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A multilevel analysis of the effect of Malawi's Social Cash Transfer Pilot Scheme on school-age children's health

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Objective The primary goal was to examine whether Malawi Social Cash Transfer Pilot Scheme, initially implemented in a rural district in central Malawi, improved health outcomes for children aged 6–17. Secondary goals were to examine the effects of individual child- (orphan status and gender) and household-level factors (number of working-age adults and sick adults) on health outcomes. Another secondary goal was to examine whether orphan status modified the cash transfer effect on health outcomes.

Methods This multilevel study used panel data collected in 2007–08 from a randomized controlled evaluation study of phase one of the programme. The analyses included 1197 children aged 6–17 in 486 households. The four outcomes of interest were: illness in the past month, illness that stopped normal activities in the past month, missing school due to illness or injury in the past month and health care use for worst illness in the past year.

Findings Approximately two-thirds of children in cash transfer eligible households were orphans. Compared with children in non-beneficiary households, those in beneficiary households had a 37% lower odds of child illness ($P < 0.05$), 42% lower odds of illness that stopped normal activities ($P < 0.01$) and substantially higher odds of utilizing health services for a serious illness (odds ratio = 10.98; $P < 0.01$). An increase in the household number of working-age adults was associated with 34% lower odds of child illness ($P < 0.01$). An increase in the household number of sick adults increased the odds of child illness by 97% ($P < 0.01$) and serious illness by 49% ($P < 0.01$). No statistically significant differences were observed by orphan status and child's gender. Consistent differential programme effects by orphan status were not observed.

Conclusion Unconditional cash transfer programmes to poor households have the potential to improve health outcomes for all vulnerable children aged 6–17.

Keywords Unconditional cash transfer, health, school-age children, orphans, Malawi

KEY MESSAGES

- Recent studies in developing countries show that although their risk for morbidity and mortality is lower than younger children, older children aged 6–17 are nevertheless at substantial risk for poor health and death. Thus, they should not be neglected by researchers and policymakers.
- Limited research has examined the impact of cash transfer programmes on school-age children's health.
- A significant proportion of children in poor households eligible to receive cash transfers are orphans and/or at risk for adverse health outcomes.
- Findings from this study suggest that unconditional cash transfer programmes have the potential to improve health outcomes for all vulnerable children aged 6–17.

Introduction

Sub-Saharan African school-age children, ages 6–17, bear the highest burden of disease and risk for death among all school-age children, worldwide (Patton *et al.* 2009; Gore *et al.* 2011). 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 (Lopez 2006; Glewwe and Miguel 2007). About one-quarter is due to injuries and one-fifth to non-communicable diseases and nutritional problems (Lopez 2006; Glewwe and Miguel 2007).

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 *et al.* 2003). Appropriate policies and programmes 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 and low future earnings) and potential inter-generational effects (e.g. poor birth outcomes among infants of young mothers with chronic poor health) (Barrientos and DeJong 2006; Adato and Bassett 2009).

The primary purpose of this article was to determine the effect of Malawi's Social Cash Transfer Pilot Scheme (SCTPS), an unconditional cash transfer programme implemented in rural Malawi, on school-age children's health outcomes. Secondary goals were to examine if and how individual child-level factors (orphan status and gender) and household-level factors (number of sick adults and working age adults) affect children's health outcomes. We also examined whether the impact of the cash transfer on health outcomes varies by children's orphan status.

Cash transfer programmes to address poor school-age children's health outcomes

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 programmes expect transfer recipients to comply with a set of requirements, whereas unconditional programmes do not. The former are more common in Latin American countries and the latter in sub-Saharan Africa (Schubert and Slater 2006; Lagarde *et al.* 2007; Fiszbein *et al.* 2009). The unconditional design feature of most sub-Saharan African cash transfer programmes is shaped by limited human and financial capacity to monitor conditional cash transfers and concerns about the limited availability of health services to meet any additional demand due to programme conditions (Schubert and Slater 2006). Another design difference that distinguishes cash transfer programmes in sub-Saharan Africa is that they tend to be targeted to extremely poor households rather than all poor households and are based on community identification and verification of eligible beneficiaries (Schubert and Slater 2006; Davis *et al.* 2012).

