assess this issue directly, Figure 3 compares student and teacher attitudes regarding academic aptitude, with student attitudes aggregated for male and female pupils. The patterns across the four charts in the figure are fairly consistent across students and teachers, with some variability: boys are significantly more likely to be perceived to be better at English and Mathematics, while girls are slightly more likely to be perceived to be better at Chichewa and Lifeskills. The origin of these attitudes is largely unknown and requires further exploration.

[Figure 3 about here]

As for more general gender role attitudes, what is most striking is that for two of the four indicators girls hold more traditional and gender inequitable attitudes than do boys. For instance, on average more girls than boys think a girl should get married when she finds an appropriate spouse, even if she is attending school. Moreover, while it might be not-surprising that a significant majority of boys report that they are more intelligent, the fact that a considerable fraction of female students also think boys are more intelligent is particularly noteworthy. While the vast majority of both boys and girls say the husband is not justified in beating his wife except if she has an extramarital affair, again it is striking that girls exhibit attitudes that are less gender equitable than boys.

As with material resources and opportunities to learn, we also computed correlations among teachers and students for a selection of the gender indicators (see Appendix Tables 3a and 4a). Indicators that were not included in this table were ones that exhibited little variability in Tables 3 and 4. For both the students and teachers the correlations are stronger and more consistent

across the array of indicators of student abilities by gender; weaker and less consistent correlations are observed for general gender attitudes. Overall, the correlation matrix in Table 3a and 4a do not exhibit the patterns that would provide much confidence that these are indicators are derivative from a broader school specific dimension of gender equitable beliefs or attitudes. This suggests either that Malawi has significantly less traditional gender role beliefs that have been found elsewhere in Africa or that the array of indicators used in this analyses do not tap into such attitudes effectively.

[Table 5 about here]

Table 5 displays another aspect of the gender experience of students, specifically physical and sexual harassment in the current school year. A non-trivial fraction of students report being teased, hit by schoolmates, and receiving sexual comments on the way to or at school. About one-fifth of both male and female students report being hit by teachers at school, a form of discipline that is not official sanctioned but still occurs. Interestingly both boys and girls report being the recipients of sexual comments, with boys twice as likely to report receiving sexual comments from teachers than girls. Of course, whether these comments are directed at boys or are about girls, is not completely clear from the wording of the question. However, given boys responses to the question about being touched sexually by teachers, the former seems more likely the case. If accurate, these results suggest that programs and interventions that emphasize the sexual harassment of girls would not serve the needs of boys in the Malawian context.

[Figure 4 about here]

To examine the distribution of experience in these indicators across the sample schools, Figure 4 utilizes an aggregated indicator that includes all three different types of physical and sexual harassment and differentiates the experience by the frequency of occurrence. As can be observed from the box-and-whisker plots, there is quite a dispersion of experience with regard to the amount of physical and sexual harassment that is occurring at the schools. In some schools more than three quarters of the students report harassment by teachers, although occurring only once or a few times during the year. Although more frequent harassment is less typical, it still occurs in some schools among more than 25% of the student population. The gender differences in harassment at schools are small, although boys are slightly more likely to be harassed than the girls. In future analyses, it will be important to capture what impact these experiences have on adolescent's performance.

[Table 6 about here]

Table 6 provides a summary of selected educational outcomes among the student sample; the top panel is by gender and the bottom by district. The attendance is based on self-reports rather than school registers, which are frequently incomplete. Absenteeism among students is high. Only about half of students attended school in the previous week and under two-thirds in the week

before that. While the absenteeism rate does not differ by gender, it is higher in Balaka than Machinga. The short literacy exam that we asked the students to complete revealed that ability to read simple Chichewa sentences is quite high, whereas reading ability in English is considerably lower. Interestingly, the results of the literacy test, which indicate that girls perform slightly better, stand in contrast to student and teacher attitudes about gender differences in English ability. Both teachers and male and female students think that boys are better at learning English. As for the math evaluation given, students had particular difficulty with fundamental arithmetic operations. Note that the exam is based on knowledge that is supposed to be acquired in standard 3 and indicates that students are not acquiring basic skills before proceeding on to the next level of schooling. Gender differences in math ability are quite small, again in contrast to male student and teacher reports that boys have superior aptitude.

[Table 7 about here]

Table 7 presents preliminary measures of association between a selection of schooling quality indicators and the various measures of educational outcomes. Given the problems inherent with empirical measure of associations that are captured in the cross-section, the results are only exploratory in nature. However, they do indicate the direction of future analyses, where we will take advantage of the second and third survey rounds to more rigorously explore more the effect of school quality on adolescent outcomes. Although generally the correlations in Table 7 are not as consistent with expectations as desired, those that are statistically significant different from zero (highlighted boxes) are, for the most part, directionally consistent. Of the 22 indicators that are significant, only one is not directionally in line with expectations. Further, a key indicator, the student-teacher ratio is strong and consistently in the expected direction; the higher the ratio, the lower the attendance and performance on the literacy and math exams. In addition a negative effect of physical and sexual harassment on attendance and performance is also indicated, although again for non-significant indicators the results are not directionally consistent.

