EFFECT OF THE MCHINJI SOCIAL CASH TRANSFER PILOT SCHEME ON CHILDREN'S SCHOOLING, WORK AND HEALTH OUTCOMES: A MULTILEVEL STUDY USING EXPERIMENTAL DATA

Winnie Kavulani Luseno

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Approved by:

Kavita Singh Ongechi, PhD

Carolyn Halpern, PhD

Denise Hallfors, PhD

Suzanne Maman, PhD

Sudhanshu Handa, PhD

Chirayath Suchindran, PhD

ABSTRACT

WINNIE KAVULANI LUSENO: Effect of the Mchinji Social Cash Transfer Pilot Scheme on Children's Schooling, Work and Health Outcomes: A Multilevel Study using Experimental Data
(Under the direction of Dr. Kavita Singh Ongechi)

This dissertation examines whether the Mchinji Social Cash Transfer Pilot Scheme (SCTPS), implemented in a rural district in central Malawi, improved schooling, work and health outcomes for children ages 6-17. Effects of individual level (orphan status and child's gender) and household level factors (working-age adults and sick adults) on the outcomes are also studied. The study uses panel data collected in 2007-2008 from a randomized controlled evaluation study. This dissertation is unique in its use of multilevel methods. Also, this is the first study to report on the impact of an unconditional cash transfer program on health outcomes for school-age children.

The first paper shows that the Mchinji SCTPS increased school enrollment, decreased days missed from school and reduced children's time spent in economic work activities. Although, transfers increased the number of and time spent in domestic work activities, the number of hours worked remained relatively low. While girls were more advantaged in education they were disadvantaged in child work compared to boys. A larger number of working-age adults in a household was associated with reduced work burden on children. Contrary to other research, orphans in this study were not disadvantaged in schooling and work outcomes relative to non-orphans.

The second paper shows that compared to children in non-beneficiary households, those in beneficiary households had lower odds of child illness and serious illness that stopped normal activities. An increase in the household number of working-age adults was associated with lower odds of child illness and health care use. An increase in the household number of sick adults increased the odds of child illness, serious illness and health care use. No statistically significant differences were observed by orphan status and child's gender.

Study findings suggest that unconditional programs have the potential to improve outcomes for older children in sub-Saharan Africa. Further research is needed to understand the causal pathways or mechanisms through which Mchinji SCTPS impacts children's outcomes. Going forward, in addition to poverty, unconditional cash transfer programs in Malawi and other sub-Saharan countries should consider other factors that reflect household vulnerabilities or constraints as eligibility criteria, such as adult morbidity.

To the memory of my mother, Dorcas Chepkemboi Luseno

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CHAPTER 1

INTRODUCTION

Poverty is a critical obstacle to the survival and development of children (Gordon 2003). Children living in poverty often have limited access to education and health services, suffer from poor health, and are involved in work activities to assist adults who may be sick, elderly or engaged in seeking income (Gordon 2003). Cash transfers to poor households are increasingly being used in developing countries as a key policy intervention to reduce child poverty, facilitate household investment in child education and health, and discourage child work (Barrientos and DeJong 2006; Fiszbein et al. 2009). While emerging evidence from Latin American countries indicates that conditional cash transfers significantly improve children's outcomes (Fiszbein et al. 2009), less is known about cash transfer effects in sub-Saharan African countries where most programs are unconditional and poverty, HIV and lack of services are more widespread (Adato and Bassett 2009; Case, Hosegood and Lund 2005; Fiszbein et al. 2009; Miller, Tsoka and Reichert 2008a; Miller et al. 2010; Samson et al. 2010).

In order to facilitate precise targeting of effective programs to reach children who are most in need, a complete understanding is required of other individual and household level factors that also affect children's outcomes. Previous research suggests that in some settings orphanhood may be an important individual level risk factor for child poverty and the associated adverse education outcomes (Case and Ardington 2006; Case, Paxson and Ableidinger 2004; Evans and Miguel 2007; Yamano and Jayne 2005). However, little is

known about the effect of parental death on children's health and work outcomes. Also, it is not known whether cash transfer programs are differentially effective for orphans relative to non-orphans.

Child gender is also an important individual level risk factor for children's outcomes. Studies show a higher burden of disease and mortality rates among females in sub-Saharan Africa, especially those aged 15-19, than among males in the same age group (Gore et al. 2011; Patton et al. 2009). Studies have also found that while the probability of domestic work is higher for female children than male children in developing countries, male children are more likely to engage in economic work activities. Few studies, however, have examined gender differences in time spent on child work activities. Although recent studies show a closing of the education gender gap in many countries and in some cases the emergence of a female advantage (Chimombo 2009; Grant and Behrman 2010; Lewin 2009), there is some evidence that gender inequalities favoring boys remain in some dimensions of education. For example, while fewer girls drop out and have better school progress than boys, they have a lower likelihood of being enrolled in school. These mixed findings underscore the urgent need for continued research on gender inequity in education.

UNICEF (2005) defines vulnerable children as those who are orphans; have chronically ill parents; live in a household where in the past 12 months at least one adult died and was sick for 3 of the 12 months before he/she died; live in a household where at least one adult was seriously ill for at least 3 months in the past 12 months; or live in an institution (e.g., orphanage) or on the streets. Indeed, higher burdens of disease have been found among children living with sick parents (Kidman et al. 2010). Other studies have found negative effects on children's education outcomes due to illness among household adults and positive

effects on children's work burden as the number of able adults in a household increased (Ainsworth, Beegle and Koda 2005; Case and Ardington 2006; Evans and Miguel 2007; Nankhuni and Findeis 2004; Yamano and Jayne 2005).

This dissertation has three goals. The first goal is to determine the effect of the Mchinji Social Cash Transfer Pilot Scheme (SCTPS), an unconditional cash transfer program implemented in rural Malawi, on children's schooling, work and health outcomes. The second goal is to obtain a more complete understanding of orphan status and child gender effects on children's outcomes in Malawi. Third, this dissertation study examines whether and how the presence of sick and working-age adults in a household affects school-age children's outcomes.

The research is guided by the socio-ecological framework as well as a conceptual model based on findings from previous research. Multilevel regression methods are used for the analyses. Multilevel modeling accounts for clustering in data such as in this study whereby outcomes for children living in the same household were likely to be similar. Multilevel models also offer a robust and efficient approach to simultaneously test research hypotheses concerning individual and household level influences on children's outcomes (Bingenheimer and Raudenbush 2004). They are also more efficient for examining cross-level relationships in nested data structures than previously used fixed-effects methods. This dissertation study is the first to use a multilevel estimation approach to evaluate a cash transfer program. De-identified data collected for an evaluation study of the Mchinji SCTPS, a cash transfer program owned and implemented by the Government of Malawi, were used for this study. The evaluation study was conducted as a collaboration between Boston University's School of Public Health and the Center for Social Research of the University of Malawi.

SPECIFIC AIMS

This dissertation research consists of two distinct studies with similar aims and methods but different outcomes. The first study focuses on schooling and work outcomes while the second focuses on health outcomes. The specific aims and hypotheses for the two studies are as follows:

Study 1

Aim 1.1. To examine the effect of the Mchinji SCTPS on schooling and child work outcomes

Hypothesis 1.1.a: Children in households that receive the cash transfer will be more likely to be enrolled in school, have fewer days missed from school, and be in the appropriate grade-for-age than children in households that do not receive the cash transfer.

Hypothesis 1.1.b: Children in households that receive the cash transfer will have fewer numbers of child work activities and child work hours than children in households that do not receive the cash transfer.

Aim 1.2. To examine the effect of orphan status and child gender on schooling and child work outcomes

Hypothesis 1.2.a: Orphans will be less likely to be enrolled in school, have a higher number of days missed from school, and have slower progression through school than non-orphans.

Hypothesis 1.2.b: Orphans will be involved in more child work activities and child work hours than non-orphans.

Hypothesis 1.2.c: Girls will be less likely to be enrolled in school but they may or may not have a higher number of days missed from school and slower progression through school than boys.

Hypothesis 1.2.d: Girls will be more involved and spend more hours in domestic work activities, while boys will be more involved and spend more hours in economic work activities.

Aim 1.3. To examine the effect of number of household working-age and sick adults on children's schooling and child work outcomes

Hypothesis 1.3.a: There will be a positive association between the number of working-age adults in a household and children's enrollment in school and a negative association between the number of working-age adults and number of days missed from school.

Hypothesis 1.3.b: There will be a negative association between the number of sick adults in a household and children's enrollment in school and a positive association between the number of sick adults in a household and number of days missed from school.

Aim 1.4. To determine if the impact of the cash transfer program on schooling and child work outcomes varies by orphan status and/or household characteristics

Hypothesis 1.4.1: The effect of the cash transfer program on child outcomes will vary by orphan status such that:

Hypothesis 1.4.1.a: Orphans in households that receive the cash transfer will have a smaller increase in the likelihood of school enrollment and smaller decrease in the number of days missed from school than non-orphans in households that receive the cash transfer.

Hypothesis 1.4.1.b: Orphans in households that receive the cash transfer will have a smaller decrease in the number of child work activities and child work hours than non-orphans in households that receive the cash transfer.

Hypothesis 1.4.2: The effect of the cash transfer program on child outcomes will vary by the number of working-age adults in the household such that:

Hypothesis 1.4.2.a: Children in households that receive the cash transfer and have more working-age adults will have a larger increase in the likelihood of school enrollment and larger decrease in the number of days missed from school than children in households that receive the cash transfer and have fewer working age adults.

Hypothesis 1.4.2.b: Children in households that receive the cash transfer and have more working-age adults will have a larger decrease in the number of child work activities and child work hours than children in households that receive the cash transfer and have fewer working age adults.

Hypothesis 1.4.3: The effect of the cash transfer program on child outcomes will vary by the number of sick adults in the household such that:

Hypothesis 1.4.3.a: Children in households that receive the cash transfer and have more sick adults will have a smaller increase in the likelihood of school enrollment and smaller decrease in the number of days missed from school than children in households that receive the cash transfer and have fewer sick adults.

Hypothesis 1.4.3.b: Children in households that receive the cash transfer and have more sick adults will have a smaller decrease in the number of child work activities and child work hours than children in households that receive the cash transfer and have fewer sick adults.

Study 2

Aim 2.1. To examine the effect of the Mchinji SCTPS on children's health outcomes

Hypothesis 2.1.: Children in households that receive the cash transfer will be less likely to report illness in the past month, report illness that stopped normal activities, report missing school because of illness and/or injury; and more likely to report use of health care services for a child's worst illness in the past year than children in households that do not receive the cash transfer.

Aim 2.2. To examine the effect of orphan status and child gender on children's health outcomes

Hypothesis 2.2.a: Orphans will be more likely to report illness and less likely to utilize health services than non-orphans.

Aim 2.3. To examine the effect of number of household working-age and sick adults on children's health outcomes

Hypothesis 2.3.a: There will be a negative association between the number of working-age adults in a household and the likelihood of children's sickness and a positive association between the number of working-age adults and the likelihood of children's utilization of health services.

Hypothesis 2.3.b: There will be a positive association between the number of sick adults in a household and the likelihood of children's sickness and a negative association between the

number of sick adults in a household and the likelihood of children's utilization of health services.

Aim 2.4. To determine if the impact of the cash transfer program on children's health outcomes varies by orphan status and/or by household characteristics

Hypothesis 2.4.a: The effect of the cash transfer program on child outcomes will vary by orphan status such that orphans in households that receive the cash transfer will have a smaller decrease in the likelihood of being sick and smaller increase in the likelihood of health services utilization than non-orphans in households that receive the cash transfer.

Hypothesis 2.4.b: The effect of the cash transfer program on child outcomes will vary by the number of working-age adults such that children in households that receive the cash transfer and have more working-age adults will have a larger decrease in the likelihood of being sick and larger increase in the likelihood of health services utilization than children in households that receive the cash transfer and have fewer working-age adults.

Hypothesis 2.4.c: The effect of the cash transfer program on child outcomes will vary by the number of sick adults in the household such that children in households that receive the cash transfer and have more sick adults will have a smaller decrease in the likelihood of being sick and smaller increase in the likelihood of health services utilization than children in households that receive the cash transfer and have fewer sick adults.

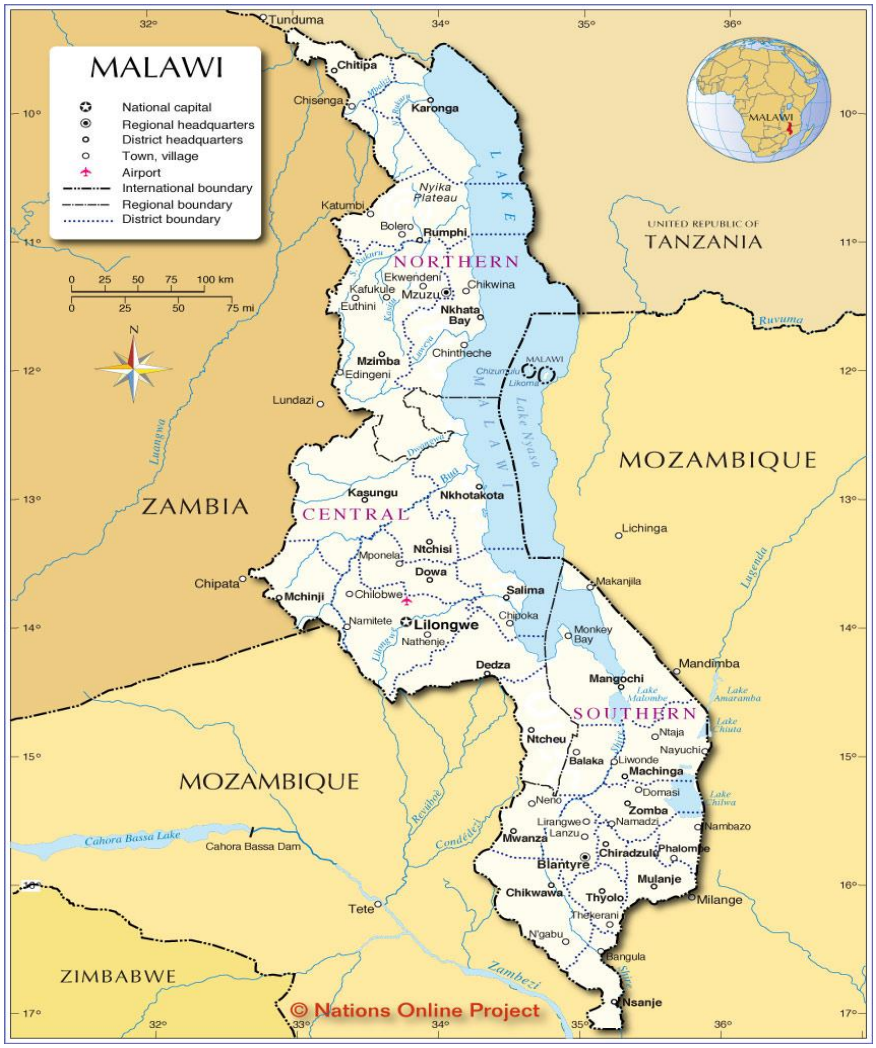
BACKGROUND

Malawi is a landlocked country situated south of the equator in sub-Saharan Africa. It is bordered to the west and northwest by the Republic of Zambia, to the north and northeast by the United Republic of Tanzania, and to the east, south and southwest by the People's

Republic of Mozambique (see Figure 1.1. Map of Malawi). Malawi was under British rule from 1891 to July 1964 when it gained independence. Although the official language in Malawi is English, Chichewa – the language of the largest ethnic group, the Chewa – is most commonly spoken. Other significant ethnic groups include the Lomwe, Yao, Ngoni and Tumbuka.

Administratively, Malawi is divided into three regions with a total of 28 districts. There are 6 districts in the Northern Region, 9 in the Central Region, and 13 in the Southern Region. Each district is subdivided into Traditional Authorities (TAs) presided over by chiefs. The TAs are composed of villages, which are the smallest administrative units presided over by village heads.

Figure 1.1. Map of Malawi



An estimated 85% of the population reside in rural areas and the share of agricultural exports is estimated at 53% of total merchandise (National Statistical Office (NSO) [Malawi] 2008). Malawi is one of the poorest countries in the world and is ranked 153 out of 169 countries in the 2010 Human Development Index (United Nations Development Fund (UNDP) 2010). In 2005, 52% of the Malawi population was classified as poor and 22% as ultra-poor (National Statistical Office (NSO) [Malawi] 2005). Life expectancy at birth is 54.6 years, the combined gross enrolment ratio in education for both girls and boys is 61.9% and mean years of schooling among adults 25 years and older is 4.3 (National Statistical Office (NSO) [Malawi] 2005; United Nations Development Fund (UNDP) 2010). In 2010, an estimated 12.6% of children under age 18 years were orphans (National Statistical Office (NSO) [Malawi] and ICF Macro 2011). In 2007, it was estimated that out of 1,164,939 orphans, 436,503 Malawian children were orphans due to AIDS (Government of Malawi 2010). Malawi is among the worst HIV/AIDS affected countries in sub-Saharan Africa with prevalence among people aged 15 to 49 estimated at 10.6% in 2010 (National Statistical Office (NSO) [Malawi] and ICF Macro 2011).

The Malawi Social Cash Transfer Scheme (SCTS) is owned and implemented by the Government of Malawi with funding from the Malawi National AIDS Commission (NAC), United Nations Children's Fund (UNICEF), Irish Aid, European Union (EU) and the German Government. The program is designed to alleviate poverty, reduce hunger and malnutrition, and improve school enrollment within the poorest 10% of households, i.e., the ultra-poor, who are also labor constrained (Miller, Tsoka and Reichert 2008b). Ultra poor households live below the national ultra-poverty line, are in the lowest expenditure quintile, consume only one meal per day and own no valuable assets (Miller et al. 2008b). In 2005, the official

Malawi poverty line was Malawi Kwacha (MK)16,165 per capita per year (US$115 per year) and the ultra-poverty line was MK 10,029 per capita per year (US$71) (National Statistical Office (NSO) [Malawi] 2005). Labor constrained households are elderly headed with no adults between ages 19-64 that are fit for work or child-headed households; have incalculable or worse than three dependency ratios; and/or contain adults that are chronically sick or disabled (Miller et al. 2008b).