Cash transfer programmes in developing countries aim to enable caregivers to provide for their children's well-being and health (Adato and Bassett 2009; Fiszbein *et al.* 2009). Because of their longer history, the published literature is replete with evaluation studies of conditional cash transfer programmes (Lagarde *et al.* 2007; Fiszbein *et al.* 2009). Fewer studies have been published on unconditional programmes which are more recent (Adato and Bassett 2009; Davis *et al.* 2012). Overall, studies of conditional and unconditional cash transfer programmes generally show positive effects of these programmes on children's schooling and work outcomes, as well as on health outcomes among children under age 6 (Lagarde *et al.* 2007; Adato and Bassett 2009; Fiszbein *et al.* 2009; Ranganathan and Lagarde 2012; The Kenya CT-OVC Evaluation Team 2012a,b). Fewer studies, however, have examined the impact of these programmes on school-age children's health.

Recent epidemiological studies highlight the fact that although their risk for morbidity and mortality is lower than for younger children, older children aged 6–17 are nevertheless at substantial risk for poor health and death and thus should not be neglected by researchers and policymakers (Patton *et al.* 2009, 2012; Gore *et al.* 2011). At least one study has shown positive effects of Mexico's 'Oportunidades', a conditional cash transfer programme, on older children's (ages 8–10 years) anthropometric indicators, cognitive development, language development and behaviour (Fernald *et al.* 2009). However, Gertler (2000) found no effect of Mexico's programme on school-age children's (ages 6–17 years) health status and health care utilization. Although Paxson and Schady (2010) did not find significant treatment effects of an unconditional programme in Ecuador for the sample as a whole of young children (ages 3–7 years), they found significant positive effects on haemoglobin levels and deworming treatments for children in the poorest families. Only one study in Malawi has examined the differential impact of conditional and unconditional cash transfers on health outcomes among adolescent girls (ages 13–22 years) (Baird *et al.* 2011, 2012). Although cash transfers reduced HIV and HSV-2 prevalence relative to the control group, effects did not differ significantly between conditional and unconditional groups. This article contributes to the continuing debate over whether unconditional programmes can improve important health outcomes among school-age children.

The Malawi SCTPS was designed to alleviate poverty, reduce hunger and malnutrition and improve school enrolment for the poorest 10% of households (Miller *et al.* 2008a). The cash transfer programme began as a pilot in 2006 in Mchinji District and has gradually expanded to a further seven districts. As of 2012 an estimated 26 000 households with ~105 000 individuals were receiving transfers on a monthly basis. The programme is a key pillar in the country's social protection strategy and is executed through district councils and falls under Malawi's Ministry of Gender, Children and Community Development.

Possible pathways through which the Malawi SCTPS may improve school-age children's health include improvements in household food security and ability to purchase basic amenities. Studies in Malawi have found that households receiving cash transfers significantly increased food expenditures, increased the share of expenditures dedicated to food and improved their dietary diversity by consuming nutritious foods (Miller *et al.* 2010b, 2011). The evaluation of an unconditional cash transfer programme in Kenya also showed significant increases in overall spending, food spending and health spending (The Kenya CT-OVC Evaluation Team 2012a,b). Similar findings were observed from a conditional cash transfer programme in Nicaragua (Maluccio and Flores 2005). Improved food security for poor households in Malawi may result in healthier children with the ability to fend off common child ailments. Improvements due to the cash transfer programme in the health of younger children in the household who are more susceptible to communicable diseases may also result in better overall health for all household members, including older children. Through information from qualitative interviews, Miller *et al.* (2010b) reported 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.

Disparities in health due to orphan status and gender

A better understanding of individual- and household-level determinants of child health is also needed to facilitate precise targeting of programmes to reach those children who are most in need. Orphans, defined as children under age 18 years with one or both parents deceased (UNICEF *et al.* 2004), are vulnerable (UNICEF 2005). Several sub-Saharan African studies suggest that orphan status is an important individual-level risk factor for short height or stunting which is often a sign of chronic undernutrition and poor child health (Beegle *et al.* 2006, 2010). 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 (Viner *et al.* 2012). Studies show a higher burden of disease and mortality rates among females aged 15–19 in sub-Saharan Africa than among males in the same age group. This is largely due to communicable diseases such as HIV/AIDS and tuberculosis and also maternal causes from early pregnancy (Patton *et al.* 2009, 2012; Gore *et al.* 2011). 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; Thielman *et al.* 2012). If, as hypothesized earlier, orphans are discriminated against within households or live in poorer households then it is possible that they will reap fewer benefits from a cash transfer than non-orphans.

Disparities in health due to household factors

Vulnerable children are also defined as those who 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 or live in a household where at least one adult was seriously ill for at least 3 months in the past 12 months (UNICEF 2005). Indeed, higher burdens of disease have been found among children living with sick parents or caregivers (Kidman *et al.* 2010; Thielman *et al.* 2012). This study examined if and how the numbers of able working-age adults and of sick adults in a household are associated with school-age children's health outcomes.