Conclusions and Study Limitations

The purpose of this paper was to explore the levels and distributions of schooling quality within and across the sample of schools, as well as to preliminarily explore the effect of school quality on a selection of adolescent outcomes. The data were drawn from the first round of data collection of a three year longitudinal study of schooling quality in two rural districts in southern Malawi. The sample includes 59 primary schools and interviews with 326 teachers and 1,762 adolescents attending school in the second term of 2007. The analysis was implemented at the level of schools with indicators from the teachers and students questionnaires aggregated. Although aggregation is more reasonable for the indicators generated from the student sample, it is more problematic for the teachers, since on average there are five teachers in each school. However, a sensitivity analysis that compared the school averages by the overall averages did not reveal any significant divergences.

It is apparent that Malawian schools still struggle with limited resources, under staffed schools, untrained teachers, a lack of adequate school supplies for students and extremely high student teacher ratios. Although Malawi has achieved almost universal enrollment in primary school since eliminating school fees in 1994, it has come at a significant cost. Of course, this is not to imply that no progress has been made. Since 1994, when nearly 90% of the teachers employed by the MOE received no training before entering the schools, almost all of the teachers in our sample have received at least some teacher training, whether it is formal pre-service training at one of the Teacher's colleges or on the job in-service training. What is unclear at this point is how effective this training is in preparing teachers for the classroom. If the low performance of Malawian students on the SACMEQ exams, as well as on our own literacy and mathematics evaluations, is any indication, much still needs to be done to improve the quality of Malawian schools and teachers.

One of the contributions of this research agenda is the expand the definition of schooling quality to incorporates dimensions of the school and learning environment that are not traditionally captured, such as the gender attitudes of teachers and students, inequitable treatment of boys and girls in the classroom and harassment and violence. This paper presented how indicators were conceptualized and measured and their distribution in our sample. In some respects our results were disappointing. For instance, although we maximized the anonymity and confidentiality of teachers' responses by using computerized self-interviewing technologies, very little gender differentiation in treatment and attitudes was observed. Only in perceptions of students abilities did significant differences in assessments between boys and girls emerge. On the one hand, this perhaps suggests that gender issues are not as critical or problematic in the Malawian context. On the other it could also suggest that teachers are quite aware of the socially desirable response and are not willing to risk answering truthfully to questions about the differential treatment of boys and girls in the classroom. That said, there is very little evidence from the students perspective to suggest that girls are being singled out and mistreated.

There have been many studies that have pointed to a pervasive pattern of harassment and abuse of girls in Malawian schools (Leach et al., 2003; Chimombo et al., 2000; DevTech, 2004). Preliminary indications suggest that harassment although occurring cannot, be accurately be described as common in most schools. That said, it does occur, and more importantly perhaps seems to occur among boys at an equal or higher rate than girls. There is some indication from our preliminary measures of association between harassment and adolescent outcomes that such events can have a negative impact on the performance of adolescents in school. Further exploration of these issues is warranted, as well as a more rigorous evaluation of the impact of harassment on student outcomes.

References

- Anzar, Uzma, Harpring, S., Cohen, J., and Leu, E. 2004. "Retrospective Pilot Study of USAID-funded Education Projects in Malawi." *Equip1 Cross-National Synthesis of Education Quality*. Washington, DC: USAID.
- Behrman, Jere R. and Birdsall, Nancy. 1983. "The quality of schooling: Quantity alone is misleading." *The American Economic Review*, 73(5): 928-946 .
- Betts, Julian R. 1996. "Is There a Link between School Inputs and Earnings?" *Economics Working Paper Series No. 96-09*. San Diego: University of California.
- Case, Anne and Deaton, Angus. 1999. "School inputs and educational outcomes in South Africa." *The Quarterly Journal of Economics*, 114(3): 1047-1084.
- Chimombo, Joseph, Chibwana, Mike, Dzimidzi, Chris, Kadzamira, Esme, Kunkwenzu, Esther, Kunje, Demis, and Namphota, Dorothy. 2000. *Classroom, School and Home Factors That Negatively Affect Girls Education in Malawi: A Report Submitted to UNICEF (Draft)*. Centre for Educational Research and Training (CERT). Zomba, Malawi: CERT.
- Davidson, Jean and Kanyuka, Martin. 1992. "Girls' participation in basic education in southern Malawi." *Comparative Education Review*, 36(4): 446-466.
- DevTech. 2004. *The Safe Schools Program: Malawi Assessment Report, October 25th - November 5th, 2004*. Washington, DC: DevTech Systems, Inc.
- Fuller, Bruce. 1986. *Raising School Quality in Developing Countries: What Investments Boost Learning?* World Bank Discussion Papers 2. Washington DC: World Bank (monograph).
- Glewwe, Paul. 2002. "Schools and skills in developing countries: Education policies and socioeconomic outcomes." *Journal of Economic Literature*, XL: 436-482.
- Glewwe, Paul and Michael Kremer 2006. "Schools, teachers and education outcomes in developing countries" in Eric A Hanushek and Finis Welch (eds) *Handbook of the Economics of Education. Vol 2*. North Holland.
- Government of Malawi. 2002. *Final Draft: Malawi Poverty Reduction Strategy Paper*. Lilongwe, Malawi: Government of Malawi.
- Grogger, J. and Eide, E. 1995. "Changes in college skills and the rise of the college wage premium." *Journal of Human Resources*, 30: 280-310.
- Hanushek, Eric A. 2006. "School Resources," in E.A. Hanushek and F. Welch (eds.) *Handbook of the Economics of Education, Volume 2*. Elsevier.