The Malawi SCTS targeting criteria (i.e., ultra-poor and labor constrained households) combines several dimensions of vulnerability that have been hailed as important components of a successful child-sensitive social protection program that is AIDS sensitive rather than AIDS exclusive (Yates, Chandan and Lim Ah Ken 2010). AIDS sensitive programs appreciate that although AIDS-affected children (e.g., AIDS orphans) living in poverty and suffering from social exclusion in high HIV-prevalence countries may face specific vulnerabilities (e.g., HIV/AIDS-related stigma and discrimination and/or barriers to accessing health services and treatment), many of their needs due to poverty and social exclusion are shared with other vulnerable children. These programs recognize that exclusive focus on AIDS-specific child vulnerability runs the risk of excluding other vulnerable children who are equally in need of social protection (Yates et al. 2010).

Mchinji Social Cash Transfer Pilot Scheme (SCTPS). The Malawi SCTS began as a pilot in 2006-07 in Mchinji District which is in the western-most part of the Central Region of Malawi about 100 miles from Lilongwe, the national capital city (see Figure 1.1.). In 2005, 30% of households in Mchinji District were classified as ultra-poor compared to 22% of households in Malawi, overall (National Statistical Office (NSO) [Malawi] 2005) and the district was ranked as the 14th poorest out of 28 districts (Schubert and Huijbregts 2006). The

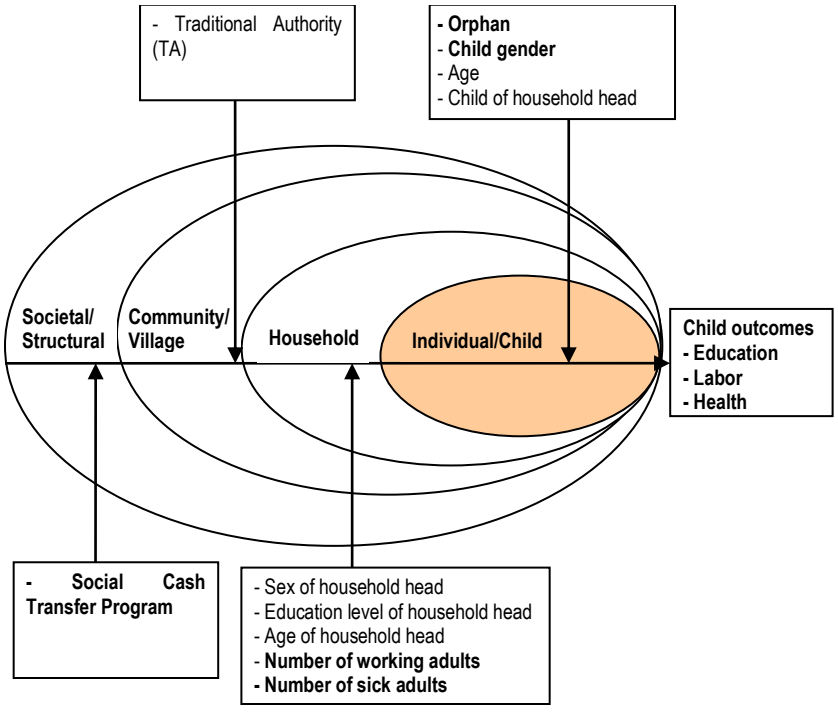
first transfers to recipient households in the Mchinji SCTPS were made in June 2006 and by April 2008, 2,878 households were receiving transfers on a monthly basis. As of July 2010, the SCTS had been expanded beyond Mchinji to 7 additional districts, reaching 24,051 ultra-poor households and approximately 95,000 individuals (Carolina Population Center (CPC) 2012). It is expected that by 2015 the scheme will have been implemented in all districts in the country. To date, approximately 80% of the Malawi SCTS program participants are estimated to be AIDS affected households, 80% of households include children, and among those households with children, the mean number of orphans is 1.6, well above the national average.

CONCEPTUAL FRAMEWORK AND METHODS

Theoretical Framework, Conceptual Model and Estimation

Theory. The proposed research is based on the socio-ecological framework (Bronfenbrenner 1977; Stokols 1992), which posits that children's outcomes are influenced not only by individual characteristics but also by the social environments or contexts in which they live (see Figure 1.2.). The framework suggests that

Figure 1.2. Socio-Ecological Framework



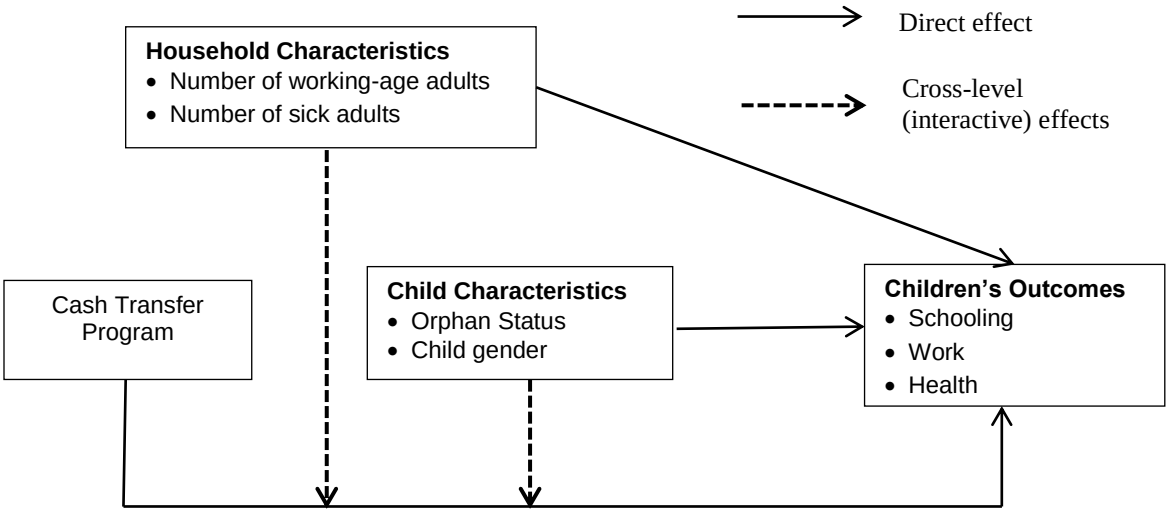
these environments can be conceptualized as a set of nested levels of relationships from the individual, to the household, to the community, and finally to the wider society (Bronfenbrenner 1977; Stokols 1992; Susser and Susser 1996). The more distant the level, the less influence it has on outcomes. Processes occur at each level as well as interact between levels to determine a child's outcomes.

Conceptual Model. The conceptual model guiding this study is presented in Figure 1.3. Based on the socio-ecological framework and previous studies, three social contexts or levels are posited as potentially relevant to children's schooling, work, and health outcomes – individual (or child), household, and structural (or societal). Due to lack of data, the proposed study cannot examine the effect of community (or village) level factors, another potentially relevant context, on children's outcomes. All three contexts examined in this study are expected to uniquely contribute to children's outcomes. In addition, following from the socio-ecological framework and findings from previous studies, interactive relationships are expected within the three contexts. In particular, cash transfer effects are expected to vary depending on orphan status and households characteristics. In the following section, the rationale for including each of the factors as well as the interactive relationships is reviewed.

Cash transfer effects on children's outcomes. In the Mchinji SCTPS, households selected to receive the cash transfer were informed that a portion of the cash transfer was for child education and this was reinforced each time they collected their monthly stipend. Although there was no formal monitoring of enrollment or attendance, if it was their choice, recipients gained the financial ability to enroll children in their households in school (Miller et al. 2010). Thus, it was expected that households that did not enroll their children in school prior to receiving the cash transfer because of limited financial resources would enroll them after

receiving the cash transfer because they now had the means and were encouraged by program staff to do so.

Figure 1.3. Conceptual Framework



Children in Mchinji are reported to leave primary school in high numbers for employment and to meet family responsibilities (Miller et al. 2010). Cash transfers were expected to reduce the number of child work activities and hours among school-age children through two possible channels. First, given increased school enrollment and regular attendance due to the cash transfer, children would have less time to participate in work activities (Fiszbein et al. 2009). Second, households that receive the cash transfer may be less dependent on the income of their children or may be able to hire additional labor and thus may reduce child work (Fiszbein et al. 2009).

Similar to schooling outcomes, cash transfer beneficiaries were encouraged to use funds to improve nutrition and for healthcare services. However, no conditions were imposed and recipients made their own decisions about expenditure (Miller, Tsoka and Reichert 2010). It was expected that households would use some of the funds to improve their diet, which in turn would lead to sufficient energy intake, better nutrition, stronger immune systems and

ultimately better health, especially among children. It was also expected that cash transfer recipients would make more use of health services for sick children because they now had the means to do so.

Orphan status effects on children's outcomes. Findings from previous research suggest that parental loss may lead to deficits in children's outcomes manifested by poor schooling outcomes (e.g., school dropout, increased number of missed school days and lower grade for age). Although there is less guidance in the literature on the relationship between orphan status and child work and health outcomes, we expect orphan status will be positively associated with child work (e.g., increased number of work activities or work hours), and/or poor health outcomes (e.g., higher likelihood of ill-health and inadequate use of health services).

Gender. Findings from previous research are mixed with respect to the effect of gender on children's outcomes in sub-Saharan Africa. However, we expect girls will be less likely to be enrolled in school but may or may not have fewer days missed from school or slower progression through school. Also, girls will be more involved in domestic work activities and boys in economic work activities.

Household characteristics. Based on previous research we expect that if a household has a sick adult member, children may (1) be removed from school or forced to attend irregularly either because they have to take care of the sick person or because financial resources have been diverted away from school-related costs (e.g., fees, uniform, textbooks and other school supplies) to medical and funeral bills; (2) have to devote more time to labor activities either to earn an income to substitute lost income previously earned by a now sick adult or help with household chores; and (3) themselves also be in poor health if the sick household

member is a primary caregiver or income earner and unable to provide adequate childcare, proper nutrition and sanitation, and/or use of child healthcare services, if needed.

In contrast, the presence of working-age adults (i.e., ages 18 to 64 years) in the household may positively influence children's outcomes in a number of ways. Working-age adults either may step in to take care of sick household members or, if sufficient resources are available, hire additional workers to meet household labor needs rather than pull school-age children from school or increase children's work activities or hours. They may also, especially if they are the child's parent or close relative (e.g., an older sibling), ensure that the child is in good health and receives proper healthcare when needed.

Cross-level (interactive/modification) effects: orphan status, household characteristics, and cash transfer. If, as hypothesized earlier, orphans are discriminated against within households, live in poorer households, or have lower returns to education than non-orphans then it is expected that they will reap fewer benefits from a cash transfer than non-orphans. The conceptual model further suggests that children living in households with sick adults will benefit less from a cash transfer than those living in households with no sick adults. This is because a large proportion of the funds may be allocated to medical bills for the sick adults rather than to school expenses, reductions in child labor and/or to acute child illnesses or healthcare use for children. Finally, households with no working-age adults are expected to be poorer and thus children living in these households may benefit less from a cash transfer than those living in households with working-age adults because there may be a greater need to allocate resources to other priority needs.

Multilevel methods. The use of multilevel methods for this study offers several improvements on the previously used household fixed effects (FE) and generalized

estimating equations (GEE) approaches, including more efficient estimates of household level effects on child outcomes. Most importantly, multilevel analysis allows for simultaneous examination of individual and household level influences on child outcomes. With multilevel analysis, households are appropriately treated as randomly sampled from a population of households. Effects of orphan status and gender on child outcomes are not estimated individually for each household as in the FE approach but are assumed to have a distribution across a population of households. Thus, estimation models estimate means and variances for the distribution of household effects allowing for inferences to specific households as well as to the population of all households as opposed to restricting inferences only to children living in the same households.

CHAPTER 2

EFFECT OF THE MCHINJI SOCIAL CASH TRANSFER PILOT SCHEME ON CHILDREN'S SCHOOLING AND WORK OUTCOMES

INTRODUCTION

Children living in poverty often have limited access to education and are involved in work activities to assist adults who may be sick, elderly or engaged in seeking income (Gordon 2003). Appropriate policy responses to childhood poverty and the associated adverse schooling and work outcomes are important as a human rights issue and because of the long-term consequences for affected children (e.g., fewer years of schooling, reduced capacity to learn, low future earnings) and potential inter-generational effects (e.g., poor outcomes among children with poorly educated mothers) (Adato and Bassett 2009; Barrientos and DeJong 2006). Cash transfers to poor households are increasingly being used in developing countries as a key policy intervention to address poverty and adverse child outcomes. However, the impact of cash transfer programs on children's schooling and work has not been conclusively established in sub-Saharan Africa. To this end, a complete understanding is needed of other individual and household level factors that also affect children's outcomes to facilitate precise targeting of effective programs to reach children who are most in need.

This paper used panel data collected for an evaluation study of the Mchinji Social Cash Transfer Pilot Scheme (SCTPS) to examine the impact of cash transfers on children's schooling and work. For the evaluation study, village groups in Mchinji District in central

Malawi were randomly assigned to intervention and control conditions. Eligible households in the intervention groups received cash transfers. To be eligible to receive a cash transfer, households had to be ultra-poor[1] and/or labor-constrained[2]. Although eligible, households in the control group did not receive cash transfers during the one year evaluation study. They did, however, receive transfers on completion of the evaluation study. Pre- and post-intervention surveys were used to collect data on children's education, work and other outcomes as well as several household and child characteristics (Miller et al. 2008a; Miller, Tsoka and Reichert 2010). Mchinji SCTPS was designed to alleviate poverty, reduce hunger and malnutrition, and improve school enrollment for the poorest 10% of households in the district (Miller et al. 2008b). The experimental design of the evaluation study allowed for the examination of the causal impact of cash transfers to poor households on children's schooling and work. Although the study was not explicitly designed to examine individual child and household effects on children's outcomes, the data were well suited and offered an opportunity to analyze these relationships in Malawi. The use of multilevel methods facilitated these secondary analyses. Multilevel modeling accounts for clustering in data such as in our study whereby outcomes for children living in the same household were likely to be similar. Multilevel models also offer a robust and efficient approach to simultaneously test research hypotheses concerning individual and household level influences on children's

[1] In Malawi, ultra poor households live below the national ultra-poverty line, are in the lowest expenditure quintile, consume only one meal per day and own no valuable assets (Miller et al. 2008b). In 2005, the official Malawi poverty line was Malawi Kwacha (MK) 16,165 (approximately US$115) per capita per year and the ultra-poverty line was MK 10,029 (approximately US$71) per capita per year (National Statistical Office (NSO) [Malawi] 2005).

[2] Labor constrained households are elderly headed with no adults between ages 19 and 64 that are fit for work, child headed households, have incalculable or worse than three dependency ratio and/or contain adults who are chronically sick or disabled (Miller et al. 2008b).

outcomes (Bingenheimer and Raudenbush 2004). This study is the first to use a multilevel estimation approach to evaluate a cash transfer program.

Our study had several important findings. First, results indicated that cash transfers improved schooling outcomes, specifically enrollment and number of days missed from school, for children in beneficiary households relative to those in non-beneficiary households. Second, while transfers reduced time spent in economic work activities, they increased the number of and time spent in domestic work for children in beneficiary households compared to those in non-beneficiary households. Differences, however, were trivial with children in beneficiary households involved in, on average, 1.24 domestic work activities and spending 3.12 hours on domestic work activities compared to 1.17 activities and 2.84 hours among children in non-beneficiary households. Third, contrary to other research, we did not find that orphans were disadvantaged in schooling and work outcomes relative to non-orphans. Fourth, gender differences were found with girls more advantaged in education but disadvantaged in child work compared to boys. Finally, support was found for the argument that the number of working-age adults (i.e., ages 18 to 64) in a household reduces the work burden on children.

In the next three sections we briefly review the literature on cash transfer programs, child vulnerabilities due to orphan status and type, child gender, and household demographic factors. We also provide an argument for how each factor may affect children's schooling and work outcomes. We next review previous methods and provide a rationale for our multilevel approach. Following this we discuss the data and methods used in this study and then present our results. The discussion and conclusion are presented in the final sections.

CASH TRANSFER PROGRAMS

Global consensus is building around cash transfers to poor households as a key child-sensitive social protection policy intervention that aims to address children's poverty and vulnerability and improve their long-term outcomes (Adato and Bassett 2009; Barrientos and DeJong 2006; Fiszbein et al. 2009; Yates et al. 2010). Cash transfer programs have been implemented in over 30 developing countries to facilitate household investment in child education and health and discourage child work (Barrientos and DeJong 2006; Farrington and Slater 2006; Fiszbein et al. 2009). An important principle of child-sensitive social protection is that cash transfer interventions be directed at families that support children.

Cash transfer programs have had a longer history in Latin American than sub-Saharan African countries. Most programs in Latin America are conditional and require recipient households to make specific investments on their school-age children's education and health. Evidence overwhelmingly indicates that conditional cash transfer (CCT) programs in this region have increased school enrollment rates and reduced rates of child labor among school-age children in beneficiary households (Fiszbein et al. 2009).