Methods

Study setting

Malawi is a landlocked country situated south of the equator in sub-Saharan Africa. It is one of the poorest countries in the world and is ranked 171 of 187 countries in the 2011 Human Development Index (United Nations Development Fund (UNDP) 2011). In 2005, 52% of the population of Malawi 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 (NSO [Malawi] and ICF Macro 2011). Out of 1 164 939 orphans, an estimated 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 HIV prevalence among people aged 15–49 estimated at 10.6% in 2010 (NSO [Malawi] and ICF Macro 2011). HIV prevalence is higher in urban (17.4%) than rural (8.9%) areas.

Mchinji District, the study setting, is a rural area in the western-most part of the Central Region of Malawi. The district is situated ~100 miles from Lilongwe, the national capital city. Overall, in 2005, 30% of households in Mchinji District were classified as ultra-poor compared with 22% of households in Malawi (NSO [Malawi] 2005). The district was ranked as the 14th poorest of 28 districts (Schubert and Huijbregts 2006).

HIV prevalence in this region is estimated at 7.6% (NSO [Malawi] and ICF Macro 2011).

Sample selection and eligibility

This article presents a secondary analysis of data from the Mchinji SCTPS evaluation study. The study 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 (Miller *et al.* 2008b).

Sample selection for the Mchinji SCTPS evaluation study was conducted in multiple stages. Mchinji District is divided into nine traditional authorities (TAs) that are further divided into village groups that contain multiple villages creating clusters of ~1000 households. First, eight village groups were selected by a District Committee comprised of the District Social Welfare Officer, Cash Transfer Desk Officer, social welfare assistants and trainers (Miller *et al.* 2008c). These village groups were located in four TAs where the Mchinji SCTPS was already operational but households were not yet receiving cash transfers. The cash transfer programme was scaled up in Mchinji District over a period of time. Village groups were added to the programme as time, finances and human resources permitted (Schubert and Huijbregts 2006). Approximately 100 eligible households per village group were then identified in each selected village group. Eligible households were identified by Village Committees, which were comprised of volunteers from the communities. The sampling frame was a district-provided roster of all cash transfer approved households in the eight village groups. The list of eligible households was approved by the District and Village Committees (Miller *et al.* 2008b,c, 2011). All school-age children (ages 6–17) who were living in the selected households were eligible for the study. Children living in households with no adult present were excluded.

Eligible households that were cash transfer approved were ultra-poor and/or labour-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.* 2008a, 2010a,b). In 2005, the official Malawi poverty line was Malawi Kwacha (MK) 16 165 (~US$115) per capita per year and the ultra-poverty line was MK 10 029 (~US$71) per capita per year (NSO [Malawi] 2005). Labour constrained households are elderly headed with no adults between ages 19 and 64 who are fit for work, are child headed households, have incalculable (i.e. no able adults age 19 and older to care for dependents) or worse than three dependency ratios and/or contain adults that are chronically sick or disabled (Miller *et al.* 2008a, 2010a,b). Cash transfer programmes in other sub-Saharan African countries with similar targeting criteria include Zambia, Zimbabwe and Liberia (Schubert 2005; UNICEF 2008). Detailed descriptions of the Mchinji SCTPS evaluation study procedures are presented elsewhere (Miller *et al.* 2008a,b, 2010a, 2011).

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 1).

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. Monthly transfers ranged from MK 600 (~US$4) for a household with one member to MK 1800 (~US$13) for a household with four members. An extra MK 200 (~US$1) and MK 400 (US$3) per month were received for each additional primary aged and secondary aged child in the household, respectively. On average, beneficiary households received monthly transfers of MK 1700 (~US$12) (Schubert and Huijbregts 2006; Miller *et al.* 2008c) or MK 20 400 (~US$144) annually (i.e. ~20% of average annual household expenditure in Malawi in 2005) (NSO [Malawi] 2005). Although eligible, households in the control group did not receive cash transfers during the 1 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 in paper format as well as height and weight measurements of all children in the household. Face-to-face interviews were conducted with the household head registered to receive the cash transfer or another household member selected by the household head. Interviews, conducted in Chichewa or English by a team of trained research assistants, lasted between 1.5 and 3 h depending on the size of the household and age and well-being of the respondent (Miller *et al.* 2008b, 2011).

Measures

The four health outcomes of interest were (1) child illness in the past month ('Has [name] been sick during the past month?'); (2) use of health services for child's worst illness in the past year, among only those who had a serious illness in the last year ('Think about the worst illness over the last year. Did you seek health care for [name] during this illness?'); (3) illness that stopped normal activities in the past month ('During the past month, did [name] have to stop normal activities because of any illness?') and (4) missed school because of illness or injury in the past month (created from two questions: 'How many days did [name] miss school during the past month? What was the main reason for missing school?'). The fourth variable only included children who were enrolled in school at follow-up. Over 90% of children in the sample were enrolled in school. All outcome measures were binary variables measured at 1-year follow-up.