- Hanushek, Eric. 1995. "Interpreting recent research on schooling in developing countries." *World Bank Research Observer*, 10(2): 227-247.
- Hanushek, Eric A. and Lavy, Victor. 1994. "School Quality, Achievement Bias, and Dropout Behavior in Egypt." *LSMS Working Paper No. 107*. Washington, DC: World Bank.
- Harbison, Ralph W. and Hanushek, Eric A. 1992. *Educational Performance of the Poor: Lessons From Rural Northeast Brazil*. Washington, DC: Oxford University Press for the World Bank.
- Hewett, Paul C., Mensch, Barbara S., and Erulkar, Annabel S. 2004. "Consistency in the reporting of sexual behavior by adolescent girls in Kenya: A comparison of interviewing methods." *Sexually Transmitted Infections*, 80(supplement II): ii43-ii48.
- Hyde, K. (1999). Barriers to educational opportunity in Malawi. In S. Erskine & M. Wilson (Eds.), *Gender issues in international education: Beyond policy and practice* (pp. 131-147). New York: Falmer Press.
- Kremer M. 2003. Randomized evaluations of educational programs in developing countries: Some lessons. *The American Economic Review Papers and Proceedings 2003*; 93(2):102-6.
- Kunje, D with K. Lewin & J. Stuart 2003. *Primary Teacher Education in Malawi: Insights into Practice and Policy*, Multi-Site Teacher Education Research Project (MUSTER) Research Report No 3, Researching the Issues No 49d, London: DFID.
- Kunje, Demis, and Joseph Chimombo. 1999. *Malawi: A Baseline Study of the Teacher Education System*. Discussion Paper No. 5, Multi-Site Teacher Education Research Project. Sussex: Centre for International Education, University of Sussex Institute of Education.
- Leach, Fiona, Vivian Fiscian, Esme Kadzamira, Eve Lemani, and Pamela Machakanja. 2003. "An investigative study of the abuse of girls in African Schools." Department for International Development: *Educational Papers*, No. 54, DFID.
- Lloyd, Cynthia B. (ed.). 2005. *Growing Up Global: The Changing Transitions to Adulthood in Developing Countries*. Panel on Transitions to Adulthood in Developing Countries, National Research Council and Institute of Medicine. Washington, DC: National Academies Press.
- Lloyd, Cynthia B., El-Tawila, Sahar, Clark, Wesley H., and Mensch, Barbara S. 2003. "The impact of educational quality on school exit in Egypt." *Comparative Education Review*, 47(4): 444-467.

- Lloyd, Cynthia B., Mensch, Barbara S., and Clark, Wesley H. 2000. "The effects of primary school quality on school dropout among Kenyan girls and boys." *Comparative Education Review*, 44(2): 113-47.
- Lloyd, Cynthia B. and Mensch, Barbara. 1999. "Implications of formal schooling for girls' transitions to adulthood in developing countries." Pp. 80-104 in In C. H. Bledsoe, J. B. Casterline, J. A. Johnson-Kuhn, and J. G. Haaga, eds., *Critical Perspectives on Schooling and Fertility in the Developing World*. Washington, DC: National Academy Press.
- Lockheed, Marlaine E. and Verspoor, Adriaan M. Authors. 1991. *Improving Primary Education in Developing Countries*. Washington, DC: Oxford University Press for the World Bank.
- Mensch, Barbara S. Paul C. Hewett, Richard Gregory, and Stephane Helleringer. 2008. "Sexual Behavior and STI/HIV Status among Adolescents in Rural Malawi: An Evaluation of the Effect of Interview Mode on Reporting." *Poverty, Gender, and Youth Working Paper No. 7*. New York: Population Council. Accepted for publication in *Studies in Family Planning* (Forthcoming).
- Mensch, Barbara S., Hewett, Paul C., and Erulkar, Annabel S. 2003. "The reporting of sensitive behavior by adolescents: A methodological experiment in Kenya." *Demography*, 40(2): 247-268.
- Mensch, Barbara S., Clark, Wesley H., Lloyd, Cynthia B., and Erulkar, Annabel. 2001. "Premarital Sex, Schoolgirl Pregnancy, and School Quality in Rural Kenya." *Studies in Family Planning*, 32(4): 285-301.
- Mensch, Barbara S. and Lloyd, Cynthia B. 1998. "Gender differences in the schooling experiences of adolescents in low-income countries: The case of Kenya." *Studies in Family Planning*, 29(2): 167-184.
- Murnane, Richard J., Willett, John B., and Levy, Frank. 1995. "The growing importance of cognitive skills in wage determination." *The Review of Economics and Statistics*, 77(2): 251-266.
- National Statistical Office (NSO) Malawi, and ORC Macro. 2005 Malawi Demographic and Health Survey 2004. Calverton, MD: NSO and ORC Macro.
- National Statistical Office and ORC Macro. 2003. *Malawi DHS EdData Survey 2002: Education Data for Decision-Making*. Calverton, MD: National Statistical Office and ORC Macro.
- Prouty, Diane B. 1990. "Reproducers reproduced: Female resistance in a Rwanda classroom." *Journal of the Society for International Development*, 1: 74-79.