Because of the limited human and financial capacity to monitor CCTs, most cash transfer programs in sub-Saharan Africa have been targeted to extremely poor households or households with orphans and have been unconditional in that they do not require certain actions or activities by the beneficiaries (Schubert and Slater 2006). Existing evidence on CCT programs based in Latin American countries cannot be generalized to sub-Saharan African countries where programs are unconditional and poverty, HIV and lack of services are more widespread. However, similar to CCTs in Latin America, some unconditional cash transfer programs in sub-Saharan Africa have been shown to also increase school enrollment

and reduce drop-out rates (Adato and Bassett 2009; Case et al. 2005; Miller et al. 2008a; Samson et al. 2010). Although there is some evidence in unpublished literature that unconditional cash transfers have a mixed effect on work among school-age children (Miller et al. 2008a), this review found no published studies examining the impact of these programs on child work outcomes among school-age children in sub-Saharan Africa.

Cash transfers can be expected to improve schooling outcomes and reduce child work among school-age children in a number of ways. Cash transfers have the potential to enable families who previously lacked financial resources, to enroll their children in school. In some unconditional cash transfer programs such as the Mchinji SCTPS, families may be encouraged to use some of the transfer money for costs related to children's schooling. Additionally, given increased school enrollment and regular attendance due to the cash transfer, children may have less time to participate in work activities (Fiszbein et al. 2009). It can also be anticipated that households that received the cash transfer would be less dependent on the income of their children or more able to hire additional labor and thus child work would be reduced (Fiszbein et al. 2009).

INDIVIDUAL LEVEL VULNERABILITIES

Orphan status. Several studies have examined the effect of orphanhood, defined as being a child under age 18 years with one or both parents deceased, on schooling. These studies can be divided into two groups: cross-sectional and panel or longitudinal. Although findings from these studies, especially those that are cross-sectional, have been varying most suggest that orphan status and type are important individual level risk factors for child poverty and the associated adverse education outcomes.

Among the cross-sectional studies, Kurzinger et al. (2008) and Pagnier et al. (2008) found no statistically significant differences between orphans and non-orphans in school enrollment and school delay in Burkina Faso and Tanzania. Chuong and Operario (2012) analyzed a South Africa Demographic and Health Survey (DHS) dataset and found no significant effect of orphan status on educational delay, defined as being below the appropriate grade-for-age. Using data for 51 countries from a variety of sources (e.g., DHS, Multiple Indicator Cluster Surveys (MICS), and Integrated Household Surveys (IHS)), 35 of which were in sub-Saharan Africa, Ainsworth and Filmer (2006) showed that the effect of orphan status on school enrollment varies substantially by country. They also found that where orphans are disadvantaged relative to non-orphans, differences may be small and not statistically significant. In many countries, household poverty had a stronger effect on children's school enrollment than orphan status.

In contrast, Case, Paxson and Ableidinger (2004) and Campbell et al. (2010), using DHS data from 10 and 11 sub-Saharan African countries, respectively, found that orphans were significantly less likely to be enrolled in school than were non-orphans with whom they lived. Campbell et al. (2010) also found that in a third of the countries orphans were significantly less likely to complete primary schooling than non-orphans. Bicego, Rutstein, and Johnson (2003) pooled DHS data from five sub-Saharan African countries to create East and West African samples. In the East African sample they found that, while younger orphans aged 6-10 years were not significantly less likely to be at a low grade for age, older maternal and double orphans ages 11-14 years were significantly more likely to be below the proper grade level for their age than non-orphans. In the West African countries they found that younger paternal and double orphans and older paternal orphans were more likely to be

in a lower grade for their age than non-orphans. Using data from South Africa, Parikh et al. (2007) found that paternal orphans were more likely to be behind in school than non-orphans with whom they live. No significant differences in schooling were found between non-orphans and maternal or double orphans. Yamano, Shimamura and Sserunkuuma (2006) used data from Uganda and found orphan status had no significant effect on school enrollment among children aged 7-14 but double and virtual double (i.e., single orphans living away from their surviving parent) female orphans aged 15-18 were less likely to be enrolled in school compared to non-orphans in the same household. They also found that among children aged 7-14, male but not female orphans living with a surviving parent progressed through school more slowly than non-orphans in the same household. Both male and female double and virtual orphans aged 15-18 had significantly slower school progression than non-orphans. Cross-sectional studies, however, are limited in their ability to determine causal effects of orphan status or rule out alternative explanations for children's outcomes.

With panel data, measures of the outcomes of interest may in some cases be obtained prior to and after parental death, thus establishing a time sequence of events. Evidence from studies using panel data more consistently indicates that orphanhood is an important risk factor for poor schooling outcomes. In a study using panel data from Tanzania, Ainsworth, Beegle and Koda (2005) found that maternal orphans were significantly less likely than non-orphans to be attending primary school. While findings from Sharma (2006) do not indicate a significant effect of orphan status on school attendance in Malawi, they do indicate that orphans have a greater likelihood of dropping out of school compared to non-orphans as education level increases. Additionally, Evans and Miguel (2007) found a substantial and significant negative impact of parent death on primary school participation in Kenya. Impacts

were more than twice as large for maternal deaths than paternal deaths. Case and Ardington (2006) also found that maternal death, but not paternal death, has strong negative effects on children's schooling in South Africa. They also found that, relative to the non-orphans with whom they lived, maternal orphans were behind in their schooling and fewer resources were spent on their education. Yamano and Jayne (2005), also using panel data from Kenya, found significant negative effects of working-age adult death on school attendance.

Based on this previous research, we hypothesized that maternal, paternal and double orphans would have poorer schooling and work outcomes than non-orphans. Paternal orphans might live in poorer households with fewer resources available to allocate to their needs (Evans and Miguel 2007; Yamano and Jayne 2005). Having lost the key gatekeeper of their welfare, maternal and double orphans may be left without a caregiver committed to ensuring that their basic needs are met (Ainsworth et al. 2005; Case and Ardington 2006; Evans and Miguel 2007). Having to make changes in their living arrangements, some orphans, particularly double orphans, may find that they are faced with discrimination in their new homes in that their new caregivers may not be willing or able to allocate resources to their education and may expect them to take on more household work. It is also possible that orphans may have fallen behind their peers in school or dropped out of school prior to parental death because they were taking care of a sick parent (Evans and Miguel 2007; Yamano and Jayne 2005). Some studies have also suggested that having witnessed the death of their parents due to HIV/AIDS or other causes as well as having lost time from school and being behind their peers, orphans may have lower returns to education than non-orphans.

Orphanhood also may significantly increase school-age children's exposure to child work (Andrews, Skinner and Zuma 2006; Whetten et al. 2009; Whetten et al. 2011). Few studies,

however, have examined the association between orphanhood and child work outcomes in sub-Saharan Africa, and those that have produced inconclusive results (Guarcello et al. 2004). Our study makes a significant contribution to this gap in the literature.

Gender. While gender gaps in schooling in many developing countries, especially those in sub-Saharan Africa, largely favored boys in the 1970s and 1980s among poor households, more recent studies show a closing of the gap in many countries and in some cases the emergence of a female advantage (Grant and Behrman 2010; Lewin 2009). Despite these important improvements, there is some evidence that gender inequalities favoring boys remain in some dimensions of education. Using DHS data from 38 countries (21 of which were in sub-Saharan Africa, including Malawi), Grant and Behrman (2010) found that although girls were less likely to drop out and had better school progress than boys, they had a lower likelihood of being enrolled in school. Additionally, Chimombo (2009) reports that girls' education in Malawi has significantly improved relative to boys since the 1990s due to a high emphasis placed on girls' access to education by the government and donors. However, drop out is more common for girls in higher grades than for boys. These mixed findings underscore the urgent need for continued research on gender inequity in education.

Much of the focus on child work has been in the economics literature (Edmonds 2007; Edmonds and Pavcnik 2005; Haile and Haile 2011). These studies find that while the probability of domestic work is higher for female children than male children in developing countries, male children are more likely to engage in economic work activities. Similar results have been found in Malawi (Hazarika and Sarangi 2008; Nankhuni and Findeis 2004; Shimamura and Lastarria-Cornhiel 2010). We used data from the Mchinji SCTPS evaluation study to determine whether these relationships hold in our study region.

HOUSEHOLD EFFECTS

Most research on child vulnerability has focused on individual level risk determinants of adverse outcomes. Even though they may play a critically important role, few studies have examined whether household factors affect children's outcomes. Among these few studies, most have focused on household wealth with mixed findings (Beegle, De Weerdt and Dercon 2006; Case and Ardington 2006; Case et al. 2004; Evans and Miguel 2007; Sharma 2006). For our study, differences in wealth were negligible because only very poor households were included in the Mchinji SCTPS evaluation study.

Using the United Nations Children's Fund's (UNICEF) definition of vulnerable children and results from previous research, we identified other household factors that may be important for children's schooling and work outcomes. UNICEF (2005) defines vulnerable children as those who are orphans; have chronically ill parents; live in a household where in the past 12 months at least one adult died and was sick for 3 of the 12 months before he/she died; live in a household where at least one adult was seriously ill for at least 3 months in the past 12 months; or live in an institution (e.g., orphanage) or on the streets. Indeed, a number of previous studies have found significant negative effects on education outcomes among children due to serious prolonged parental illness prior to death and/or ongoing illness among surviving parents and other adults in the home (Ainsworth et al. 2005; Case and Ardington 2006; Evans and Miguel 2007; Yamano and Jayne 2005), whereas Nankhuni and Findeis (2004) found that a larger number of able adult household members reduced the work burden of school-age children in Malawi.

These findings suggest that in the absence of able adults in poor households, orphans and other vulnerable children may play an important role in caring for sick parents and/or other adults as well as performing other household and economic work (Ainsworth and Filmer 2006; Bennell 2005; Case and Ardington 2006; Evans and Miguel 2007; Weil 2010; Yamano and Jayne 2005). Because of their roles as caregivers, these children are more likely to drop-out of school, miss school days and have lower educational attainment (Bennell 2005; Edmonds 2007; Edmonds and Pavcnik 2005). This may be because financial resources have been diverted away from school-related costs (e.g., fees, uniform, textbooks and other school supplies) to medical and funeral bills. They may also have to devote more time to work activities either to earn an income to substitute lost income previously earned by a now sick adult or help with household chores. In contrast, the presence of working-age adults (i.e., ages 18 to 64 years) in the household may positively influence children's outcomes in a number of ways. Working-age adults either may step in to take care of sick household members or, if sufficient resources are available, hire additional workers to meet household labor needs rather than pull school-age children from school or increase children's work activities or hours. They may also serve as positive role models and provide social support for the children and thereby encourage continued school enrollment and attendance.

REVIEW OF PREVIOUS ESTIMATION METHODS

Our review of previous estimation strategies focuses mainly on CCT evaluations and studies examining the effect of orphan status on schooling outcomes. We highlight the limitations of the different methods that have been used and provide a rationale for the use of multilevel models. Study approaches that use standard regression methods (e.g., probit,

logistic, or ordinary least squares) with hierarchical or nested data without adequate adjustments in standard errors fail to account for dependence in the data structure, in that outcomes of children living together in the same households are likely to be correlated. In so doing, these studies (de Janvry and Sadoulet 2006; Kurzinger et al. 2008) violate a key regression assumption that residuals are independent, i.e., uncorrelated. On the other hand, studies that use standard methods with corrections for standard errors (Ainsworth et al. 2005; Schady et al. 2008; Schultz 2004; Sharma 2006; Skoufias et al. 2001) limit inferences to only overall effects of orphan status or cash transfers on child outcomes and do not allow for accurate evaluation of how effects may vary across households or the unique effect of other individual or household characteristics on outcomes. Generalized estimating equations (GEE), or population average models, are an alternative modeling approach for clustered data that do not require introduction of random effects together with the attendant distributional assumptions (Gardiner, Luo and Roman 2009; Hubbard et al. 2010). However, GEE models are limited in that they only estimate changes in the outcome population mean due to changes in the covariates averaged over all observed groups (e.g., households or communities) (Gardiner et al. 2009; Hubbard et al. 2010; Merlo 2003).

Longitudinal fixed-effects (FE) methods (e.g., Case, Paxson, and Ableidinger, 2004; Evans and Miguel, 2007; Yamano and Jayne, 2005; Case and Ardington, 2006) offer a better approach to control for dependence in the data as well as to more precisely determine the unique effect of orphan status on child outcomes than methods that simply correct standard errors. A nice feature of FE approaches is that dependence in the data can be accounted for by including dummy variables to control for all characteristics that vary across households and thereby account for differences across households in children's outcomes. However, this

approach has a number of disadvantages. Most importantly, a household FE approach limits the scope of analysis when households are randomly sampled from the population because this approach only permits comparisons to be made between orphans and non-orphans living in the same household. Inferences cannot be generalized to similar households in the study area or geographic setting. Additionally, it is difficult and cumbersome to simultaneously examine child and household level effects or to evaluate cross-level effects on child outcomes, requiring estimation of several equations to determine effects of interest.

The use of a multilevel approach offers several improvements on the household FE approach as well as GEE, including more efficient estimates of household level effects on child outcomes. Most importantly, multilevel analysis allows for simultaneous examination of individual and household level influences on child outcomes. With multilevel analysis, households are appropriately treated as randomly sampled from a population of households. Effects of orphan status and gender on child outcomes are not estimated individually for each household as in the FE approach but are assumed to have a distribution across a population of households. Thus, estimation models estimate means and variances for the distribution of household effects allowing for inferences to specific households as well as to the population of all households as opposed to restricting inferences only to children living in the same households.

DATA

Study setting. Malawi is a landlocked country situated south of the equator in sub-Saharan Africa. It is bordered to the west and northwest by the Republic of Zambia, to the north and northeast by the United Republic of Tanzania, and to the east, south and southwest

by the People's Republic of Mozambique (see Figure 1.1. in Chapter 1). The population of Malawi is approximately 13.1 million and the country has a predominantly agricultural economy. An estimated 85% of the population resides in rural areas (National Statistical Office (NSO) [Malawi] 2008). Malawi is one of the poorest countries in the world and is ranked 153 out of 169 countries in the 2010 Human Development Index (United Nations Development Fund (UNDP) 2010). In 2005, 52% of the Malawi population was classified as poor and 22% as ultra-poor (National Statistical Office (NSO) [Malawi] 2005).

In 2010, an estimated 12.6% of children under age 18 years were orphans (National Statistical Office (NSO) [Malawi] and ICF Macro 2011). In 2007, it was estimated that out of 1,164,939 orphans, 436,503 Malawian children were orphans due to AIDS (Government of Malawi 2010). Malawi is among the worst HIV/AIDS affected countries in sub-Saharan Africa with prevalence among people aged 15 to 49 estimated at 10.6% in 2010 (National Statistical Office (NSO) [Malawi] and ICF Macro 2011).

Malawi's education system is based on the 8-4-4 system, which is eight years of primary level education, four years of secondary education and four years at the tertiary level including university, technical and teacher training colleges. Although free primary education was introduced in 1994, other school related expenses e.g., uniforms and school supplies can limit primary school enrollment and attendance. Additionally, tuition and other costs associated with secondary education are prohibitive for many poor households in Malawi. The combined gross enrolment ratio in education for both girls and boys is 61.9% and mean years of schooling among adults 25 years and older is 4.3 (NSO [Malawi] 2005; UNDP 2010).

The Malawi Social Cash Transfer Scheme (SCTS) began as a pilot in 2006-07 in Mchinji District, which is in the western-most part of the Central Region[3] of Malawi about 100 miles from Lilongwe, the national capital city (see Figure 1.1. in Chapter 1). In 2005, 30% of households in Mchinji District were classified as ultra-poor compared to 22% of households in Malawi overall (NSO [Malawi] 2005), and the district was ranked as the 14th poorest out of 28 districts (Schubert and Huijbregts 2006). The first transfers to recipient households in the Mchinji SCTPS were made in June 2006 and by April 2008, 2,878 households were receiving transfers on a monthly basis. As of July 2010, the Malawi SCTS had been expanded beyond Mchinji to 7 additional districts, reaching 24,051 ultra-poor households and approximately 95,000 individuals (Carolina Population Center (CPC) 2012). It is expected that by 2015 the scheme will have been implemented in all districts in the country. To date, approximately 80% of Malawi SCTS program participants are estimated to be AIDS affected households, 80% of households include children, and among those households with children, the mean number of orphans is 1.6, well above the national average.

Sample selection and eligibility. Sample selection for the Mchinji SCTPS evaluation study was conducted in multiple stages. Mchinji District is divided into nine TAs which are further divided into village groups that contain multiple villages, creating clusters of about 1000 households. During the time of the evaluation study Mchinji SCTPS was operational in four out of nine TAs. Approximately 100 SCTPS eligible households per village group were identified in eight village groups. The sampling frame was a district-provided roster of all cash transfer approved households in the eight village groups, yielding approximately 819 households (Miller et al. 2008; Miller et al. 2010).

[3] Administratively, Malawi is divided into three regions (Northern, Central and Southern) with a total of 28 districts. Each district is subdivided into Traditional Authorities (TAs) presided over by chiefs. The TAs are composed of villages, which are the smallest administrative units presided over by village heads.

Intervention. By random assignment, four village groups were assigned to receive the cash transfer (i.e., intervention condition) and four to the control group that did not receive the cash transfer until after the evaluation study (see Figures 2.1. and 2.2.). All eligible households in the village groups randomized to the intervention condition received the cash transfer on a monthly basis. Disbursements began in the month following baseline data collection (see Figure 2.1.).The amount of the cash transfer depended on household size (see Table 2.1.) and the number of school-aged children in the household. An extra $1.44 and $2.88 (US) was received for each additional primary aged and secondary aged child in the household, respectively.