This study used reported illness and utilization of health care services because they are more direct measures of children's health outcomes. Previous studies have used anthropometric indicators, specifically height and body mass index, as proxies for child health (Beegle *et al.* 2006; Hall *et al.* 2010). However, while anthropometric measures may capture the nutritional status of older children well, they may not accurately assess their health status (Trapp and Menken 2005).

The outcomes were modelled 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 (mother deceased), paternal orphan (father deceased) or double orphan (both parents deceased)] and child's 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. Selection of these variables was guided by previous research (Kidman *et al.* 2010; Paxson and Schady 2010; The Kenya CT-OVC Evaluation Team 2012a,b). 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. These household-level variables were included as controls because they may have some explanatory role in the estimation of the outcomes. For example, household heads who are female or more educated are more likely than males or those with less education to have a positive effect on children's health. On the other hand, increasing age of the household head may have a negative effect on children's health. Also included were five household composition variables: number of children under age 6, number of children aged 6–9, number of children aged 10–14, number of children aged 15–17 and number of dependent adults older than age 64. Household composition variables were included to control for dependency ratios. Households with higher numbers of children and dependent adults may be poorer with fewer resources (e.g. financial and time) for each individual child. It could also be a sign of household crowding which increases the risk of exposure to some infectious diseases. Data on actual cash transfers amounts received by each household were not available for this analysis though the programme take-up rate was universal.

Statistical analyses

Univariate and bivariate analyses were first conducted. Multilevel logistic regression 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). Study data were collected at three time points, i.e. at 6-month intervals, over a 1-year period. While a third level could conceivably be added to the models with time nested within child, in this context a 6-month interval period between data collection is a relatively short time in which to observe substantial change in the key covariates. Illness also varies with seasons (i.e. warm-wet vs cool-dry vs hot-dry) so that using the mid-line survey could introduce other confounding factors. Thus, two-level random intercepts models were used because three-level models would add complexity to analysis and interpretation of results that may not be warranted. 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 centred to facilitate interpretation of effects (Kreft *et al.* 1995; Enders and Tofighi 2007). Interactions between intervention and orphan status were examined to test for differential intervention effects. SAS 9.2 PROC GLIMMIX was used for all analyses.

Ethical approval

The Mchinji SCTPS evaluation study was approved by the Boston University Institutional Review Board (IRB) and the Malawi National Health Research Council at the Ministry of Health. Prior to baseline data collection, research staff visited 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.* 2008b, 2010a). IRB approval for secondary data analysis was also obtained from the University of North Carolina at Chapel Hill.

Results

Sample characteristics

At baseline, the Mchinji SCTPS evaluation sample frame included 581 households with a total of 1649 children aged 6–17. Of these children, 452 were excluded because they were not observed at baseline, were no longer in the household at follow-up, were 'ghost'[1] children, had missing key baseline covariates (gender, orphan status), or there 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 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; $P < 0.05$) but not with age of the child, intervention/control status, household head's gender or age (data not shown).

Table 1 shows selected summary statistics from the baseline data for the overall child 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 with more paternal and double orphans overall. There was a mean of two children per household. The statistics revealed few significant differences at the child level between the intervention and control groups at baseline. Significant differences were observed in the distribution of children by orphan status, with more double orphans in beneficiary households and more paternal and maternal orphans in non-beneficiary households. 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 diarrhoea, ear and eye infections among children 6–9 years of age (data not shown).

At the household level, beneficiary households reported having significantly more household heads with primary or