- Psacharopoulos 1989. "Time trends in returns to education." *Economics of Education Review* 8(3):225-331.
- Schultz, T. P. 1987. "School expenditures and enrollments 1960-1980: The effects of income, prices and population growth." National Academy of Sciences, *Population Growth and Economic Development*. Madison, WI: University of Wisconsin Press.
- UNAIDS. 2004. *2004 Report on the Global HIV/AIDS Epidemic: 4th Global Report*. Geneva: UNAIDS.
- UNESCO. 2005. *Education for All Global Monitoring Report 2006*. Paris: UNESCO Publishing. Available <<http://portal.unesco.org/education>> [accessed November 2005].
- USAID/AIR. 2004. *USAID/Malawi Education Support Activity (MESA): Annual Report, August 2003-July2004*. Washington, DC: USAID.
- World Bank. 2004. *World Development Indicators, 2004*. Washington, DC: World Bank.
- World Bank. 1995. *Developing Girls' Education in Guinea: Issues and Policies. Draft Sector Report*. West Africa Department, Population and Human Resource Division. Washington, DC: World Bank.

Table 1: Select Characteristics of Study Schools

	Number of Schools		
	Balaka District (29)	Machinga District (30)	Total (59)
Type of School^a			
Number: Full Primary (standards 1-8)	26	26	52
Number: Junior Primary (standards 5 or 6 – 8)	3	4	7
Affiliation^a			
Public: Local Education Authority (LEA)	5	9	14
Islamic	3	1	4
Presbyterian	1	3	4
Anglican	1	1	2
Catholic	19	16	35
Year established^a			
Pre-independence (1964)	9	11	20
Independence to UPE (1994)	12	13	25
Post-UPE	8	6	14
School shifts^b			
Single	23	29	52
Double	1	0	1
Overlapping	3	0	3
Distances to...			
Another primary school ^b			
less than 5km	17	18	35
equal to or greater than 5m	10	11	21
A secondary school ^b			
less than 5km	10	6	16
From 5km to 9km	8	9	17
10km or more	8	14	22
Farthest school catchment village ^b			
less than 5km	9	10	19
From 5km to 9km	15	15	30
10km or more	2	4	6

^a Based on published information provided by the Malawi Ministry of Education.

^b Collected on Head Teacher's Instrument. Head teacher information missing for 2 schools in Balaka, 1 school in Machinga. Additional missing information may exist on individual indicator.

Table 2 Dimensions of School Quality: Material Inputs and Opportunities to Learn

	Balaka District (Max N = 29)	Machinga District (Max N = 30)	Total
<i>Dimension: Material Inputs</i>			
Resources^a	% Schools...	% Schools...	% Schools...
All standards/streams have classrooms	48	54	51
Toilet facilities available: Boys	90	80	85
Toilet facilities available: Girls	90	77	83
Working potable water source on grounds	67	43	55
Formal playing fields	80	90	85
Netball court	83	93	88
Secure book storage room	14	28	21
Head teachers office	38	34	36
Staff/Teachers room	79	62	71
<i>Teacher Education and Training: Standards 4-8^b</i>			
% one or more teachers: junior secondary certificate or less	% Schools...	% Schools...	% Schools...
% one or more teachers: junior secondary certificate or less	76	77	76
% one or more teachers: non-permanent/volunteer	66	50	58
% one or more teachers: No training Teachers College	52	43	47
% one or more teachers: MOE in-service training	90	77	83
% one or more teachers: MESA in-service training	24	93	59
% one or more teachers: MTTA in-service training	10	97	54
% one or more teachers: Safe Schools in-service training	28 ^c	30	29
<i>Dimension: Opportunities to Learn</i>			
Average Student to teacher ratio ^d	94/1	101/1	98/1
Average Student to female teacher ratio ^d	411/1	476/1	440/1
Average Male to female teacher ratio ^d	3/1	4/1	4/1
Length of school day ^b			
% Less than 6 hrs	79	79	79
% More than 6 hrs	21	21	21
% of students with all subject textbooks ^e	19	25	22
% at least one teacher absent previous school week ^b	66	60	67
Avg. # days missed all teachers in ST 4-8: previous week ^b	2.3	1.5	1.9

^a Derived from the school facilities instrument.

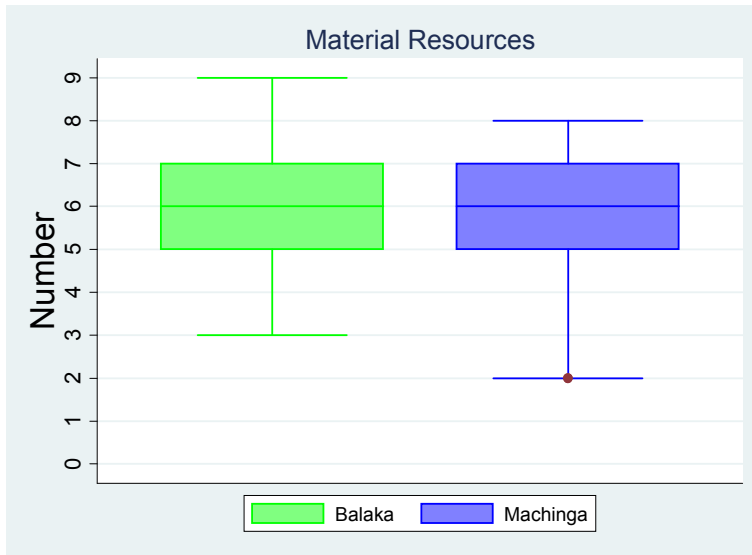
^b Derived from the head teachers and teachers questionnaire. Averages are calculated first within schools and then across schools.

^c Anomalous finding to be further investigated.