Data collection procedures. The Mchinji SCTPS evaluation study was approved by the Boston University Institutional Review Board (IRB) and the Malawian National Health Research Council at the Ministry of Health. IRB approval for secondary data analysis was also obtained from the University of North Carolina at Chapel Hill. Prior to baseline data collection, research staff conducted community consultations in participating villages to inform communities of the study. Guides were then identified to lead research staff to households but were not permitted to remain near the household during the interview (Miller et al. 2008; Miller et al. 2010). Interviews began with research staff describing the study to the participant and securing consent. Respondents were given a copy of the consent form for their records. Interviews were conducted with the household head, the person registered to receive the cash transfer, or another household member selected by the household head. Interviews lasted between 1.5 to 3 hours depending on the size of the household and the age and wellbeing of the respondent. Data collection consisted of completion of a survey questionnaire as well as height and weight measurements of all children and the household

head. The evaluation study consisted of three rounds of panel data collection (see Figure 2.1): Round 1 was in March 2007, Round 2 in September 2007 and Round 3 in April 2008 (Miller et al. 2008; Miller et al. 2010). For our study we used data from Rounds 1 and 3.

Sample characteristics. Appendix Table A1 and Figure 2.2 show that our final sample included 1,193 children aged between 6 and 17 years with complete baseline demographic information (695 intervention and 498 control). We included these ages because the official age for entry into primary school in Malawi is 6 years and an orphan is defined as a child under 18 years with one or both parents deceased. A total of 481 children were excluded because they had inconsistent age data, were not observed at baseline, had missing key baseline covariates (gender, orphan status), or they were no adults, age 18 or older, present in the household (see Figure 2.2). A logistic regression was fit to examine missingness of baseline covariates. Baseline missingness was significantly associated with the household head's education (Odds Ratio (OR)=0.54; $p<.05$) but not with child age, intervention/control status, household head's gender or age (Data not shown).

Sample sizes vary for the outcomes because children with full information on at least one outcome measured at baseline and 1-year follow-up were included. The mean age of the final analytical sample was 11 years with 44% between ages 6 and 10 years, 38% between ages 11 and 14 years, and 18% between ages 15 and 17 years. Half of the sample was female and 66% were orphans (33% maternal orphans, 56% paternal orphans and 24% double orphans). Orphan status changed for 37 children between baseline and 1-year follow-up from either non-orphan to maternal or paternal orphan or from maternal or paternal orphan to double orphan. We ran our analyses with and without these children to examine whether our results would be different.

At baseline, the mean school enrollment rate in the sample was 88% and 3 days were missed from school. About 98% of children in the sample were below the appropriate grade for their age (data not shown). Educational delay or slow grade progression is common in many sub-Saharan countries, especially rural areas, including in Malawi. It has been attributed to delayed enrollment, frequent grade repetitions, irregular school attendance and dropouts (Lewin 2009; Chimombo 2009).

At baseline, children in the study were mostly involved in household or domestic work activities. About 72% performed household chores (e.g., shopping, collecting firewood, cleaning or fetching water), 32% cared for other children in the household and 20% cared for adults in the household. They were less involved in work activities outside their home referred to here as economic work activities. The data show that 9% of children did paid or unpaid domestic service (i.e., mainly household chores) in someone else's house, 5% were self-employed (e.g., selling things, making things for sale, doing repairs, guarding cars, hairdressing, etc.), and 27% did other family work (e.g., on a farm or in a business).

Among children who worked at baseline 3.69 hours a week were spent on domestic work activities and 2.83 hours a week on economic work activities. Overall, children spent 4.73 hours a week in child work. Our data on child work substantially differ from those reported by Nankhuni and Findeis (2004), who found that 6-14 year old Malawian children spend on average 18.3 hours per week in household domestic work and that the most common form of domestic work is child care followed by fetching water, cooking and collecting firewood.

Selected household characteristics are shown in Appendix Table A2. A total of 235 households were excluded from analyses for the present study because of missing cluster codes, errors in intervention codes and not having any children ages 6-17 (see Figure 2.2).

Children ages 6-17 years in the final sample were distributed between 486 households, with a mean of 2 children per household. Just over half of the households in the sample were randomized to receive the cash transfer. Among household heads, mean age was 58 years, 68% were female and 47% had primary education or more.

Table 2.2 and Appendix Table A3 presents summary statistics from the baseline and follow-up data used in our analyses with tests for equivalence in the assigned groups (i.e., intervention vs. control). The statistics revealed some statistically significant baseline differences at the child level between the intervention and control groups in orphan status and type, school enrollment, number of domestic work activities and number of domestic work hours. At the household level, the data indicate differences between the assigned groups in the number of working-age adults, number of sick adults, proportion of female household heads, household heads with primary or more education, number of children ages 6-10, number of children ages 11-14 and number of children ages 15-17. These differences at the child and household levels were all significant at the 5% level.

MODEL SPECIFICATION, MEASURES AND STATISTICAL METHODS

We used multilevel models to account for the nested structure of the Mchinji SCTPS data, given that children are nested within households (see Table 2.3.), and to estimate the unique effects of child and household factors on child outcomes (Raudenbush and Bryk 2002). Two level models were used to examine the effects of child level factors (i.e., orphan type and sex) and household level factors (i.e., intervention, working-age adults and sick adults) on schooling and work outcomes for children aged 6-17 at baseline. It was initially anticipated that three level analyses would be performed to control for the cluster or village

group level. We were, however, unable to do this because randomization of households was based on village clusters. We estimated random-intercepts only models and the general two level model specification for the schooling and work outcomes of interest were as follows:

General level 1 model

Equation 1:

$$\eta_{ij} =$$

$$\beta_{0j} + \beta_{1j}(Mat.orphan)_{ij} + \beta_{2j}(Pat.orphan)_{ij} + \beta_{3j}(Dbl.orphan)_{ij} +$$

$$\beta_{4j}(Child\ gender)_{ij} + \sum_{q=5}^{q=8}\beta_{qj}(X)_{qij},$$

where η_{ij} is the appropriate link function for the dependent variable, i.e., logit link for the binary dependent variable, identity link function for the continuous dependent variable and log link function for the count dependent variables (see below for description of outcome measures). Mat. refers to maternal, Pat. to paternal and Dbl. to double.

General level 2 model

Equation 2a: $\beta_{0j} = \gamma_{00} + \gamma_{01}(Intervention)_j + \gamma_{02}(Working-age\ adults)_j +$

$\gamma_{03}(Sick\ adults\ 30d)_j + \sum_{s=5}^{s=12}\gamma_{0s}(W)_{sj} + u_{0j}$

where $u_{0j} \sim N(0, \tau_{00})$

Equation 2b:

$\beta_{pj} = \gamma_{pj}$ for p > 0

Measures. The three education outcomes of interest were (1) current school enrollment at 1-year follow-up (1=yes, 0=no), a binary variable; (2) number of days missed from school during the past month at 1-year follow-up (range 0-30), modeled as a count variable; and (3) school progression or appropriate age-for grade at 1-year follow-up calculated as (highest grade completed at 1-year follow-up)/(age – 5), a continuous variable (range 0-2.5)[4].

Two categories of child work outcomes were examined. They were number of child work activities involved in during the past week and, among those who were engaged in child work in the past week, number of hours spent in work. Following Edmonds and Pavcnik (2005) and Edmonds (2008), child work activities were further divided into two groups, household or domestic work and economic activities. Domestic work included shopping, collecting firewood, cleaning or fetching water, caring for other children in the household and caring for other adults in the household. Economic activities were defined as work outside the home including paid or unpaid domestic service in someone else's house (e.g., chores or caring for children or adults), self-employment (e.g., selling things, making things for sale, doing repairs, guarding cars, or hairdressing), and other paid or unpaid family work (e.g., on the farm, in a business or selling goods in the street). The total number of child work activities combining domestic and economic activities was also examined. Child work hours were also examined as hours spent in domestic activities, economic activities and all work activities. Child work outcomes were all modeled as count variables.

The outcomes were modeled as influenced by several child and household level factors. The key variables of interest at the child level were type of orphan (i.e., non-orphan, maternal orphan, paternal orphan and double orphan) and gender of the child, which were all measured

[4] If school progression is < 1 then the child is below his/her appropriate grade-for-age and if school progression is ≥ 1 then the child is at or above grade level.

at baseline. At the household level, the key variables of interest were receipt of a cash transfer (i.e., intervention), number of working-age adults measured at baseline and number of sick adults in the past 30 days measured at 1-year follow-up.

X_{qij} and W_{sj} in equations 1 and 2 were child and household level control variables, respectively. All child level control variables were measured at baseline. They included age group dummies for age 6-10 years, age 11-14 years and age 15-17 years. A dummy variable for the child's relationship to the household head was also included (1=biological child of household head, 0=other). The models also included the relevant baseline measure of the outcome variable as a control to further isolate the effects of the variables of interest.

Household level control variables were also all measured at baseline and included age of the household head, as a continuous variable; a dummy variable for education level of the household head (1=primary education or more, 0=no schooling or preschool) and gender of household head (1=female, 0=male). Also included were five household demographic information variables: number of children under 6 years of age, number of children between ages 6 and 10, number of children between ages 11 and 14, number of children between ages 15 and 17 and number of dependent adults older than age 64

All level 1 covariates were entered into the models as fixed effects; the only random effect in all models was for the intercept. All the level 1 slopes were specified as non-randomly varying. All continuous level 1 covariates were group-mean centered to mitigate confounding due to differences between households and continuous level 2 covariates were grand-mean centered to facilitate interpretation of effects (Enders and Tofighi 2007; Kreft, De Leeuw and Aiken 1995).

For the schooling outcomes, multilevel logistic regression was used to estimate current school enrollment, multilevel negative binomial regression was used to estimate number of days missed from school in the past month[5], and multilevel linear regression was used to estimate appropriate age-for-grade. The work outcomes were all count variables and multilevel Poisson regression was used for estimation. SAS 9.2 PROC GLIMMIX was used for the logistic and count regressions. For the linear regression SAS 9.2 PROC MIXED was used and an error term, r_{ij}, where $r_{ij} \sim N(0,\ \sigma^2)$, was included in Equation 1. Convergence was obtained for all models and all variance and covariance estimates were admissible.

RESULTS

Schooling outcomes

Effect of Mchinji SCTPS. Children in households that received the cash transfer had significantly greater odds of being enrolled in school at 1 year follow up (3.59; $p<0.01$) than those in households that did not receive the cash transfer (See Table 2.4, Panel 1). In addition, receipt of the cash transfer significantly reduced the number of days missed from school by 0.41 ($p<0.01$; Table 2.4, Panel 2). That is, children in beneficiary households had 59% fewer days missed from school than those in non-beneficiary households. However, receipt of the cash transfer had no significant impact on school progression (Table 2.4, Panel 3).

Effect of orphan type. We found no evidence in our data that maternal, paternal or double orphans were disadvantaged in school enrollment or had a slower progression through school relative to non-orphans. Results also did not show significant differences in the number of

[5] We used negative binomial and not Poisson because of overdispersion in the dependent variable, number of days missed from school.

days missed from school between maternal and double orphans and non-orphans. However, paternal orphans had 28% fewer days missed from school ($p<0.10$; Table 2.4, Panel 2) relative to non-orphans. We had similar results when we did not include the 37 children whose orphan status changed between baseline and 1-year follow-up.

Effect of child gender. While girls were just as likely as boys to be enrolled in school, they had 25% fewer days missed from school ($p<0.05$; Table 2.4, Panel 2) and progressed faster through school than boys ($p<0.05$; Table 2.4, Panel 3). We tested whether the intervention was moderated by child gender but the interaction was not statistically significant.

Effect of the number of working-age and sick adults in a household. Among other household level variables of interest, number of working-age adults and sick adults in the past 30 days had no statistically significant effect on school enrollment, number of days missed from school or school progression.

Child work outcomes

Effect of Mchinji SCTPS. Receipt of the cash transfer significantly increased the rate of children's participation in domestic work activities ($p<0.05$; Table 2.5, Panel 1). That is, children in beneficiary households were involved in 15% more household chores than those in non-beneficiary households. The cash transfer program, however, did not have a significant effect on children's involvement in economic activities or the total number of work activities a child was involved in (Table 2.5, Panels 2 and 3).

Additionally, children in households that received the cash transfer had a 1.19 higher rate of (or a 19% increase in) hours doing domestic work in the past week than children in non-

beneficiary ($p<0.05$; Table 2.6, Panel 1). Although the Mchinji SCTPS did not have a significant effect on the number of children's economic work activities, the program significantly reduced the number of hours doing economic work activities. Specifically, children in beneficiary households spent 21% fewer hours doing economic activities than those in non-beneficiary households ($p<0.05$; Table 2.6, Panel 2). Study results indicated no significant program effect on the total number of child work hours (Table 2.6, Panel 3).

Effect of orphan type. Tables 2.5 and 2.6 show no significant effects of maternal, paternal or double orphan status on child work activities and hours compared to non-orphans. Again, there was no difference in our results when we did not include the 37 children whose orphan status changed between baseline and 1-year follow-up.

Effect of child gender. Girls were involved in 50% more domestic work activities ($p<0.01$; Table 2.5, Panel 1), 16% fewer economic activities ($p<0.05$; Table 2.5, Panel 2) and 25% more work activities, overall, than boys ($p<0.01$; Table 2.5, Panel 3). Girls also spent 43% more hours on domestic work in the past week relative to boys ($p<0.01$; Table 2.6, Panel 1). Although girls spent 17% fewer hours doing economic activities ($p<0.05$; Table 2.6, Panel 2) they spent 21% more hours in child work, overall, than boys ($p<0.01$; Table 2.6, Panel 3). Here again we tested whether the intervention effects on domestic work and economic were moderated by gender but none of the interactions were statistically significant.

Effect of the number of working-age and sick adults in a household. An increase of one working-age adult in a household reduced by 14% the number of economic work activities a child was involved in ($p<0.10$; Table 2.5, Panel 2) and reduced by 7% the total number of work activities a child was involved in ($p<0.10$; Table 2.5, Panel 3). The results also show

that an increase of one working-age adult in a household reduced the hours a child did domestic chores by 12% ($p<0.05$; Table 2.6, Panel 1) and decreased by 14% the overall number of hours a child was involved in work activities ($p<0.01$; Table 2.6, Panel 3).

DISCUSSION AND STUDY LIMITATIONS

Our study provides evidence that increasing household income through unconditional cash transfers improves school enrollment among the poor. In the Mchinji SCTPS, households selected to receive the cash transfer were informed that a portion of the cash transfer was for child education and this was reinforced each time they collected their monthly stipend. Although there was no formal monitoring of enrollment or attendance, if it was their choice, recipients gained the financial ability to enroll children in their households in school (Miller et al. 2008a). Our results indicate that relative to non-beneficiary households, a significant number of beneficiary households had enrolled their children in school at 1-year follow-up.

Our finding is consistent with several previous studies examining the effect of cash transfers on school enrollment among children in poor households in other settings. These studies overwhelmingly show positive effects of conditional cash transfers on school enrollment (Adato and Bassett 2009; Fiszbein et al. 2009; Schady et al. 2008; Schultz 2004; Skoufias et al. 2001). The difference, however, is that while conditional programs require households to make investments on their children's education, unconditional programs do not. Our results confirm findings from previous studies that suggest that in sub-Saharan African countries conditions on cash transfers may not be necessary to obtain positive effects on children's schooling (Adato and Bassett 2009).

In a similar vein, other studies have examined the effect of household access to and use of financial resources, specifically credit, on school enrollment. These studies suggest that credit instruments may not work in the same way as cash transfers with respect to child schooling. Indeed, studies evaluating the impact of credit programs on school enrollment in rural Malawi found access to microcredit had no effect on school enrollment (Hazarika and Sarangi 2008) and credit use decreased school enrollment for children aged 6-14 but had no effect for children aged 15-18 (Shimamura and Lastarria-Cornhiel 2010). Thus, the type of financial assistance provided to poor households may have important implications for children's education outcomes.

Few studies, however, have examined the effect of cash transfers on school absence and school progression. Evidence from our study suggests that unconditional cash transfers may decrease absence from school among poor children. This finding is supported by a study in Jamaica that showed that conditional cash transfers increased the number of days of school attendance (Fiszbein et al. 2009). No significant program effect was observed on school progression in our study. This may be due to the short time frame, less than a year, between receipt of the cash transfer and measurement of school progression. It is possible that this was not enough time for the cash transfer program to have an impact on this dimension of education.

The prevalence of child work is reported to be relatively high in Malawi compared to other sub-Saharan countries (Otañez et al. 2006). In our study, cash transfers were expected to reduce the number of child work activities and hours among school-age children. No clear evidence, however, emerged from this study in support of the premise that unconditional cash transfers reduce child participation and hours in work activities. On the one hand, the

study found that unconditional cash transfers increased child involvement and hours spent in domestic work. Differences, however, were not substantial, with children in beneficiary households involved in, on average, 1.24 domestic work activities compared to 1.17 among children in non-beneficiary households (with activities in both groups ranging from 0 to 3) and spending 3.12 hours on domestic work activities compared to 2.84 hours among children in non-beneficiary households (range 1-36 hours in beneficiary household and 1-25 hours in non-beneficiary households). These results are not consistent with study findings from Latin America that show evidence of conditional cash transfers reducing child work, including domestic work (Fiszbein et al. 2009; Skoufias et al. 2001). They are, however, similar to other research from Malawi that finds household access to microcredit significantly raises the probability of child domestic work in households either owning land or operating retail sales enterprises (Hazarika and Sarangi 2008). On the other hand, cash transfers decreased the hours children spent in economic activities. This suggests that as poor households gain access to financial resources they may become less dependent on child income through economic activities as adults become more involved in agricultural and other income generating activities. However, as more adult time is allocated to activities outside the home, children may become increasingly involved in domestic work (Hazarika and Sarangi 2008).