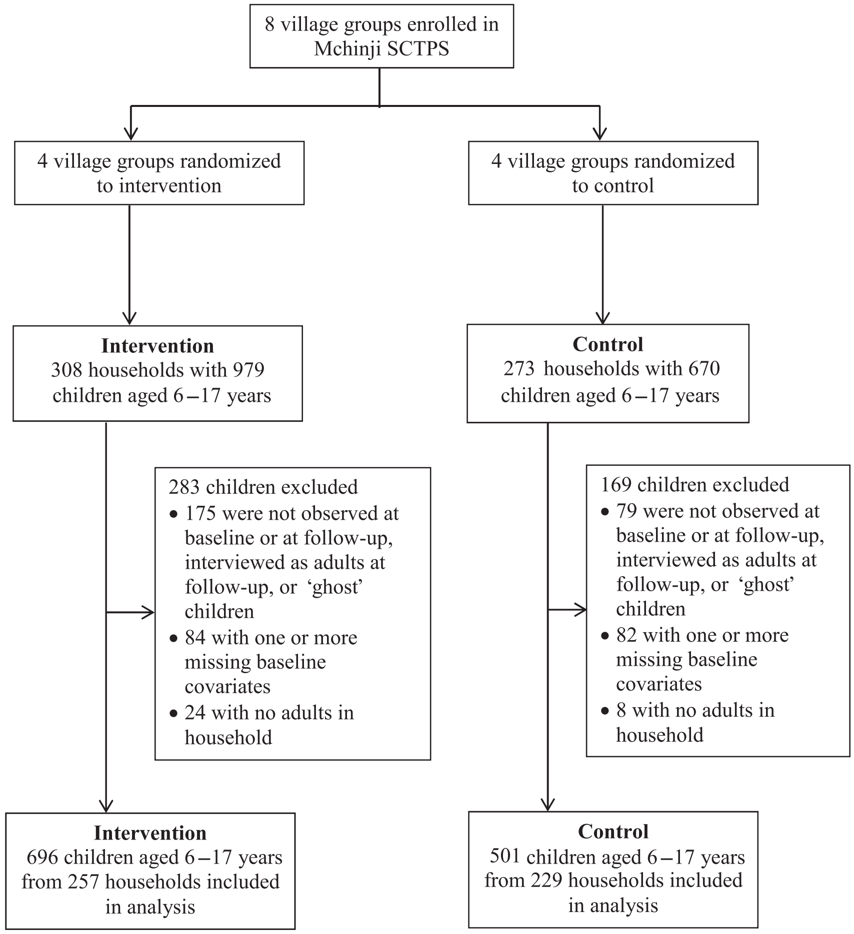

Figure 1 Participant flowchart.

more education, working-age adults and children 6–9 years, 10–14 years and 15–17 years than non-beneficiary households. Beneficiary households also had significantly more household members than non-beneficiary households. Among household heads, mean age was 58 years, 68% were female and 47% had primary education or more (see Table 2).

Table 3 shows results of bivariate analyses of the dependent variables at baseline and 1-year follow-up by intervention condition. The results show significant differences between the two groups at baseline and follow-up in health care used for child's worst illness among children who had a serious illness. At baseline a significantly higher proportion of children in control than in beneficiary households reported health care utilization. However, at follow-up a higher proportion of children in beneficiary households reported health care use. At follow-up, significantly fewer children in beneficiary households reported illness in the previous month and illness that stopped normal activities than non-beneficiary households. However, there were substantial improvements in the health outcomes for both groups from baseline to 1-year follow-up, except in the case of health care utilization that reduced for control households. While this improvement in outcomes was expected for cash transfer households, it was unexpected for the non-beneficiary households. In addition, a significantly greater proportion of non-orphans reported illness in the past month at baseline compared with orphans (see Table 4). Significant differences were not observed between orphans and non-orphans in any of the other outcomes of interest.

Effect of cash transfer on health

Table 5 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 at <5% for all outcome variables, and therefore was not a concern. Compared with children in non-beneficiary households, those in households who received the cash transfer had significantly lower odds of reported illness in the previous month ($OR = 0.63$; $P < 0.05$) and lower odds of reported illness in the previous month that stopped normal activities ($OR = 0.58$; $P < 0.01$). Children in cash transfer households also had higher odds of utilizing health services in the previous year if they had a serious illness ($OR = 10.98$; $P < 0.01$) compared with those in control households. The wide confidence interval for this estimate, however, suggests large differences in the use of health services among children with a serious illness in cash transfer households. Cash transfers did not have a significant effect on missing school due to illness or injury.

Effect of key individual child- and household-level factors on health

There were no significant associations between reported child illness and health care use with orphan status and child's gender. However, independent of exposure to the cash transfer, numbers of working-age adults and of sick adults in a household were associated with illness and health care use. An increase in the household number of working-age adults was significantly associated with a lower odds of reported child illness (OR = 0.66; $P < 0.01$). It was also 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; $P < 0.01$) and reported illness that stopped normal activities (OR = 1.49; $P < 0.01$). A trend towards an increase in the odds of health care use was also observed among children as the number of sick adults increased (OR = 2.94; $P < 0.06$).

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; $P < 0.05$). In addition, while an increase in the number of dependent adults was significantly associated with a lower odds of reported illness (OR = 0.55; $P < 0.05$), an increase in the number of younger children was significantly associated with a higher odds of reported illness (OR = 1.27; $P < 0.05$).