^d Based on Malawi Ministry of Education information for the 2005 school year

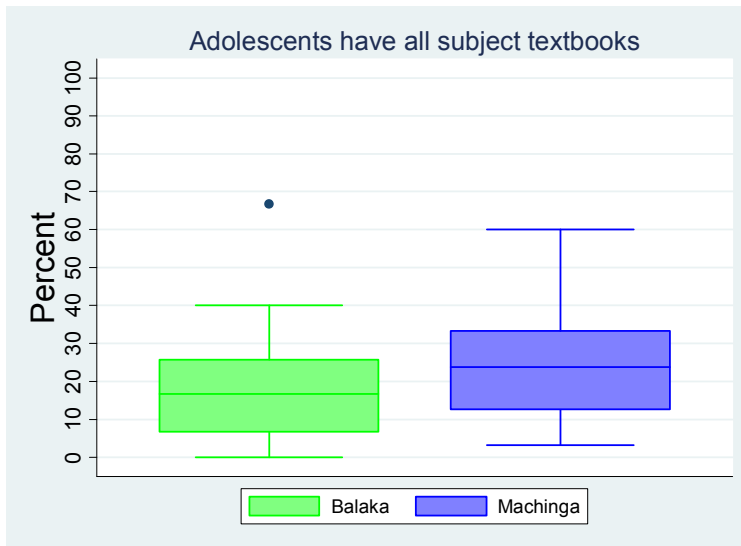
^e Derived from the adolescent student questionnaire. Averages are calculated first within schools and then across schools.

Figure 1 Distribution of School Material Resources by district



Source: Table 2: Count of material resources at school (max=9)

Figure 2 Distribution of Students Access to Subject Textbooks



Source: Table 2: Percent of students in school with all textbooks

Table 3 Dimensions of School Quality: Classroom Dynamics and Attitudes: Teachers Reporting^{a,b}

	Balaka District N=28		Machinga District N = 30		Total N=58	
	% who say...		% who say...		% who say...	
Dimension: Classroom Dynamics	Boys	Girls	Boys	Girls	Boys	Girls
Who is assign more chores at school	3	3	5	1	4	2
Who receives more positive comments in class	3	7	2	6	2	6
Who receives more negative comments in class	2	2	5	1	3	1
Who receive more punishment	7	0	8	0	8	0
Who receive harsher punishment	4	0	3	3	4	1
Who are more unruly in class	78	3	69	8	74	6
	% who say...		% who say...		% who say...	
Dimension: Gender Attitudes	Boys	Girls	Boys	Girls	Boys	Girls
Toward student abilities...						
Who is better at learning English	34	25	46	10	40	17
Who is better at learning Mathematics	43	8	49	7	46	8
Who is better at learning Chichewa	5	15	5	15	5	15
Who is better at learning Lifeskills education	19	11	31	7	25	9
	% who...		% who...		% who...	
General Gender Attitudes	Agree	Disagree	Agree	Disagree	Agree	Disagree
it is as important girls to complete secondary school as it is for boys (+)	96	2	98	1	97	2
when a family cannot afford to send all children to school, it is better to send boys than girls (-)	8	85	10	84	9	85
when a husband and wife disagree about the number of children to have, the husband's opinion matters more (-)	39	52	34	59	37	55
A girl should get married when she finds an appropriate spouse, even if she is still in school (-)	5	94	4	95	4	95
Girls are as intelligent as boys (+)	89	10	92	8	91	9
	% who say...		% who say...		% who say...	
A husband is justified in hitting or beating his wife...	Yes	No	Yes	No	Yes	No
If she goes out without telling him	3	93	3	95	3	94
If she neglects the children	2	95	1	97	1	96
If she argues with him	1	95	1	99	1	98
If she refuses to have sex with him	2	95	1	98	2	96
If she burns the food	1	96	0	99	0	98
If she has an extra marital affair	15	70	8	81	12	75

^a Questions asked using audio computer self-administered interviews (ACASI) on handheld computers. The omitted category is "Equally Good/About the Same/No Opinion/ or Don't Know."

^b Estimates averaged first within schools among teachers, then across schools. Sensitivity analysis of estimates show little difference (+/ 2%) removing schools with small numbers of teachers (n<3) and compared to teacher level analyses.