Our results suggest that girls carried a larger burden of overall work and were more involved in domestic work than boys. On the other hand, boys were more involved in economic activities. Similar findings were reported by Shimamura and Lastarria-Cornhiel (2010), Hazarika and Sarangi (2008), Nankhuni and Findeis (2004) and Skoufias et al. (2001). With respect to schooling, on the other hand, the data showed that girls were equally likely to be enrolled in school and in general had better schooling outcomes (i.e., missed days

from school and school progression) than boys. Putting these findings together with those on the effects of cash transfers on children's schooling and work lends support to the notion that improvements in schooling outcomes may not result in reductions in child work because not all work activities are substitutes for schooling. Improved schooling may result in children spending less time on leisure rather than less time on certain types of work activities, e.g., domestic work (Skoufias et al. 2001). This may be especially true for girls.

Similar to Sharma (2006), maternal, paternal and double orphans did not appear to be significantly disadvantaged in education outcomes compared to non-orphans. This is an important finding in view of several recent studies that highlight adverse education outcomes due to orphan status and type among children in sub-Saharan Africa. These studies show parental death, especially maternal, leads to deficits in children's schooling outcomes manifested by school dropout, reduced enrollment and slower progression through school (Case and Ardington 2006; Evans and Miguel 2007; Yamano et al. 2006).

Also noteworthy is that contrary to expectation orphan disadvantages in child work were not found in our study. Evidence from sub-Saharan Africa is unclear about the impact of orphan status and type on child work. While Whetten et al. (2011) found high levels of work among orphans and other vulnerable children, Guarcello et al. (2004), using MICS data from nine countries in sub-Saharan Africa, did not find that orphans were consistently significantly more likely to work than non-orphans. Our findings are important in that they support the argument by Ainsworth and Filmer (2006) that the effects of orphan status on school-age children's outcomes may be country-specific and may not prevail in all situations. It is also possible that household characteristics (e.g., household poverty and demographic

composition) may, in some countries, be more important than orphan status in determining children's education outcomes.

Indeed, our analyses found support for the argument that more working-age adults in poor households reduced child work. Working-age adults either may step in to take care of sick household members or, if sufficient resources are available, hire additional workers to meet household labor needs rather than pull school-age children from school or increase children's work activities or hours. Nankhuni and Findeis (2004) similarly found that a larger number of able adult household members helped in lessening the work burden on school-age children.

Our study has a number of important limitations. First, our data include only two time points within a relatively short timeframe of 1 year. Thus, our study could not determine if and how the effects of cash transfers, orphan status, gender and household factors on children's outcomes change over time. However, our data were from a well-designed experimental study and the innovative use of multilevel estimation methods allowed for unbiased estimation of the causal effects of cash transfers, orphan status, child gender and household factors on children's outcomes. In addition, because the study data are from an actual government-owned and implemented program, results are much more externally valid than findings from social experiments.

A second limitation is that because of the study design, whereby randomization was done at the village group level, we ignored a third level of nesting. Though the reported effects and associated standard errors from our models may be incorrect (Moerbeek 2004; Van den Noortgate, Opdenakker and Onghena 2005; Van Landeghem, De Fraine and Van Damme 2005), we do not expect this to be a serious problem because the number of village groups

was small (N=8), and because only the poorest households were included in the study, cluster variation may be small and not have a strong study effect.

CONCLUSIONS

Policymakers in developing countries have long sought to identify programs and policies that improve the well-being of poor children. As more sub-Saharan African countries adopt social cash transfer programs to address child poverty, there is an urgent need to evaluate the impact of these programs on key indicators of child well-being. This study used data from an experimental social cash transfer program in rural Malawi to determine the effect of the program on children's education and work outcomes. Also examined were the importance of individual level (i.e., orphan type and child gender) and household level demographic factors (i.e., number of working-age and sick adults) on children's outcomes. This study was the first to use multilevel estimation to evaluate the impact of a cash transfer program. The multilevel approach accounted for children clustered within households in the data and also allowed the simultaneous examination of cash transfer program effects as well as other important individual and household level influences on child outcomes.

We found evidence that the Mchinji SCTPS improved schooling outcomes for poor children in rural Malawi. With respect to child work, findings were mixed with the cash transfer program decreasing time spent in economic activities but increasing domestic work. Orphans in very poor households in this region of rural Malawi did not appear to be worse off than their non-orphan counterparts. In terms of gender, we found some indication that the pendulum of inequality in education may be reversing in Malawi with boys now more disadvantaged than girls. Girls, however, worked more than boys despite having better

schooling outcomes. Finally, having working-age adults in the household reduced the burden of work for children.

Our results suggest that with respect to schooling, targeting cash transfer programs to the poorest households benefits all poor – male, female, orphan and nonorphan- children in Malawi. We did not find that cash transfer effects on schooling and work are moderated by gender. More research is needed, however, to examine if increases in work adversely affects schooling and health outcomes, especially for girls. There is also need for research to better understand the causal pathways through which cash transfers influence children's schooling and work. It is also critical that structures be put in place to maintain gender parity in education once it is achieved. To further improve schooling and work outcomes for poor children, policies and programs are urgently needed to improve employment and income generating opportunities for working-age adults in rural areas of Malawi.

Table 2.1. Cash transfers by household size

Number of household members	MWK/month	US$/month
1	600	4.30
2	1000	7.14
3	1400	10.00
4	1800	12.85

MWK=Malawi Kwacha; US$=US Dollar

Table 2.2. Bivariate tests for baseline equivalence between intervention and control group

	Cash transfer group	**Control group**	**Test of differences p value**
Variable	**% / Mean (SD)**	**%/ Mean (SD)**	
Covariates			
Age categories 6 to 10 years 11 to 14 years 15 to 17 years	 45% 38% 18%	 43% 39% 18%	0.87
Female child	48%	53%	0.07
Orphan status Non-orphan Maternal orphan Paternal orphan Double orphan	 35% 8% 31% 26%	 34% 12% 34% 20%	0.04
Biological child of household head	52%	56%	0.25
# working-age adults in household	1.27 (0.94)	1.01 (0.87)	0.00
# sick adults in household past 30 days	1.40 (0.87)	1.25 (0.72)	0.00
Age of household head	56.41	56.42	0.99
Female household head	66%	72%	0.02
Household head has primary education or more	55%	43%	0.00
# dependent adults in household	0.50 (0.64)	0.52 (0.61)	0.55
# children under 6 years in household	0.72 (0.87)	0.63 (0.85)	0.10
# children 6-10 years in household	1.72 (1.00)	1.33 (0.82	0.00
# children 11-14 years in household	1.35 (0.88)	1.17 (0.81)	0.00
# children 15-17 years in household	0.74 (0.71)	0.55 (0.64)	0.00
Outcomes at baseline			
Schooling			
Enrolled in school	90%	86%	0.04
# days missed school during the past month	2.92 (3.83)	3.12 (4.67)	0.45
Appropriate grade for age	0.28 (0.27)	0.26 (0.23)	0.11
Work activities			
# child domestic work activities	1.19 (0.98)	1.31 (0.93)	0.04
# child economic work activities	0.40 (0.62)	0.42 (0.60)	0.54
# all child work activities	1.59 (1.32)	1.73 (1.23)	0.06
Work hours			
# child domestic work hours	3.40 (3.53)	4.06 (6.17)	0.05
# child economic work hours	2.69 (2.54)	3.00 (3.34)	0.29
# all child work hours	4.48 (4.70)	5.04 (7.08)	0.16

SD=Standard Deviation; #=Number

Table 2.3. Distribution of children in households

Number of children Ages 6-17	Number of households	% of households	Cumulative Frequency of households
1	132	27.16	132
2	132	27.16	264
3	120	24.69	384
4	81	16.67	465
5	15	3.09	480
6	5	1.03	485
8	1	0.21	486

Table 2.4. Multilevel regressions for school outcomes

Variables	**Panel 1 Logit Regression Dep. Var. = enrolled in school at FU**			**Panel 2 Negative Binomial Regression Dep. Var. = # of days missed from school at FU**			**Panel 3 Linear Regression Dep. Var. = appropriate grade-for-age at FU**		
Fixed Effects	**OR**	**se**	**p value**	**exp(coeff)**	**se**	**p value**	**Coeff**	**se**	**p value**
Intercept	0.86	0.75	0.83	1.61	0.31	0.12	0.22	0.03	0.00
Key household level variables									
Intervention[1]	3.59	0.41	0.00	0.41	0.16	0.00	0.00	0.02	0.92
# working-age adults	1.30	0.31	0.39	0.89	0.11	0.27	0.02	0.01	0.11
# sick adults in past 30 days	1.08	0.29	0.79	1.17	0.12	0.19	0.01	0.01	0.68
Key child level variables									
Maternal orphan[2]	0.49	0.59	0.23	1.23	0.27	0.43	0.01	0.03	0.58
Double orphan[2]	2.92	0.75	0.15	0.79	0.33	0.47	0.00	0.03	0.96
Child's gender[3]	0.98	0.31	0.94	0.75	0.13	0.03	0.02	0.01	0.02
Control variables									
Child level									
Age 11-14 years[2]	0.89	0.40	0.78	1.28	0.15	0.10	0.04	0.01	0.00
Age 15-17 years[2]	0.07	0.53	0.00	1.18	0.21	0.42	0.03	0.02	0.03
Relationship to household head [4]	1.13	0.54	0.83	0.91	0.22	0.66	0.03	0.02	0.19
Control for outcome at baseline	56.58	0.51	0.00	1.03	0.02	0.20	0.62	0.03	0.00
Household level									
Household head age	1.00	0.02	0.90	0.99	0.01	0.34	0.00	0.00	0.02
Household head sex[3]	1.64	0.46	0.28	1.44	0.19	0.06	0.04	0.02	0.07
Household head educ.[5]	1.05	0.37	0.89	1.15	0.15	0.35	0.02	0.02	0.30

Variables	Panel 1 Logit Regression Dep. Var. = enrolled in school at FU			Panel 2 Negative Binomial Regression Dep. Var. = # of days missed from school at FU			Panel 3 Linear Regression Dep. Var. = appropriate grade-for-age at FU		
Fixed Effects	**OR**	**se**	**p value**	**exp(coeff)**	**se**	**p value**	**Coeff**	**se**	**p value**
# dependent adults	1.34	0.50	0.56	-0.03	0.20	0.86	0.00	0.02	0.83
# children under age 6 years	1.37	0.23	0.18	1.13	0.09	0.19	0.00	0.01	0.83
# children 6-10 years	0.89	0.21	0.57	1.14	0.09	0.12	-0.01	0.01	0.27
# children 11-14 years	0.87	0.23	0.56	1.08	0.10	0.41	0.02	0.01	0.06
# children 15-17 years	1.73	0.34	0.11	0.83	0.12	0.13	0.04	0.01	0.00
Random effects									
Level 2	2.56	1.14	0.01	0.62	0.22	0.00	0.02	0.00	0.00
Level 1				1.83	0.27	0.00	0.02	0.00	0.00
Level 1 observations	1184.00			991.00			1186.00		

OR=Odds Ratio; se=standard error; [1]Intervention: Cash transfer recipient=1, Control=0; [2]Dummy variable: Yes=1, No=0; [3]Sex: Female=1, Male=0; [4]Relationship to household head: Biological child=1, Other=0; [5]Household head education: Primary education or more=1, No primary education=0.

Table 2.5. Multilevel Poisson regressions for child work activities

Variables	**Panel 1 Dep. Var. = # domestic work activities at FU**			**Panel 2 Dep. Var. = # economic work activities at FU**			**Panel 3 Dep. Var. = # all work activities at FU**		
Fixed Effects	**exp(coeff)**	**se**	**p value**	**exp(coeff)**	**se**	**p value**	**exp(coeff)**	**se**	**p value**
Intercept	0.67	0.13	0.00	0.33	0.21	0.00	1.05	0.12	0.65
Key household level variables									
Intervention[1]	1.15	0.06	0.02	0.86	0.10	0.15	1.07	0.06	0.26
# working-age adults	0.96	0.04	0.29	0.86	0.08	0.06	0.93	0.04	0.07
# sick adults in past 30 days	1.02	0.04	0.60	1.05	0.08	0.56	1.03	0.04	0.49
Key child level variables									
Maternal orphan[2]	0.90	0.11	0.33	0.94	0.19	0.72	0.91	0.10	0.39
Paternal orphan[2]	0.91	0.07	0.22	1.01	0.12	0.95	0.95	0.07	0.40
Double orphan[2]	1.18	0.13	0.22	1.37	0.22	0.16	1.22	0.12	0.11
Control variables									
Child level									
Age 11-14 years[2]	1.55	0.07	0.00	1.89	0.12	0.00	1.54	0.07	0.00
Age 15-17 years[2]	1.58	0.09	0.00	2.04	0.14	0.00	1.58	0.08	0.00
Relationship to household head [4]	1.18	0.09	0.08	1.42	0.15	0.02	1.25	0.08	0.01
Control for outcome at baseline	1.22	0.05	0.00	1.10	0.12	0.44	1.17	0.03	0.00
Household level									
Household head age	1.00	0.00	0.55	0.99	0.00	0.16	1.00	0.00	0.85
Household head sex[3]	1.01	0.08	0.86	0.80	0.12	0.07	0.94	0.07	0.41

Variables	Panel 1 Dep. Var. = # domestic work activities at FU			Panel 2 Dep. Var. = # economic work activities at FU			Panel 3 Dep. Var. = # all work activities at FU		
Fixed Effects	**exp(coeff)**	**se**	**p value**	**exp(coeff)**	**se**	**p value**	**exp(coeff)**	**se**	**p value**
Household head educ.[5]	0.88	0.06	0.03	0.95	0.10	0.62	0.91	0.05	0.08
# dependent adults	1.02	0.08	0.80	0.92	0.13	0.53	0.99	0.07	0.87
# children under age 6 years	1.07	0.03	0.06	0.90	0.06	0.10	1.01	0.03	0.80
# children 6-10 years	1.04	0.03	0.26	1.05	0.05	0.34	1.03	0.03	0.37
# children 11-14 years	0.93	0.04	0.06	1.02	0.06	0.80	0.96	0.03	0.20
# children 15-17 years	0.90	0.05	0.03	1.02	0.08	0.81	0.93	0.04	0.09
Random effects									
Level 2	0.00	0.02	0.47	0.11	0.06	0.03	0.04	0.02	0.01
Level 1 observations	1121.00			1173.00			1112.00		

se=standard error;[1]Intervention: Cash transfer recipient=1, Control=0; [2]Dummy variable: Yes=1, No=0; [3]Sex: Female=1, Male=0; [4]Relationship to household head: Biological child=1, Other=0; [5]Household head education: Primary education or more=1, No primary education=0.

Table 2.6. Multilevel Poisson regression for child work hours

Variables	**Panel 1 Dep. Var. = # hours in domestic work at FU**			**Panel 2 Dep. Var. = # hours in economic work at FU**			**Panel 3 Dep. Var. = Total # hours in all child work at FU**		
Fixed Effects	**exp(coeff)**	**se**	**p value**	**exp(coeff)**	**se**	**p value**	**exp(coeff)**	**se**	**p value**
Intercept	1.40	0.14	0.02	2.44	0.18	0.00	2.37	0.12	0.00
Key household level variables									
Intervention[1]	1.19	0.07	0.02	0.79	0.09	0.01	1.05	0.07	0.48
# working-age adults	0.88	0.05	0.02	0.97	0.07	0.62	0.86	0.05	0.00
# sick adults in past 30 days	1.05	0.05	0.34	0.94	0.07	0.37	1.06	0.05	0.21
Key child level variables									
Maternal orphan[2]	1.02	0.12	0.88	0.98	0.15	0.88	0.99	0.11	0.89
Paternal orphan[2]	1.02	0.08	0.81	0.85	0.10	0.13	0.94	0.07	0.37
Double orphan[2]	0.87	0.15	0.35	1.18	0.18	0.36	1.04	0.13	0.78
Control variables									
Child level									
Age 11-14 years[2]	1.59	0.06	0.00	1.23	0.08	0.02	1.67	0.05	0.00
Age 15-17 years[2]	2.02	0.07	0.00	1.49	0.11	0.00	2.11	0.06	0.00
Relationship to household head [4]	1.06	0.10	0.55	0.86	0.12	0.22	1.05	0.09	0.56
Control for outcome at baseline	1.01	0.01	0.40	1.03	0.01	0.02	1.01	0.01	0.03
Household level									
Household head age	1.00	0.00	0.98	1.00	0.00	0.23	0.99	0.00	0.07
Household head sex[3]	0.93	0.09	0.42	1.02	0.11	0.87	0.87	0.08	0.08

Variables	Panel 1 Dep. Var. = # hours in domestic work at FU			Panel 2 Dep. Var. = # hours in economic work at FU			Panel 3 Dep. Var. = Total # hours in all child work at FU		
Fixed Effects	**exp(coeff)**	**se**	**p value**	**exp(coeff)**	**se**	**p value**	**exp(coeff)**	**se**	**p value**
Household head educ.[5]	0.97	0.07	0.66	1.09	0.08	0.31	0.99	0.06	0.93
# dependent adults	0.84	0.09	0.05	0.91	0.11	0.40	0.86	0.08	0.07
# children under age 6 years	1.00	0.04	0.93	0.92	0.06	0.13	0.94	0.04	0.13
# children 6-10 years	1.03	0.04	0.51	1.01	0.05	0.79	1.03	0.04	0.38
# children 11-14 years	0.91	0.04	0.04	0.99	0.05	0.92	0.94	0.04	0.14
Random effects									
Level 2	0.22	0.03	0.00	0.16	0.03	0.00	0.22	0.02	0.00
Level 1 observations	826.00			511.00			883.00		

[1]Intervention: Cash transfer recipient=1, Control=0; [2]Dummy variable: Yes=1, No=0; [3]Sex: Female=1, Male=0; [4]Relationship to household head: Biological child=1, Other=0; [5]Household head education: Primary education or more=1, No primary education=0.