Table 1 Sample child characteristics and bivariate tests for baseline equivalence between intervention and control group

Child-level covariates	Total $N = 1197$ %/mean (SD)	Intervention $N = 696$ %/mean (SD)	Control $N = 501$ %/mean (SD)	*P*-value
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%	0.78
10–14 years	49%	48%	50%	
15–17 years	18%	18%	18%	
Orphan status				
Non-orphan	34%	35%	34%	0.75
Orphan	66%	65%	66%	
Orphan distribution				
Maternal orphan	14%	12%	17%	0.02
Paternal orphan	50%	48%	52%	
Double orphan	36%	40%	31%	
Child of household head	54%	52%	56%	0.22

SD, standard deviation.

Effect modification by orphan status

Given the risk for adverse child outcomes associated with orphan status in high HIV prevalence countries in sub-Saharan Africa, especially among children in poor households, further analyses were conducted. Interactions were examined to determine if the effect of the cash transfer programme varied by orphan status to answer the question of whether orphans benefited less than non-orphans from the programme. However, significant differential programme effects by orphan status were not indicated in the health outcomes except for serious illness that stopped normal activities (Table 6). Orphans in households who received the cash transfer were significantly less likely to report that they stopped normal activities because of serious illness than non-orphans in cash transfer households (Table 6, panel 3).

Table 2 Selected household characteristics at baseline and bivariate tests for baseline equivalence between intervention and control group

Characteristic	Total $N = 486$ %/mean (SD)	Intervention $N = 257$ %/mean (SD)	Control $N = 229$ %/mean (SD)	*P*-value
Female household head	68%	66%	70%	0.43
Household head has primary education or more	47%	52%	42%	0.02
Number of working-age adults in household	1.11 (0.95)	1.21 (0.98)	1.00 (0.91)	0.01
Number of sick adults in households in past 30 days	1.35 (0.81)	1.39 (0.86)	1.31 (0.74)	0.31
Age of household head	58.53 (17.21)	58.32 (17.42)	58.78 (17.01)	0.77
Number of dependent adults in household	0.57 (0.63)	0.54 (0.62)	0.60 (0.63)	0.35
Number of children under age 6	0.64 (0.87)	0.70 (0.90)	0.57 (0.83)	0.11
Number of children age 6–9	1.04 (0.89)	1.17 (0.96)	0.89 (0.80)	0.00
Number of children age 10–14	1.39 (0.95)	1.53 (0.95)	1.23 (0.92)	0.00
Number of children age 15–17	0.56 (0.65)	0.63 (0.67)	0.48 (0.61)	0.01
Dependency ratio	0.33 (0.39)	0.31 (0.33)	0.34 (0.45)	0.39
Household size	5.31 (1.89)	5.79 (1.97)	4.78 (1.64)	<.00

Table 3 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
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)	80%	90%	0.00	91%	79%	0.00
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

Table 4 Bivariate tests for differences at baseline and follow-up between orphans and non-orphans

Variable	Baseline			1-Year follow-up		
	Orphan %/ mean (SD)	Non-orphan %/mean (SD)	Tests of differences *P*-value	Orphan %/mean (SD)	Non-orphan %/mean (SD)	Tests of differences *P*-value
Health outcomes						
Reported illness in the past month (yes)	63%	70%	0.02	44%	45%	0.77
Health care used for child's worst illness in the past year (yes)	83%	86%	0.43	86%	85%	0.64
Stopped normal activities in the past month because of illness (yes)	47%	50%	0.28	29%	32%	0.45
Missed school in the past month because of illness/injury (yes)	45%	48%	0.35	20%	20%	0.97

Discussion and limitations

Summary of findings on cash transfer effects

This study provides evidence of positive effects of the Mchinji SCTPS—an unconditional cash transfer pilot programme implemented in rural Malawi—on school-age children's health outcomes. Specifically, at 1-year follow-up, children in households who received cash transfers had lower odds of reported illness and serious illness that stopped normal activities in the past month compared with children in non-beneficiary households. Children in households who received the transfer were also more likely to use services for serious illness. However, there were no significant effects of the cash transfer programme on school absence due to illness or injury in the past month. Overall, the results differ from a study examining the effect of a conditional cash transfer programme in Mexico which found no programme effect on reported health status and use of health services among children aged 6–17 (Gertler 2000). Differences between the studies may be due to relatively greater poverty and poorer health among school age children in Malawi compared with those in Mexico. We found no other published papers examining similar outcomes among school-age children.

While the results of this study suggest positive effects of the Malawi programme on school-age children's health, they do not provide any information about the causal pathways or mechanisms through which the programme may have affected children's outcomes. Further research is warranted to establish the causal pathway through which cash transfers improve school-age children's health. This in turn will lead to a better understanding how these programmes can be successfully implemented.