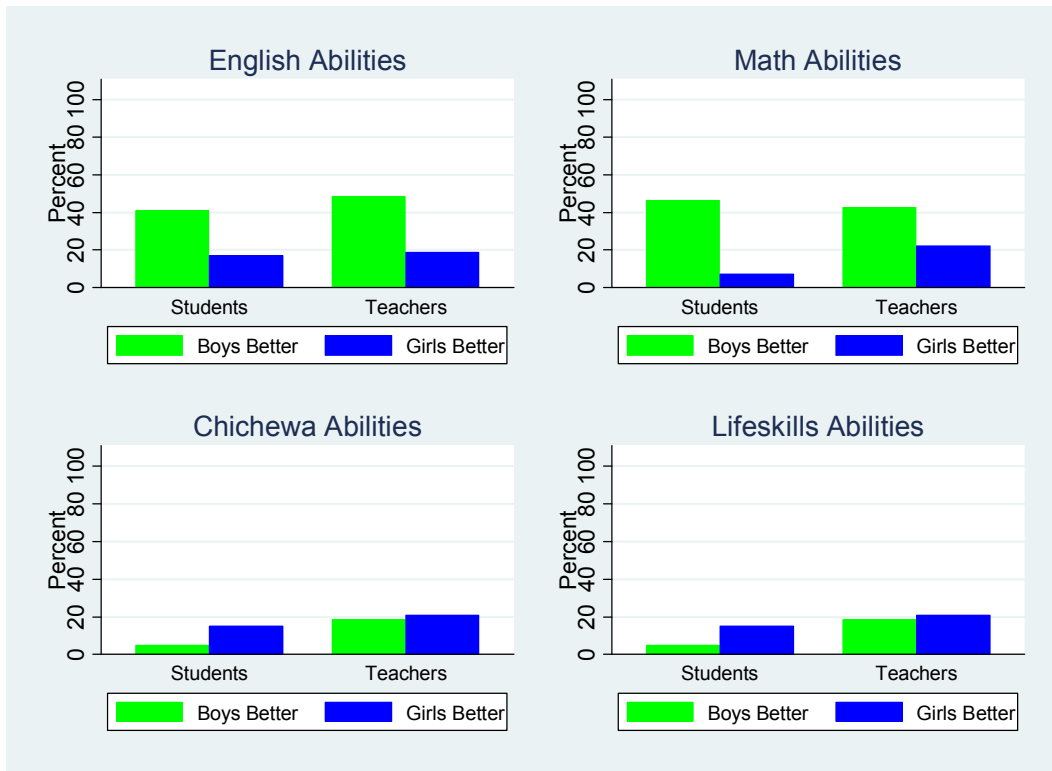
Table 4 Dimensions of School Quality: Classroom Dynamics and Attitudes: Students Reporting^{a,b}

	Boys (N = 59 Schools)		Girls (N=59 Schools)		Total (N=59 Schools)	
	% who say...		% who say...		% who say...	
Dimension: Classroom Dynamics	Boys	Girls	Boys	Girls	Boys	Girls
Who is assign more chores at school	38	3	18	11	29	7
Who receives more positive comments in class	37	12	18	18	28	15
Who receives more negative comments in class	26	34	43	17	35	25
Who receive more punishment	55	2	34	6	45	4
Who receive harsher punishment	64	2	44	6	54	4
Who are more unruly in class	75	8	88	3	81	5
Dimension: Gender Attitudes	% who say...		% who say...		% who say...	
Toward Student Abilities	Boys	Girls	Boys	Girls	Boys	Girls
Who is better at learning English	59	14	39	23	48	19
Who is better at learning Mathematics	54	14	30	32	43	22
Who is better at learning Chichewa	26	19	10	24	18	21
Who is better at learning Lifeskills education	30	19	29	17	30	17
	% who...		% who...		% who...	
General Gender Attitudes	Agree	Disagree	Agree	Disagree	Agree	Disagree
it is as important girls to complete secondary school as it is for boys (+)	96	4	96	4	96	4
when a family cannot afford to send all children to school, it is better to send boys than girls (-)	26	74	23	77	25	75
when a husband and wife disagree about the number of children to have, the husband's opinion matters more (-)	65	34	61	39	63	36
A girl should get married when she finds an appropriate spouse, even if she is still in school (-)	32	68	43	57	38	62
Girls are as intelligent as boys (+)	59	42	70	31	64	37
	% who say...		% who say...		% who say...	
A husband is justified in hitting or beating his wife...	Yes	No	Yes	No	Yes	No
If she goes out without telling him	7	93	12	88	9	91
If she neglects the children	8	92	16	84	12	88
If she argues with him	6	94	9	91	8	92
If she refuses to have sex with him	7	92	14	85	11	88
If she burns the food	6	94	14	86	10	90
If she has an extra marital affair	33	67	54	45	43	57

^a Questions asked in face-to-face interviews

^b Estimates averaged first within schools among students, then across schools, omitted category "Equally Good/About the Same/No Opinion/Don't Know"

Figure 3: Gender Attitudes about Schooling Performance Among Students and Teachers



Source: Table 3 and 4: Attitudes toward student abilities.