Figure 2.1. Mchinji SCTPS evaluation study timeline

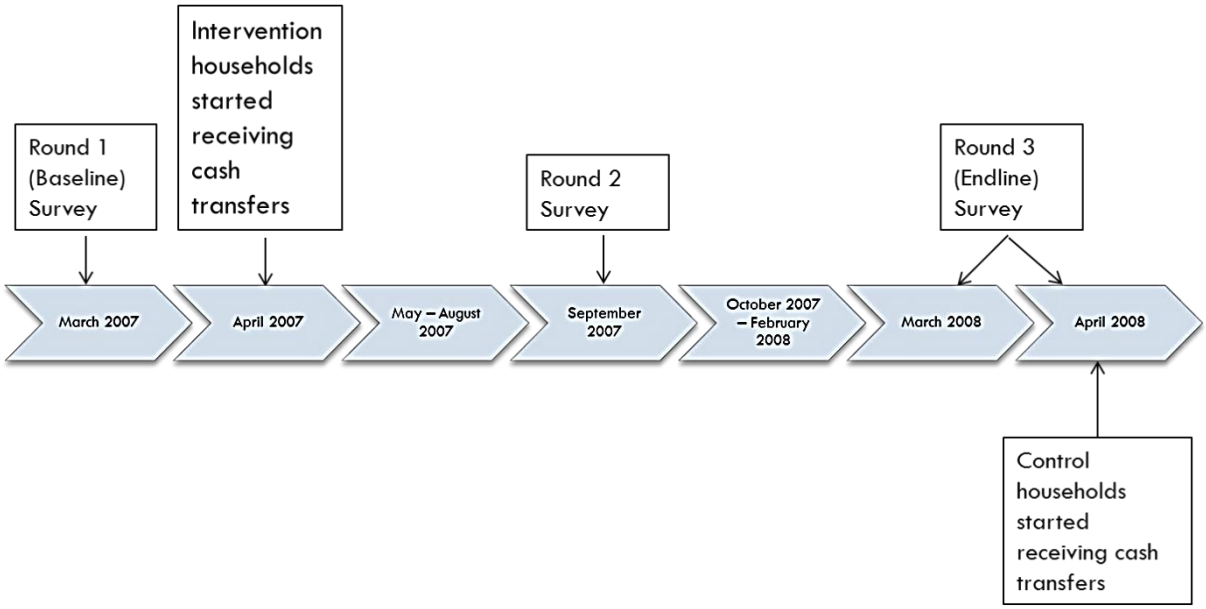
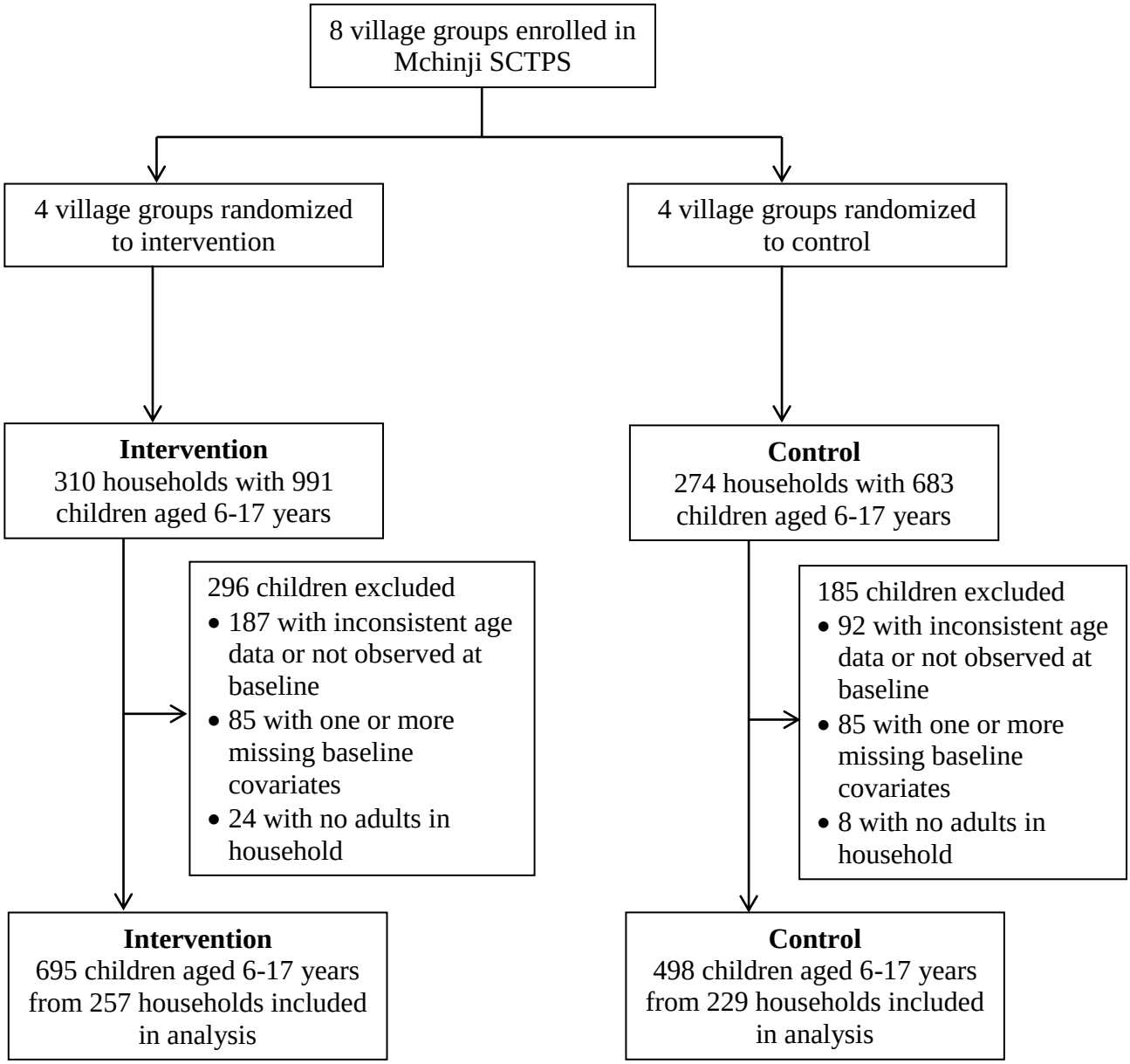


Figure 2.2. Participant flowchart



CHAPTER 3

EFFECT OF THE MCHINJI SOCIAL CASH TRANSFER PILOT SCHEME ON SCHOOL-AGE CHILDREN'S HEALTH OUTCOMES

INTRODUCTION

Sub-Saharan African school-age children, ages 6 to 17, bear the highest burden of disease and risk for death among all school-age children, worldwide (Gore et al. 2011; Patton et al. 2009). Over half of the burden of disease for these children is due to communicable diseases, of which HIV/AIDS, measles and respiratory infections are the most prominent (Glewwe and Miguel 2007; Lopez 2006). About one quarter is due to injuries and one fifth to non-communicable diseases and nutritional problems (Glewwe and Miguel 2007; Lopez 2006).

Children living in poverty are most at risk for poor health and often have limited access to health services, adequate nutrition, clean water, sanitation facilities and shelter (Gordon 2003). Appropriate policies and programs to address childhood poverty and the associated adverse health outcomes are important as a human rights issue. There are long-term consequences for affected children (e.g., chronic morbidity, early mortality, fewer years of schooling, reduced capacity to learn, low future earnings) and potential inter-generational effects (e.g., poor birth outcomes among infants of young mothers with chronic poor health) (Adato and Bassett 2009; Barrientos and DeJong 2006).

Cash transfers to poor households are increasingly being introduced in developing countries as a key policy intervention to address poverty and adverse child outcomes.

Conditional programs expect transfer recipients to comply with a set of requirements while unconditional programs do not. The former are more common in Latin American countries and the latter in sub-Saharan Africa (Fiszbein et al. 2009; Lagarde, Haines and Palmer 2007; Schubert and Slater 2006). Because of their longer history, the published literature is replete with evaluation studies of conditional cash transfer programs. However, far fewer studies have been published on unconditional programs which are more recent. Overall the studies generally show positive effects of cash transfer programs on children's schooling and work outcomes, as well as on health outcomes among children under age 6 (Adato and Bassett 2009; Fiszbein et al. 2009; Lagarde et al. 2007). Limited research, however, has examined the impact of these programs on school-age children's health (Fernald, Gertler and Neufeld 2009).

A better understanding of individual and household level determinants of child health is also needed to facilitate precise targeting of programs to reach those children who are most in need. Several studies suggest that orphan status is an important individual level risk factor for child poverty and adverse education outcomes (Ainsworth et al. 2005; Beegle, De Weerdt and Dercon 2010; Bicego et al. 2003; Campbell et al. 2010; Case and Ardington 2006; Case et al. 2004; Evans and Miguel 2007; Parikh et al. 2007; Sharma 2006; Yamano and Jayne 2005; Yamano et al. 2006). Having lost a key gatekeeper of their welfare, orphans may find that they have no other caregiver as committed to ensuring that their basic needs are met. Some may have to make changes to their living arrangements and may find that they are faced with discrimination and/or limited resources in their new homes in that their caregivers may not be willing or able to allocate resources to their health. Gender is also an important individual level factor. Studies show a higher burden of disease and mortality rates among

females aged 15-19 years in sub-Saharan Africa than among males in the same age group (Gore et al. 2011; Patton et al. 2009). Few studies, however, have examined whether orphan status and gender affect school-aged children's health outcomes in sub-Saharan Africa, and those that have produced inconclusive results (Beegle et al. 2006, 2010; Hall et al. 2010; Kidman et al. 2010).

UNICEF (2005) defines vulnerable children as those who are orphans; have chronically ill parents; live in a household where in the past 12 months at least one adult died and was sick for 3 of the 12 months before he/she died; live in a household where at least one adult was seriously ill for at least 3 months in the past 12 months; or live in an institution (e.g., orphanage) or on the streets. Indeed, higher burdens of disease have been found among children living with sick parents (Kidman et al. 2010). Other studies have found negative effects on children's education outcomes due to illness among household adults and positive effects on children's work burden as the number of able adults in a household increased (Ainsworth et al. 2005; Case and Ardington 2006; Evans and Miguel 2007; Nankhuni and Findeis 2004; Yamano and Jayne 2005).

The purpose of this study is to examine the impact of an unconditional cash transfer program, the Mchinji Social Cash Transfer Pilot Scheme (SCTPS), on school-age children's health outcomes. Mchinji SCTPS was designed to alleviate poverty, reduce hunger and malnutrition and improve school enrollment for the poorest 10% of households in a rural district in central Malawi (Miller et al. 2008b). The data offered an opportunity to also examine the effects of individual child (i.e., orphan status and gender) and household (i.e., number of working-age adults and sick adults) factors on school-age children's health outcomes. Previous studies have used anthropometric indicators, specifically height and body

mass index (BMI), as proxies for child health (Beegle et al. 2006, 2010; Hall et al. 2010). However, while anthropometric measures may capture the nutritional status of children well, they may not accurately assess their health status (Trapp and Menken 2005). This study used reported illness and utilization of health care services, which are more direct measures of children's health outcomes, and is the first to examine the impact of an unconditional cash transfer program on health outcomes for school-age children.

METHODS

Sample selection and eligibility. The data used in this paper were from the Mchinji SCTPS evaluation study, which consisted of three rounds of panel data collection in March 2007, September 2007 and April 2008. Data from March 2007 (baseline) and April 2008 (1-year follow-up) were used for this analysis. Sample selection for the Mchinji SCTPS evaluation study was conducted in multiple stages. Mchinji District is divided into nine Traditional Authorities (TAs) which are further divided into village groups that contain multiple villages creating clusters of about 1000 households. First, eight village groups were selected in four TAs where the Mchinji SCTPS was already operational but households were not yet receiving cash transfers. Approximately 100 SCTPS eligible households per village group were then identified in each selected village group. The sampling frame was a district-provided roster of all cash transfer approved households in the eight village groups (Miller et al. 2008b; Miller et al. 2010). A detailed description of the study procedures are presented elsewhere (Miller et al. 2008a; Miller et al. 2010).

Intervention. By random assignment, four village groups were assigned to receive the cash transfer (i.e., intervention condition) and four to the control group that did not receive

the cash transfer (Figure 3.1). Eligible households in both the village groups randomized to intervention and control were ultra-poor and/or labor-constrained. In Malawi, ultra poor households live below the national ultra-poverty line, are in the lowest expenditure quintile, consume only one meal per day and own no valuable assets (Miller et al. 2008b). In 2005, the official Malawi poverty line was Malawi Kwacha (MK) 16,165 (approximately US$115) per capita per year and the ultra-poverty line was MK 10,029 (approximately US$71) per capita per year (National Statistical Office (NSO) [Malawi] 2005). Labor constrained households are elderly headed with no adults between ages 19 and 64 that are fit for work, child headed households, have incalculable or worse than three dependency ratio and/or contain adults that are chronically sick or disabled (Miller et al. 2008b).

Monthly transfers begun in April 2007, which was the month following baseline data collection. The amount of the cash transfer depended on household size and the number of school-aged children in the household. Transfers ranged from $4.30/month for a household with one member to $12.85/month for a household with 4 members. An extra $1.44 and US$2.88 per month was received for each additional primary aged and secondary aged child in the household, respectively. Although eligible, households in the control group did not receive cash transfers during the one year evaluation study, but they did receive transfers on completion of the evaluation study.

Data collection procedures. Data collection consisted of completion of a survey questionnaire as well as height and weight measurements of all children in the household. Interviews were conducted with the household head, registered to receive the cash transfer, or another household member selected by the household head. Interviews lasted between 1.5

to 3 hours depending on the size of the household and age and wellbeing of the respondent (Miller et al. 2008a; Miller et al. 2010).

Measures. The four health outcomes of interest were (1) child illness in the past month; (2) use of health services for child's worst illness in the past year; (3) illness that stopped normal activities in the past month; and (4) missed school because of illness or injury in the past month. All outcomes were binary variables measured at 1-year follow-up.

The outcomes were modeled as influenced by several child and household level factors. The key variables of interest at the child level were type of orphan (non-orphan, maternal orphan, paternal orphan and double orphan) and child gender as measured at baseline. At the household level, the key variables of interest were receipt of a cash transfer (intervention or control), number of working-age adults measured at baseline and number of sick adults in the past 30 days measured at 1-year follow-up.

A series of child and household level variables were included in the models to control for any pre-existing differences between the intervention and control groups at baseline. All child level control variables were measured at baseline. They included age group dummies for age 6-9, age 10-14 and age 15-17. A dummy variable indicating whether the child was a biological child of the household head was also included. The models also included the relevant baseline measure of the outcome variable as a control to further isolate the effects of the key independent variables of interest.

Household level control variables were also all measured at baseline and included the household head's age, education level and gender. Also included were five household composition variables: number of children under age 6, number of children ages 6-9, number of children ages 10-14, number of children ages 15-17 and number of dependent adults older

than age 64. These household level variables were included as controls because they may have some explanatory role in the estimation of the outcomes. Household composition variables were also included because cash transfer receipts depended on household size as well as on the household numbers of primary-aged and secondary-aged children.

Statistical analyses. Multilevel logistic models were used for statistical analysis to account for the nested structure of the Mchinji SCTPS data, given that children are nested within households, and to estimate the unique effects of child and household factors on child outcomes (Raudenbush and Bryk 2002). Two level random-intercepts models were used. All level 1 covariates were entered into the models as fixed effects; the only random effect in all models was for the intercept. All continuous level 2 covariates were grand-mean centered to facilitate interpretation of effects (Enders and Tofighi 2007; Kreft et al. 1995). SAS 9.2 PROC GLIMMIX was used to estimate the logistic regressions.

The Mchinji SCTPS evaluation study was approved by the Boston University Institutional Review Board (IRB) and the Malawian National Health Research Council at the Ministry of Health. Prior to baseline data collection, research staff conducted community consultations in participating villages to inform communities of the study. Interviews began with research staff describing the study to the participant and securing consent. Respondents were given a copy of the consent form for their records (Miller et al. 2008a; Miller et al. 2010). IRB approval for secondary data analysis was also obtained from the University of North Carolina at Chapel Hill.

RESULTS

The Mchinji SCTPS evaluation study included 819 households at baseline. Of these households, 235 were excluded from analyses for the present study because of missing cluster codes, errors in intervention codes and not having any children ages 6-17. The remaining 584 households had a total of 1674 children ages 6-17. Of these children, 477 were excluded because they had inconsistent age data, were not observed at baseline, had missing key baseline covariates (gender, orphan status), or they were no adults, age 18 or older, present in the household. The final study baseline sample included 486 households (257 intervention and 229 control) with 1197 children (696 intervention and 501 control). A participant flow diagram is shown in Figure 3.1. A logistic regression was fit to examine missingness of baseline covariates. Missingness at baseline was significantly associated with the household head's education (Odds Ratio (OR)=0.55; $p<.05$) but not with child age, intervention/control status, household head's gender or age (Data not shown).

Table 3.1 and Appendix Table A3 show selected summary statistics from the baseline data for the overall sample and includes bivariate tests for equivalence in the assigned groups (i.e., intervention vs. control). Children had a mean age of 11 years. Half of the sample was female and 66% were orphans (9% maternal, 33% paternal and 24% double). There were a mean of 2 children per household. The statistics revealed few statistically significant differences at the child level between the intervention and control groups. Significant differences in favor of the control group were in the distribution of children by orphan status and health service utilization at baseline. At the household level, the data indicate differences between children in beneficiary and non-beneficiary households in the number of working-age adults and number of sick adults in the previous 30 days. Differences were all significant

at the 5% level. Among household heads, mean age was 58 years, 68% were female, and 47% had primary education or more (See Table 3.2).