Summary of findings on orphan status and gender

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 are not worse off than non-orphans. This finding, which is consistent with Kidman *et al.* (2010), suggests that the targeting criteria for the Malawi cash transfer were successful in reaching impoverished children in urgent need of health-related assistance. Indeed, two-thirds of the children in this study were orphans and many were vulnerable in that they were living with sick adults. Although study findings do not indicate consistent differential effectiveness of the cash transfer programme for orphans relative to non-orphans, additional research may be warranted. While it is possible that orphans in cash transfer households may have received greater benefits than non-

Table 5 Odds ratios from multilevel logistic 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	7.85	0.57, 107.23	0.12	0.29	0.14, 0.59	0.00	0.10	0.04, 0.26	<0.00
Key household-level variables												
Intervention[a]	0.63	0.44, 0.90	0.01	10.98	2.38, 50.62	0.00	0.58	0.40, 0.82	0.00	1.00	0.63, 1.57	0.99
Number of working-age adults	0.66	0.51, 0.86	0.00	1.36	0.42, 4.43	0.61	0.78	0.60, 1.02	0.07	0.75	0.53, 1.06	0.10
Number of sick adults—past 30 days	1.97	1.50, 2.59	0.00	2.94	0.97, 8.91	0.06	1.49	1.14, 1.95	0.00	1.30	0.92, 1.85	0.14
Key child-level variables												
Maternal orphan[b]	1.33	0.72, 2.47	0.36	1.66	0.23, 12.22	0.62	1.01	0.55, 1.87	0.97	1.61	0.76, 3.40	0.22
Paternal orphan[b]	0.74	0.49, 1.14	0.17	1.88	0.39, 9.15	0.43	0.75	0.49, 1.14	0.17	0.66	0.38, 1.16	0.15
Double orphan[b]	1.50	0.72, 3.14	0.28	0.88	0.06, 12.05	0.92	1.24	0.60, 2.57	0.57	0.89	0.36, 2.23	0.80
Child sex[c]	0.98	0.74, 1.30	0.90	1.53	0.65, 3.61	0.33	0.87	0.65, 1.16	0.35	0.88	0.60, 1.27	0.49
Control variables												
Child level												
Age 10–14 years[b]	0.93	0.66, 1.31	0.68	0.43	0.15, 1.18	0.10	1.25	0.88, 1.79	0.21	1.06	0.67, 1.68	0.81
Age 15–17 years[b]	0.71	0.45, 1.13	0.15	0.98	0.25, 3.79	0.98	1.03	0.63, 1.67	0.92	0.83	0.43, 1.60	0.58
Relationship to household head[d]	1.66	0.99, 2.77	0.05	1.47	0.23, 9.32	0.68	1.07	0.64, 1.79	0.79	1.43	0.73, 2.78	0.30
Control for outcome at baseline	1.70	1.25, 2.33	0.00	1.32	0.47, 3.72	0.60	1.26	0.93, 1.70	0.13	1.71	1.16, 2.53	0.01
Household level												
Household head age	1.01	0.99, 1.03	0.20	1.00	0.94, 1.07	0.89	1.01	0.99, 1.02	0.33	1.00	0.98, 1.02	0.88
Household head sex[c]	1.83	1.17, 2.87	0.01	1.66	0.29, 9.43	0.57	1.59	1.01, 2.50	0.04	1.61	0.89, 2.94	0.12
Household head educ.[e]	1.22	0.86, 1.72	0.27	2.32	0.60, 8.97	0.22	1.33	0.94, 1.87	0.11	1.24	0.80, 1.91	0.34
Number of dependent adults	0.55	0.34, 0.87	0.01	1.02	0.14, 7.45	0.98	0.67	0.42, 1.07	0.09	0.96	0.53, 1.72	0.89
Number of children under age 6 years	1.27	1.02, 1.57	0.03	0.75	0.34, 1.65	0.47	1.21	0.98, 1.50	0.07	1.14	0.87, 1.50	0.35
Number of children 6–9 years	1.01	0.82, 1.25	0.91	1.02	0.45, 2.32	0.95	1.18	0.96, 1.45	0.12	1.05	0.80, 1.36	0.74
Number of children 10–14 years	0.88	0.73, 1.06	0.17	1.43	0.68, 3.02	0.34	1.00	0.83, 1.20	0.98	0.94	0.75, 1.19	0.62
Number of children 15–17 years	0.83	0.63, 1.10	0.20	0.94	0.31, 2.80	0.91	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	12.34	4.67	0.00	0.73	0.27	0.00	0.95	0.41	0.01
Level 1 observations	1194			621			1185			916		

Sick in the previous month: yes = 1, no = 0; health services use: yes = 1, no/no important illness = 0; stopped normal activities: yes = 1, no = 0; missed school due to illness/injury: yes = 1, no = 0; CI, confidence interval.