Table 5 Dimensions of School Quality: Physical and Sexual Harassment^{a,b}

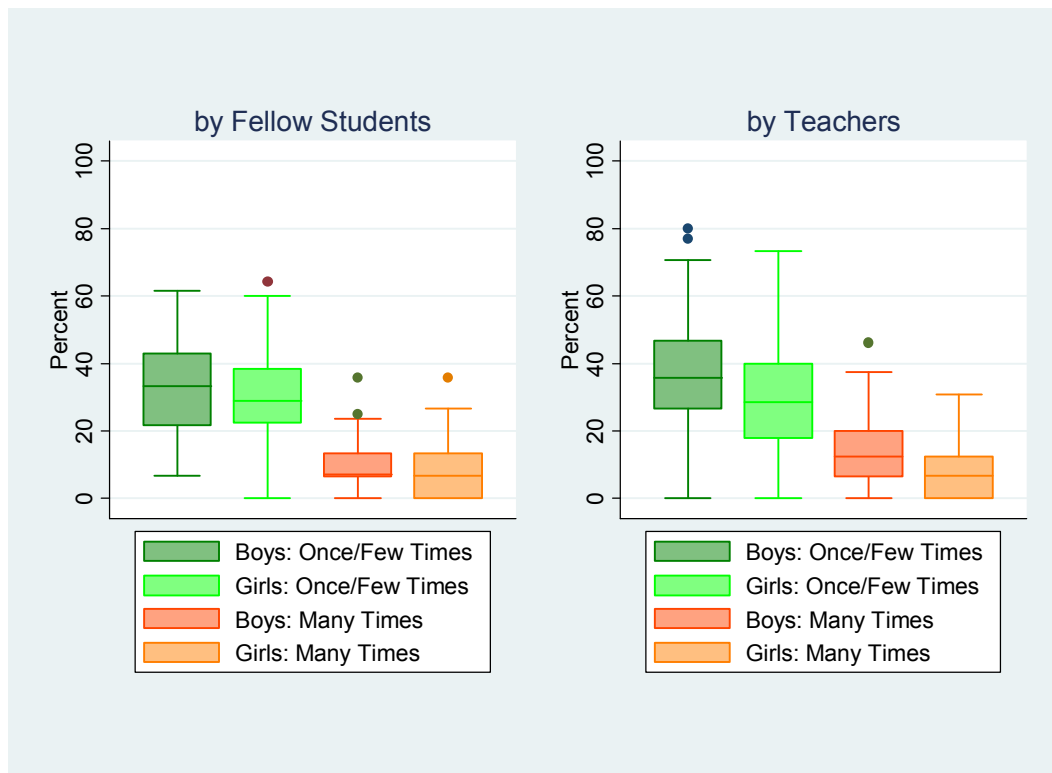
	Boys (N = 59 Schools)	Girls (N=59 Schools)	Total (N=59 Schools)
<i>Dimension: Physical and Sexual Harassment^c</i>			
Student teased or upset on the way to school	19	19	19
Student teased or upset at school by schoolmates	26	26	26
Student teased or upset at school by teacher	20	11	15
Student punched/slapped/whipped on the way to school	16	12	15
Student punched/slapped/whipped at school by schoolmates	14	13	14
Student punched/slapped/whipped at school by teacher	22	21	21
Student received sexual comments on the way to school	17	19	18
Student received sexual comments at school from schoolmates	22	18	20
Student received sexual comments at school from teacher	20	10	15
Student touched or pinched on the breast (girls only), buttocks or genitalia on the way to school	7	8	--
Student touched or pinched on the breast (girls only), buttocks or genitalia at school by schoolmates	9	10	--
Student touched or pinched on the breast (girls only), buttocks or genitalia at school by teachers	6	4	--
Schoolmates peeped into toilet while student inside	7	4	5
Teachers peeped into toilet while student in side	4	3	4

^a Questions asked using audio computer self-administered interviews (ACASI) on handheld computers.

^b Estimates averaged first within schools among students, then across schools, omitted category "Equally Good/About the Same/No Opinion/Don't Know"

^c Questions asked "In this school year how often have you been..." Response options "Never, once or twice, a few times, many times, everyday."

Figure 4 Student Physical and Sexual Harassment at School



Source: Table 5: Any one of three (1) teased or upset, (2) punched/slapped/whipped, (3) received sexual comments

Table 6 Educational Outcomes among Students

Students FTF and Literacy and Math Instruments			
	Boys	Girls	Total
Attendance			
Attended all days in the previous school week	52	55	54
Attended all days in the school week prior to that	62	66	63
Literacy			
Ability to read Chichewa sentences ^a (x2)	89	93	91
Ability to read English sentences ^a (x2)	66	72	69
Mathematical			
Logical ordering of numbers ^b (x2)	69	67	69
Fundamental mathematical operations ^c (x8)	26	23	25
Money operations ^d (x2)	59	58	59
	Balaka	Machinga	Total
Attendance			
Attended all days in the previous school week	47	60	54
Attended all days in the school week prior to that	57	69	63
Literacy			
Ability to read Chichewa sentences ^a (x2)	91	91	91
Ability to read English sentences ^a (x2)	69	70	69
Mathematical			
Logical ordering of numbers ^b (x2)	69	69	69
Fundamental mathematical operations ^c (x8)	24	25	25
Money operations ^d (x2)	59	59	59

^a Chichewa sentences (translated): “Farming is hard work”, “The child is reading”, English sentences: “Parents love their children”, “Children work hard in school.”

^b Asked to order missing numbers: 14, 15, __, 17, 18, 19, 20, __, __, 23 and order 8, 10, 5, 11, 4 from biggest to smallest

^c Consists of 2 of each of the following equations: addition, subtraction, multiplication and division

^d Asked how much 3 bananas would cost if each was 50 tambala and if they had 75 tambala to buy a pencil and paid 67 tambala, how much change they would receive.

Measuring and Assessing School Quality in Rural Malawi

Table 7 Correlation between Selected School Quality Indicators and Educational Outcomes