At baseline, 65% of children were reported to have been ill in the past month. Illness was serious enough for 48% who stopped normal activities and for 46% who missed school (See Table 3.1). About 43% reported seeking health care for the worst illness in the last year. Table 3.3 shows the prevalence of reported illness at baseline among all children and by age group. The most common reported illnesses among all children were respiratory (i.e., chest pain, tuberculosis, asthma, bronchitis, pneumonia and cough), malaria, and abdominal pain. There were no major differences by age group, except for higher reported diarrhea, ear and eye infections among children age 6-9 years.

Tables 3.4 and 3.5 show results of bivariate analyses of the dependent variables at 1-year follow-up and intervention condition. The results show significant differences at follow-up and significant effects of the cash transfer program on reported illness in the previous month and reported illness that stopped normal activities. Table 3.6 shows the results of the fully adjusted multilevel logistic regressions. Sample sizes vary for the regression models because children with full information on at least one outcome measured at baseline and follow-up were included. Attrition based on the study baseline sample was minimal, less than 5% for all outcome variables, and therefore not a concern. Compared to children in non-beneficiary households, those in households that received the cash transfer had significantly lower odds of reported illness in the previous month (OR=0.63; $p<.05$) and lower odds of reported illness in the previous month that stopped normal activities (OR=0.58; $p<.01$). Cash transfers did not have a significant effect on health services utilization in the previous year and missing school due to illness or injury.

Independent of exposure to the cash transfer, number of working-age adults and sick adults in a household were associated with child illness and health care use. An increase in the household number of working-age adults was significantly associated with lower odds of reported child illness (OR=0.66; p<.01) and health care use (OR=0.56; p<.01) but was only marginally and negatively associated with reported illness that stopped normal activities and missing school due to illness or injury. An increase in the household number of sick adults increased the odds of child illness (OR=1.97; p<.01); reported illness that stopped normal activities (OR=1.49; p<.01); and health care use (OR=1.95; p<.01). Interactions were tested between intervention and working-age adults and intervention and sick adults for the dependent variable sick in the past month and also between intervention and sick adults for the dependent variable illness that stopped normal activities. None were significant.

Among the control variables, children living in female-headed households had significantly higher odds of reported illness (OR=1.83; p<0.05) and illness that stopped normal activities (OR=1.59; p<0.05). Additionally, while an increase in the number of dependent adults was significantly associated with lower odds of reported illness (OR=0.55; p<0.05), an increase in the number of younger children was significantly associated with higher odds of reported illness (OR=1.27; p<0.05). There were no significant associations between reported child illness or health care use with orphan status and child's gender.

DISCUSSION

This study provides evidence of positive effects of the Mchinji SCTPS – an unconditional cash transfer pilot program implemented in rural Malawi – on school-age children's health outcomes. Specifically, at 1-year follow-up, children in households that received cash

transfers had lower odds of reported illness and serious illness that stopped normal activities in the past month compared to children in non-beneficiary households. However, there were no significant effects of the cash transfer program on school absence due to illness or injury in the past month and use of health care for a child's worst illness in the past year. These results differ from a study examining the effect of a conditional cash transfer program in Mexico which found no program effect on reported health status and use of health services among children aged 6-17 (Gertler 2000).

Cash transfer programs in developing countries, conditional and unconditional, aim to provide caregivers with the means to provide for their children's wellbeing and health (Adato and Bassett 2009; Fiszbein et al. 2009; Schubert and Slater 2006). The focus of many of these programs is on improving health indicators for younger children under age 6 years and school enrollment and attendance for older children (Adato and Bassett 2009; Fiszbein et al. 2009). Recent studies, however, highlight the fact that although their risk for morbidity and mortality is lower than younger children, older children ages 6-17 years are nevertheless at substantial risk for poor health and death and thus should not be neglected by researchers and policymakers (Gore et al. 2011; Patton et al. 2009). At least one study has shown positive effects of a conditional cash transfer program on older children's anthropometric indicators, cognitive development, language development and behavior (Fernald et al. 2009). While conditional cash transfer programs provide payments to poor families on condition that they comply with certain requirements, unconditional programs do not impose any requirements. This study is the first to examine the effect of an unconditional cash transfer program on older children's reported health and use of health services.

While the results of this study suggest positive effects of the Mchinji SCTPS on school-age children's health, they do not provide any information about the causal pathways or mechanisms through which the program may have affected children's outcomes. Future research in Malawi should examine differences in household expenditures between beneficiary and non-beneficiary households to provide a clearer picture of how transfer funds are being used. It is possible that cash transfers increased expenditures on certain items which may have improved school-age children's health. For example, transfers may have increased consumption of nutritious foods or improved food security for poor households resulting in healthier children with the ability to fend off common child ailments (Miller et al. 2010). Improvements due to the cash transfer program in the health of younger children in the household who are more susceptible to communicable diseases may also have resulted in better overall health for all household members, including older children. It is also possible that transfers enabled households to purchase medicines for common illness and items such as blankets, shoes, basic clothing and bed nets for malaria prevention thus providing children protection against disease.

Other important findings from this study indicate that children living with sick adults had poorer health outcomes. As the number of sick adults in a household increased, reported illness, including serious illness, and health care use increased among school-age children. Kidman et al. (2010) similarly found higher burdens of acute and chronic illness for older children whose parents had an AIDS-related illness in Malawi. These findings suggest that living with sick adults places older children at risk for illness. This may be because older children are often expected to help in providing care for sick household members, including adults (Robson et al. 2006) which may expose them to communicable diseases and raise their

risk for contracting and developing infections. Alternatively, if sick adults in the household are key caregivers and/or income earners they may be unable to work and earn income to provide children with basic and nutritional needs or basic care. Stress may also lower immunity and contribute to illness among children living with sick adults, particularly if these adults are key caregivers, parents or income earners.

Of equal importance is the finding that children living in households with working-age adults have better health outcomes. In this study, an increase in the number of working-age adults in a household was associated with lower reported illness, school absence due to illness or injury and health care use. Although working-age adults in a household may not necessarily be key caregivers or income-earners, they may assist in ensuring that children are in good health, eating well, and receiving proper health care when needed. They may also assist with caring for sick household members thereby reducing older children's risk of exposure to infections (Robson et al. 2006).

Lack of significance of orphan status and gender are also important findings. In terms of health outcomes the study findings suggest that in very poor households in rural Malawi, girls are not worse off than boys and orphans were not worse off than non-orphans. This finding, which is consistent with Kidman et al. (2010), suggests that in Malawi, while orphan status and gender are important, they may not be critical criteria for targeting resources to poor children in need of health-related assistance. Rather, the study findings imply that other household level factors, in addition to poverty, may be more important for identifying children who are most in need of assistance. These factors include whether the household is female-headed, has sick adults, and/or has children age 5 and younger. Future cash transfer programs should take such factors into account when identifying eligible households.

This study had a number of important limitations. First, because the data included only two time points within a relatively short timeframe of 1 year, the study could not determine if and how the effects of cash transfers, orphan status, gender and household factors on children's outcomes change over a longer period of time. A second limitation is that because of the study design, whereby randomization was done at the village group level, a third level of nesting was ignored. Though the reported effects and associated standard errors from our models may be incorrect (Moerbeek 2004; Van den Noortgate et al. 2005; Van Landeghem et al. 2005), we do not expect this to be a serious problem because the number of village groups was small (N=8). In addition, because only the poorest households were included in the study, cluster variation may be small and not have a strong study effect. Finally, reported health status and use of health services is subjective and may be sensitive to recall bias (though relatively short periods of time were used – one month and one year). Relatedly, the measure of health services utilization may be weak in that for many children their worst illness may not have been severe enough to warrant use of health services. Future studies should consider including more objective measures such as biomarker data and reports from medical records.

Despite the limitations, the study data were from a well-designed experimental study and the innovative use of multilevel estimation methods allowed for unbiased estimation of the causal effects of cash transfers, orphan status, child gender and household factors on children's outcomes. In addition, because the data were from an actual government-owned and implemented program, results are much more externally valid than findings from social experiments.

CONCLUSION

Sub-Saharan African countries are increasingly adopting social cash transfer programs as a strategy to address child poverty and improve key indicators of child well-being. Much of the focus for older children, however, has been on using cash transfers to improve education and work outcomes. This study used data from the Mchinji SCTPS, an experimental social cash transfer program in rural Malawi, to determine the effect of this unconditional program on school-age children's health outcomes. Also examined were the importance of individual level (i.e., orphan type and child gender) and household level demographic factors (i.e., number of working-age and sick adults) on children's outcomes. Analyses were conducted using multilevel regression methods which allowed the simultaneous examination of cash transfer program effects as well as other important individual and household level influences on child outcomes. This study was the first to examine the effect of cash transfer programs on older children's reported health status and health services utilization.

Study findings indicate that the Mchinji SCPTS improved health outcomes for school-age children in rural Malawi. However, more should be done to identify children at high risk for illness, such as those living with sick adults, and to provide needed services to these children and the adults they live with. More research is also needed to understand the causal pathways through which older children get sick and exactly how the cash transfer programs improve health outcomes. This will provide critical information for the development of more effective interventions to improve school-age children's health.

Figure 3.1. Participant flowchart

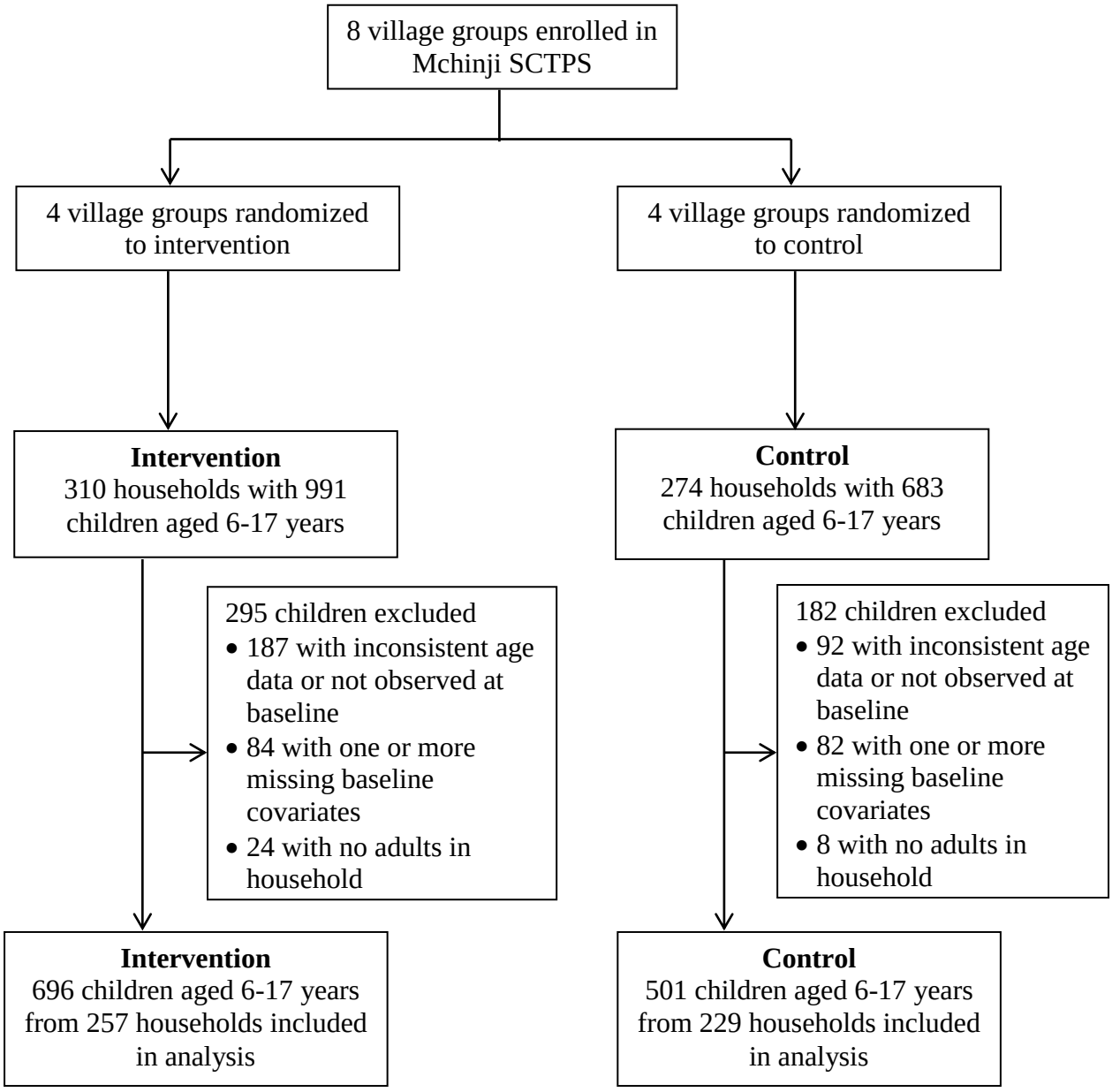


Table 3.1. Selected sample characteristics and bivariate tests for baseline equivalence between intervention and control group

	Total N=1197	**Intervention N=696**	**Control N=501**	**P value**
Child level covariates	**% / mean (SD)**	**% / mean (SD)**	**% / mean (SD)**	
Gender				
Male	50%	52%	47%	0.07
Female	50%	48%	53%	
Age (in years)	11.14 (3.16)	11.07 (3.21)	11.24 (3.10)	0.37
Age				
6-9 years	33%	34%	32%	
10-14 years	49%	48%	50%	0.78
15-17 years	18%	18%	18%	
Orphan status				
Non-orphan	34%	35%	34%	
Maternal orphan	9%	8%	12%	0.04
Paternal orphan	33%	32%	34%	
Double orphan	24%	26%	20%	
Household level covariates				
Number of working-age adults	1.16 (0.92)	1.27 (0.94)	1.01 (0.88)	0.00
Number of sick adults past 30 days	1.34 (0.81)	1.40 (0.87)	1.25 (0.72)	0.00
Outcomes at baseline				
Illness in the last month (n=1194)	65%	64%	66%	0.53
Health care used for worst illness in last year (n=1195)	43%	40%	47%	0.02
Stopped normal activities in past month because of illness (n=1185)	48%	46%	51%	0.06
Missed school in past month because of illness/injury (n=920)	46%	43%	49%	0.08

SD=Standard Deviation

Table 3.2. Selected household characteristics at baseline (N=486)

Characteristic	% / Mean(SD)
Intervention	53%
Female household head	68%
Household head has primary education or more	47%
# working-age adults in household	1.11 (0.95)
# sick adults in households in past 30 days	1.35 (0.81)
Age of household head	58.53 (17.21)
# dependent adults in household	0.57 (0.63)
# children under age 6	0.64 (0.87)
# children age 6 to 9	1.04 (0.89)
# children age 10 to 14	1.39 (0.95)
# children age 15 to 17	0.56 (0.65)
Dependency ratio	0.33 (0.39)
Household size	5.31 (1.89)

#=number, SD=Standard Deviation

Table 3.3. Causes of illness at baseline among the study sample of 6-17 year olds in Mchinji, overall and by age group.

	All (n=1197)	6-9 years (n=400)	10-14 years (n=587)	15-17 years (n=210)
Respiratory*	35%	39%	34%	31%
Malaria	9%	9%	10%	10%
Abdominal pain	8%	7%	9%	5%
Diarrhea/vomit	3%	5%	1%	1%
Ear/eye infections	3%	5%	3%	0%
Skin infections	2%	2%	2%	1%

* Chest pain, tuberculosis, asthma, bronchitis, pneumonia and cough

Table 3.4. Comparison of dependent variables at 1-year follow-up by intervention condition

Outcome variable	**Intervention Mean (SE)**	**Control Mean (SE)**	**p value**
Illness in the last month	0.38 (0.02)	0.53 (0.02)	<0.00
Health care used for worst illness in last year	0.47 (0.02)	0.44 (0.02)	0.42
Stopped normal activities in past month because of illness	0.25 (0.02)	0.37 (0.02)	<0.00
Missed school in past month because of illness/injury	0.19 (0.02)	0.22 (0.02)	0.25

SE=Standard Error

Table 3.5. Odds ratios (OR) from multilevel regressions controlling only for intervention

Outcome variable	**Intervention OR**	**95% CI**	**p value**
Illness in the last month	0.47	0.32 – 0.67	<0.00
Health care used for worst illness in last year	1.12	0.66 – 1.89	0.68
Stopped normal activities in past month because of illness	0.51	0.37 – 0.72	<0.00
Missed school in past month because of illness/injury	0.79	0.55 – 1.15	0.22

Table 3.6. Odds ratios from multilevel regressions of children's health outcomes, including all covariates