[a]Intervention: cash transfer recipient = 1, control = 0.

[b]Dummy variable: yes = 1, no = 0.

[c]Sex: female = 1, male = 0.

[d]Relationship to household head: biological child = 1, other = 0.

[e]Household head education: primary education or more = 1, no primary education = 0.

Table 6 Multilevel logistic regressions predicting differential programme effect by orphan status on children's health outcomes

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
Orphan[a]	1.30	0.75, 2.26	0.34	2.73	0.46, 16.12	0.27	1.23	0.74, 2.08	0.42	1.26	0.61, 2.57	0.53
Intervention[b]	0.88	0.49, 1.58	0.68	17.61	1.81, 171.53	0.01	0.91	0.52, 1.60	0.75	1.54	0.73, 3.28	0.32
Intervention × orphan	0.58	0.29, 1.17	0.13	0.51	0.05, 5.57	0.58	0.49	0.25, 0.97	0.04	0.51	0.21, 1.23	0.13
Random effects	Estimate	SE	*P*-value	Estimate	SE	*P*-value	Estimate	SE	*P*-value	Estimate	SE	*P*-value
Level 2	1.04	0.31	0.00	12.59	4.71	0.00	0.75	0.28	0.00	0.96	0.41	0.01
Level 1 observations	1194			621			1185			916		

[a]Any orphan type = 1, non-orphan = 0.
[b]Intervention: cash transfer recipient = 1, control = 0. Unreported controls include: number of working-age adults; number of sick adults—past 30 days; age dummies for age 10–14 years and age 15–17 years; relationship to household head; control for outcome at baseline; household head age; household head sex; household head education; number of dependent adults; number of children under age 6 years; number of children 6–9 years; number of children 10–14 years; and number of children 15–17 years.

orphans in similar households such that they were less likely to report serious illness that stopped normal activities, it is also possible that in the face of discrimination or serious hardship they are less likely to stop normal activities because they are sick.

Summary of findings on sick and working-age adults

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) and Thielman *et al.* (2012) similarly found higher burdens of acute and chronic illness for older orphaned and vulnerable children whose parents or caregivers were in poor health. 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 and school absence due to illness or injury. 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).

Overall study implications

There are several implications of these results for Malawi and similar unconditional programmes in the region. First, programme managers should be sensitive to the increased demand for health services evoked by cash transfer programmes and ensure there are complementary investments on the supply side to accommodate this response and to thus maximize the potential impact of the programme on health. Second, the programme eligibility criterion of 'fit for work', which focuses on physical health, could place stronger emphasis on chronic illness or other morbidity as part of the definition since adult illness is both common and an important correlate of children's health. Relatedly, household-level vulnerabilities such as presence of sick adults and female household heads could also be considered as part of the selection criteria for cash transfer interventions. In settings such as Malawi where HIV prevalence is high, households with sick adults may have difficulty caring for children. Finally, the Malawi Social Cash Transfer Programme and other unconditional cash transfer programmes such as those in Kenya, Zambia and Zimbabwe could provide more information during beneficiary enrolment about health care practices to help households mitigate the spread of disease, particularly the transmission of infectious diseases among household members which appears to be important in Malawi.

Study limitations

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. Although the 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. A third limitation is that the outcomes were reported by household heads and not children themselves. Household heads who were more distant relatives or less invested in some or all of the children in their household might have had less knowledge about their illnesses. 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—1 month and 1 year). Future studies should consider including self-reported data collected from children in participating households or 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 multi-level 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 programme, results are much more externally valid than findings from small-scale research experiments.

Conclusion

Sub-Saharan African countries are increasingly adopting social cash transfer programmes 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 outcomes. Our study is one among a very limited number that examine the effect of cash transfers on school-age children's health outcomes. Our results contribute evidence that unconditional cash transfer programmes can improve health outcomes for school-age children in impoverished households. We also conclude that the targeting process for the Malawi SCTPS was successful in reaching vulnerable children at high risk for adverse health outcomes. More research, however, is warranted to better understand the causal pathways through which cash transfer programmes improve health outcomes for older children. This will provide critical information for the development and implementation of more effective interventions to improve school-age children's health.

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Note

[1]The term 'ghost' children refers to children whose residence status in a household could not be verified by research staff.

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