Schooling Quality Indicator	Expected Corr.	Attendance ^a		Literacy ^b		Mathematics ^c	
		Balaka	Machinga	Balaka	Machinga	Balaka	Machinga
Material resources and inputs							
Material resources (avg. score) ^d	+	.23	.01	-.04	.36†	.10	.17
Student Teacher ratio	-	-.32†	-.41*	-.40*	-.41*	-.04	-.49**
% Untrained teachers at school (ST 4-8)	-	-.37*	.29	-.23	.16	-.38*	-.04
% Volunteer teachers at school (ST 4-8)	-	-.49**	.18	-.41*	.13	-.27	-.22
Opportunities to learn							
Total teacher absent days in the previous week	-	.30	.02	-.07	.12	.06	-.07
% of students with all subject text books	+	.15	.12	.01	.17	.37*	.06
Gender Attitudes: Teachers							
				Girls Only		Girls Only	
% Teachers: Boys better English	-	.27	-.01	.00	-.31†	.13	-.47**
% Teachers: Boys better Mathematics	-	.17	.46**	.36†	-.06	.22	-.02
Gender Attitudes: Students							
				Girls Only		Girls Only	
% Teachers: Boys better English	-	-.15	.00	-.21	-.12	-.27	-.31†
% Teachers: Boys better Mathematics	-	-.04	.27	.16	.02	-.17	-.03
Student Harassment by teachers							
% Students punched/slapped/whipped: once/few	-	.28	.02	.23	-.02	-.06	.18
% Students punched/slapped/whipped: many times	-	.22	.07	-.11	-.46*	.03	-.22
% Boys touched sexually: once/few times	-	.29	.02	.29	-.23	.14	.08
% Boys touched sexually: many times	-	-.17	-.15	-.31†	-.08	-.39*	-.09
% Girls touched sexually: once/few times	-	-.02	.15	-.48**	-.32†	-.42*	-.03
% Girls touched sexually: many times	-	.32	.05	.13	.18	.32	.06

† p<.10, * p<.05, ** p<.01

^a Indicator used (Table 6): % attending all days in the previous week: observed range (11 to 88%); median 59%

^b Indicator used (Table 6): % able to read English sentences: observed range (20 to 93%); median 71%

^c Indicator used (Table 6): % able to complete fundamental mathematical operations: observed range (6 to 48%); median 23%

^d Equally weighted additive index (Table 2)

Appendix Table 2a Dimensions of School Quality: Material Inputs, Teacher Characteristics and Opportunities to Learn

	D1	D2	D3a	D3b	D3d	D4a	D4b	D4c
D1	1.0000							
D2	0.1608	1.0000						
D3a	0.2117	0.2814	1.0000					
D3b	0.0182	0.1826	0.1720	1.0000				
D3d	0.0589	0.2274	0.2037	0.6670	1.0000			
D4a	0.0663	0.2485	0.2255	0.0592	0.0890	1.0000		
D4b	-0.1096	-0.2786	-0.3284	-0.2205	-0.1734	-0.0330	1.0000	
D4c	-0.0105	-0.2452	-0.2296	-0.1482	-0.1114	0.0264	0.8699	1.0000

D1 = Avg. N Material Resources at school
D2 = Avg. Student Teacher Ratio^a
D3a = % Teacher Education: JCE or Lower^a
D3b = % Teacher Training: No Teacher College Training^a
D3d = % Teacher Volunteer or Non-Permanent^a
D4a = % Students: Have All Textbooks
D4b = % Teachers: Absent Last Week^a
D4c = Avg. N days absent last week^a

^a Note: indicator scale reversed: higher values = greater degree of schooling quality

Appendix Table 3a Dimensions of School Quality: Correlation of Gender Attitudes among Teachers

	A1	A2	A3	A4	G1	G2	G3	G4	G5
A1	1.0000								
A2	0.3278	1.0000							
A3	0.1360	0.0677	1.0000						
A4	0.3202	0.2408	0.0318	1.0000					
G1	0.0428	-0.1012	-0.0440	0.0013	1.0000				
G2	0.1832	0.2103	0.1626	0.3456	-0.0806	1.0000			
G3	-0.1539	0.0698	-0.1698	0.2463	0.0102	0.1689	1.0000		
G4	-0.0257	0.0265	-0.0168	0.2336	0.4111	-0.0672	0.2032	1.0000	
G5	0.2239	0.1246	-0.1160	0.2649	0.2152	0.3498	0.1447	-0.0876	1.0000

% Teachers at school Agreeing...

- A1 = Boys better at learning English
- A2 = Boys better at learning Mathematics
- A3 = Boys better at learning Chichewa
- A4 = Boys better at learning learning
- G1 = Important girls to complete secondary^a
- G2 = Better to send boys to school
- G3 = Husband opinion matters more than wife
- G4 = Marriage more important than school for girls
- G5 = Girls are as intelligent as boys^a

^a Note: indicator reversed: to % disagreeing
Source: Table 3 Dimension: Gender attitudes

Appendix Table 4a Dimensions of School Quality: Correlation of Gender Attitudes among Students

	A1	A2	A3	A4	G1	G2	G3	G4	G5
A1	1.0000								
A2	0.2439	1.0000							
A3	0.2675	0.3458	1.0000						
A4	0.4155	0.0867	0.0876	1.0000					
G1	-0.0151	-0.2552	0.1298	0.0717	1.0000				
G2	-0.0919	-0.2086	0.2020	0.0086	0.5903	1.0000			
G3	-0.1308	-0.1240	0.1629	0.2281	0.3150	0.3321	1.0000		
G4	0.0545	-0.4010	0.0222	0.1301	0.3319	0.2058	0.0710	1.0000	
G5	0.1713	0.2024	0.0835	0.0017	0.0437	-0.0800	-0.2128	-0.0607	1.0000

% Teachers at school Agreeing...

A1 = Boys better at learning English

A2 = Boys better at learning Mathematics

A3 = Boys better at learning Chichewa

A4 = Boys better at learning learning

G1 = Important girls to complete secondary^a

G2 = Better to send boys to school

G3 = Husband opinion matters more than wife

G4 = Marriage more important than school for girls

G5 = Girls are as intelligent as boys^a

^a Note: indicator reversed: to % disagreeing

Source: Table 3 Dimension: Gender attitudes