Variables	**Dep. Var. = sick in the previous month**			**Dep. Var. = health services use**			**Dep. Var. = stopped normal activities due to serious illness**			**Dep. Var. = missed school due to illness/injury**		
Fixed Effects	**OR**	**95% CI**	**p value**	**OR**	**95% CI**	**p value**	**OR**	**95% CI**	**p value**	**OR**	**95% CI**	**p value**
Intercept	0.33	0.16, 0.68	0.00	0.60	0.22, 1.63	0.31	0.29	0.14, 0.59	0.00	0.10	0.04, 0.26	<.00
Key household level variables												
Intervention[1]	0.63	0.44, 0.90	0.01	1.36	0.78, 2.39	0.28	0.58	0.40, 0.82	0.00	1.00	0.63, 1.57	0.99
# working-age adults	0.66	0.51, 0.86	0.00	0.56	0.37, 0.83	0.00	0.78	0.60, 1.02	0.07	0.75	0.53, 1.06	0.10
# sick adults - past 30 days	1.97	1.50, 2.59	<.00	1.95	1.28, 2.97	0.00	1.49	1.14, 1.95	0.00	1.30	0.92, 1.85	0.14
Maternal orphan[2]	1.33	0.72, 2.47	0.36	1.52	0.63, 3.68	0.35	1.01	0.55, 1.87	0.97	1.61	0.76, 3.40	0.22
Paternal orphan[2]	0.74	0.49, 1.14	0.17	1.19	0.64, 2.23	0.58	0.75	0.49, 1.14	0.17	0.66	0.38, 1.16	0.15
Double orphan[2]	1.50	0.72, 3.14	0.28	0.54	0.18, 1.60	0.27	1.24	0.60, 2.57	0.57	0.89	0.36, 2.23	0.80
Child sex[3]	0.98	0.74, 1.30	0.90	0.96	0.68, 1.36	0.82	0.87	0.65, 1.16	0.35	0.88	0.60, 1.27	0.49
Control variables												
Child level												
age 10-14 years[2]	0.93	0.66, 1.31	0.68	0.73	0.48, 1.10	0.13	1.25	0.88, 1.79	0.21	1.06	0.67, 1.68	0.81
age 15-17 years[2]	0.71	0.45, 1.13	0.15	0.88	0.51, 1.54	0.66	1.03	0.63, 1.67	0.92	0.83	0.43, 1.60	0.58
relationship to household head[4]	1.66	0.99, 2.77	0.05	0.98	0.47, 2.03	0.96	1.07	0.64, 1.79	0.79	1.43	0.73, 2.78	0.30
Control for	1.70	1.25, 2.33	0.00	1.49	0.99, 2.25	0.06	1.26	0.93, 1.70	0.13	1.71	1.16, 2.53	0.01

Variables	Dep. Var. = sick in the previous month			Dep. Var. = health services use			Dep. Var. = stopped normal activities due to serious illness			Dep. Var. = missed school due to illness/injury		
Fixed Effects	**OR**	**95% CI**	**p value**	**OR**	**95% CI**	**p value**	**OR**	**95% CI**	**p value**	**OR**	**95% CI**	**p value**
outcome at baseline												
Household level												
Household head age	1.01	0.99, 1.03	0.20	1.00	0.97, 1.02	0.71	1.01	0.99, 1.02	0.33	1.00	0.98, 1.02	0.88
Household head sex[3]	1.83	1.17, 2.87	0.01	0.80	0.40, 1.57	0.51	1.59	1.01, 2.50	0.04	1.61	0.89, 2.94	0.12
Household head educ.[5]	1.22	0.86, 1.72	0.27	1.26	0.73, 2.16	0.41	1.33	0.94, 1.87	0.11	1.24	0.80, 1.91	0.34
# dependent adults	0.55	0.34, 0.87	0.01	0.51	0.25, 1.05	0.07	0.67	0.42, 1.07	0.09	0.96	0.53, 1.72	0.89
# children 6-9 years	1.01	0.82, 1.25	0.91	1.25	0.91, 1.73	0.17	1.18	0.96, 1.45	0.12	1.05	0.80, 1.36	0.74
# children 10-14 years	0.88	0.73, 1.06	0.17	0.95	0.71, 1.27	0.74	1.00	0.83, 1.20	0.98	0.94	0.75, 1.19	0.62
# children 15-17 years	0.83	0.63, 1.10	0.20	1.21	0.79, 1.86	0.38	0.85	0.64, 1.12	0.24	0.75	0.52, 1.07	0.11
Random effects	Estimate	se	P value	Estimate	se	p value	Estimate	se	p value	Estimate	se	p value
Level 2	0.94	0.29	0.00	4.36	0.90	<.00	0.73	0.27	0.00	0.95	0.41	0.01
Level 1 observations	1194			1173			1185			916		

OR=Odds Ratio; CI=Confidence Interval; [1]Intervention: Cash transfer recipient=1, Control=0; [2]Dummy variable: Yes=1, No=0; [3]Sex: Female=1, Male=0; [4]Relationship to household head: Biological child=1, Other=0; [5]Household head education: Primary education or more=1, No primary education=0.

CHAPTER FOUR

CONCLUSION

Many sub-Saharan African countries have adopted social cash transfer programs to address child poverty. The Mchinji SCTPS, an unconditional cash transfer program, was implemented in rural Malawi to alleviate poverty, reduce hunger and malnutrition, and improve school enrollment. The first cash transfers to recipient households in the program were made in June 2006. A rigorous evaluation study of the program, with communities randomized to intervention and control groups and pre- and post-treatment data collected, was conducted between March 2007 and April 2008. This dissertation was based on data collected for that evaluation study.

This dissertation is unique in its use of multilevel methods to evaluate the causal effect of the Mchinji SCTPS on children's schooling, work and health outcomes. Also, this is the first study to report on the impact of an unconditional cash transfer program on health outcomes for school-age children. Further, analyses facilitated by the multilevel modeling approach provide additional program-relevant information. Specifically, information is provided about the importance of two key child level factors, orphan status and child gender, and two household level demographic factors, number of sick and working-adults, for child outcomes in Malawi.

PROGRAMMATIC IMPLICATIONS

This research has several important programmatic implications. First, study findings suggest that the Mchinji SCTPS improved schooling outcomes for poor children in recipient households. Additionally, while disadvantages due to orphan status were not indicated, boys were found to be disadvantaged in schooling relative to girls. However, upon further examination, cash transfer effects on schooling were not found to vary by gender. Thus, with respect to schooling, results from this study imply that all poor children benefitted equally from the cash transfer, regardless of orphan status or child gender.

Second, evidence with respect to child work was mixed, with the cash transfer program decreasing time spent in economic activities but increasing number of domestic work activities and time spent in domestic work. Again, while no differences in child work due to orphan status were observed, girls were found to work more than boys. Cash transfer effects, however, were not moderated by gender. Although differences in time spent on domestic work were minimal between children in beneficiary and non-beneficiary households, further study is warranted to examine if increases in time spent on domestic work adversely affects schooling and health outcomes.

Third, the Mchinji SCTPS improved health outcomes for school-age children in rural Malawi. Disadvantages in health outcomes were not observed due to orphan status or child gender. However, study findings suggest that more should be done to identify children at high risk for illness, such as those living with sick adults, and to provide needed services to these children and the adults they live with.

Fourth, study results suggest that while child level factors, in particular orphan status and gender, may be important in Malawi, poverty may be more critical for targeting resources to

all poor school-age children. Additionally, other household level factors may also be important for identifying children who are most in need of assistance and ensuring these children are reached by social programs. These factors include whether the household is female-headed, has sick adults, and/or has children age 5 and younger. Future cash transfer programs should take such factors into account when identifying eligible households.

Fifth, an important discussion and ongoing debate in the field is the difference between conditional and unconditional cash transfers and which is better at yielding desired effects. This study examines an unconditional cash transfer program and findings suggest that in Malawi conditions on cash transfers may not be necessary to obtain positive effects on children's outcomes. Though findings from this study cannot imply whether conditional or unconditional transfers are better, they do indicate the potential of unconditional cash transfer programs to improve child well-being in sub-Saharan Africa. African governments, for a variety of reasons, have chosen the unconditional approach and this study provides evidence that this approach can lead to improved outcomes for all children, regardless of gender or orphan status.

METHODOLOGICAL IMPLICATIONS

A number of important methodological implications warrant discussion. First, this study demonstrates the advantages of using multilevel modeling to evaluate an unconditional cash transfer program. Multilevel modeling offers several improvements on standard regression methods, particularly the commonly used household FE approaches. Multilevel models account for clustering such as in the experimental data used for this dissertation whereby outcomes for children living in the same household are likely to be similar. Also, with

multilevel models the unique effect of a program on outcomes of interest can be examined while at the same time determining the effects of other important factors occurring at different levels (e.g., individual and household) as well as across levels (e.g., whether program effects vary by individual or household level factors). Examining these relationships using standard regression methods would be cumbersome and require estimation of several equations to determine effects of interest. Additionally, while household FE approaches restrict inferences on relationships of interest to children living in the same households, multilevel methods allow inferences to specific households as well as to the population of households.

Second, this study estimates relative measures of program effect to determine whether the Mchniji SCTPS has any effect on school-age children's outcomes and whether the effects are in the desired direction. To obtain these relative effect measures multilevel logistic regressions are used for binary outcome variables, multilevel Poisson and negative binomial regressions for count outcome variables, and multilevel linear regressions for continuous outcome variables. Although this study does not estimate differences in absolute measures of program effect (e.g., marginal effects), it still provides important policy-relevant information as to whether the cash transfer program has the desired effect on children's outcomes.

STUDY LIMITATIONS

The study has a number of limitations. First, the data include only two time points within a relatively short timeframe of 1 year. Thus, the study could not determine if and how the effects of cash transfers, orphan status, gender and household factors on children's outcomes change over time.

Second, because of the study design, whereby randomization was done at the village group level, a third level of nesting was ignored. Though the reported effects and associated standard errors from the models may be incorrect, it is not expected to be a serious problem because the number of village groups was small, and because only the poorest households were included in the study, cluster variation may be small and not have a strong study effect.

Finally, in Chapter 3, reported health status and use of health services is subjective and may be sensitive to recall bias (though relatively short periods of time were used – one month and one year). Relatedly, the measure of health services utilization may be weak in that for many children their worst illness may not have been severe enough to warrant use of health services. Future studies should consider including more objective measures such as biomarker data and reports from medical records.

CONCLUDING REMARKS AND RECOMMENDATIONS FOR FUTURE RESEARCH

In summary, the analyses of this dissertation on the impact of the Mchinji SCTPS on children's schooling, work and health provides important policy-relevant information. Children in beneficiary households had better schooling and health outcomes than children in non-beneficiary households. However, program effects on child work were mixed with children in beneficiary households spending less time on economic activities outside the home but spending more time on domestic activities within the home compared to children in non-beneficiary households.

Further research is needed to understand the causal pathways or mechanisms through which the program impacts children's outcomes. With respect to schooling, it is important to know the cost of schooling for children in Malawi and how the cash transfer helps to keep

them in school. Since primary education is free, do households with children in primary school use cash transfer funds for school transportation, uniform and/or school supplies? Is the impact on enrollment larger for secondary school children who are required to pay school fees? Additional studies are also needed to determine if increases in domestic work adversely affect schooling outcomes, especially for girls. Future studies of unconditional cash transfer programs should examine differences in household expenditures between beneficiary and non-beneficiary households to provide a clearer picture of how transfer funds are being used. It is possible that in Mchinji cash transfers increased expenditures on certain items (e.g., more nutritious food) which may have improved school-age children's health. Future evaluation studies should also consider the importance of individual and household level factors, as was done in the study. Going forward, unconditional cash transfer programs in Malawi and other sub-Saharan countries should take into consideration factors that reflect household vulnerabilities or constraints as eligibility criteria.

APPENDIX

Table A1. Child level descriptive statistics

Variable	**N**	**% / Mean (SD)**	**Min.**	**Max.**
Child age - Round 1	1193	11.15 (3.16)	6	17
Child is between age 6 to 10 years	1193	44%	0	1
Child is between age 11 to 14 years	1193	38%	0	1
Child is between age 15 to 17 years	1193	18%	0	1
Female child	1193	50%	0	1
Child is a non-orphan	1193	34%	0	1
Child is any type of orphan	1193	66%	0	1
Child is maternal orphan	1193	33%	0	1
Child is paternal orphan	1193	56%	0	1
Child is a double orphan	1193	24%	0	1
Biological child of household head	1193	54%	0	1
# working-age adult	1193	1.16 (0.92)	0	4
# sick adults in the past 30 days	1193	1.33 (0.81)	0	5
Household head age	1193	56.41(17.09)	18	96
Female household head	1193	68%	0	1
Household head has primary education or more	1193	50%	0	1
# dependent adults (age 65 years and older)	1193	0.51 (0.63)	0	2
# children under 6 years	1193	0.68 (0.86)	0	3
# children between age 6 and 10 years	1193	1.56 (0.95)	0	4
# children between age 11 and 14 years	1193	1.27 (0.86)	0	4
# children between age 15 and 17 years	1193	0.66 (0.69)	0	2
Schooling at baseline				
Enrolled in school	1186	88%	0	1
# days missed school during the past month	1036	3.00 (4.19)	0	31
Appropriate grade for age	1187	0.27 (0.25)	0	2
Child work activities at baseline				
Helped with household chores during past week	1188	72%	0	1
Helped with caring for other children during past week	1152	32%	0	1
Helped with caring for other adults during past week	1189	20%	0	1
# child domestic work activities	1150	1.24 (0.96)	0	3
Domestic service in someone else's home during past week	1189	9%	0	1
Involved in income generating activities during past week	1188	5%	0	1
Helped with doing any other family work during past week	1188	27%	0	1
# economic work activities	1185	0.41 (0.61)	0	3

Variable	N	% / Mean (SD)	Min.	Max.
# all child work activities	1145	1.65 (1.29)	0	6
Child work hours at baseline				
# hours spent in household chores during past week	858	2.29 (3.51)	1	76
# hours spent caring for children in household	364	2.58 (4.95)	1	76
# hours spent caring for adults in household	240	2.33 (3.88)	1	42
# child domestic work hours	853	3.69 (4.86)	1	75
# hours spent doing domestic service in other home	108	3.15 (3.10)	1	24
# hours spent in income generating activities	53	2.81 (2.86)	1	21
# hours spent in any other family work	321	2.11 (2.17)	1	21
# child economic work hours	407	2.83 (2.92)	1	24
# all child work hours	885	4.73 (5.86)	1	82
Schooling at 1-year follow-up				
Enrolled in school	1191	91%	0	1
# days missed school during the past month	1087	1.56 (3.00)	0	30
Appropriate grade for age	1192	0.32 (0.23)	0	2.5
Child work activities at 1-year follow-up				
Helped with household chores during past week	1186	73%	0	1
Helped with caring for other children during past week	1157	29%	0	1
Helped with caring for other adults during past week	1184	20%	0	1
# child domestic work activities	1156	1.21 (0.95)	0	3
Domestic service in someone else's home during past week	1179	9%	0	1
Involved in income generating activities during past week	1190	2%	0	1
Helped with doing any other family work during past week	1190	38%	0	1
# child economic work activities	1180	0.49 (0.59)	0	3
# all child work activities	1150	1.71 (1.23)	0	6
Child work hours at 1-year follow-up				
# hours spent in household chores during past week	867	1.98 (1.89)	1	28
# hours spent caring for children in household	332	1.69 (1.45)	1	15
# hours spent caring for adults in household	236	1.58 (1.07)	1	8
# child domestic work hours	861	3.00 (2.95)	1	36
# hours spent doing domestic service in other home	98	2.72 (1.80)	1	8
# hours spent in income generating activities	26	2.58 (1.55)	1	6
# hours spent in any other family work	446	2.07 (1.82)	1	30
# child economic work hours	513	2.44 (2.18)	1	30
# all child work hours	925	4.11 (3.71)	1	42

SD=Standard Deviation; #=Number

Table A2. Household level descriptive statistics (N=486)

Variable	**% / Mean (SD)**	**Min.**	**Max.**
Intervention	53%	0	1
Female household head	68%	0	1
household head has primary education or more	47%	0	1
Age of household head	58.53 (17.21)	18	96
# working-age adults in household - round 1	1.11 (0.95)	0	4
# sick adults in household past 30 days - round 3	1.35 (0.81)	0	5
# dependent adults in household (age 65 and older)	0.57 (0.63)	0	2
# children under age 6 years in household	0.64 (0.87)	0	3
# children age 6-10 years in household	1.35 (0.96)	0	4
# children age 11-14 years in household	1.08 (0.83)	0	4
# children age 15-17 years in household	0.56 (0.65)	0	2
# children age 6-17 years in household	2.45 (1.22)	1	8
Dependency ratio	0.39	0	3
Household size	4.80	2	13

#=Number; SD=Standard Deviation; Min.=Minimum; Max.=Maximum

Table A3. Bivariate tests for differences at baseline and follow-up between cash transfer (intervention) and control groups

Variable	Baseline			1-year Follow-up		
	Cash transfer group % / Mean (SD)	**Control group % / Mean (SD)**	**Tests of differences p value**	**Cash transfer group % / Mean (SD)**	**Control group % / Mean (SD)**	**Tests of differences p value**
Schooling outcomes						
Enrolled in school (yes)	90%	86%	0.06	95%	86%	0.00
# days missed school during the past month	2.86 (3.67)	3.07 (4.62)	0.44	1.03 (2.27)	2.31 (3.79)	0.00
Appropriate grade-for-age	0.28 (0.27)	0.26 (0.23)	0.11	0.32 (0.25)	0.31 (0.21)	0.39
Work activity outcomes (past week)						
# child domestic work activities	1.19 (0.98)	1.32 (0.93)	0.02	1.25 (0.97)	1.16 (0.94)	0.14
# child economic work activities	0.40 (0.62)	0.43 (0.60)	0.49	0.45 (0.55)	0.53 (0.64)	0.02
# all child work activities	1.59 (1.33)	1.75 (1.23)	0.04	1.71 (1.21)	1.71 (1.24)	0.92
Work hours outcomes (past week)						
# child domestic work hours	2.80 (3.58)	3.62 (4.98)	0.01	3.11 (3.31)	2.87 (0.13)	0.24
# child economic work hours	1.26 (2.38)	1.57 (3.16)	0.21	2.25 (2.39)	2.71 (1.83)	0.02
# all child work hours	3.80 (4.72)	4.59 (6.01)	0.03	4.11 (4.17)	4.13 (3.02)	0.94
Health outcomes						
Reported illness in the past month (yes)	65%	66%	0.53	38%	53%	0.00
Health care used for child's worst illness in the past year (yes)	40%	47%	0.02	47%	44%	0.43
Stopped normal activities in the past month because of illness (yes)	46%	51%	0.06	25%	37%	0.00
Missed school in the past month because of illness/injury (yes)	43%	49%	0.08	20%	23%	0.31

SD=Standard Deviation

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