EFFECTS OF HIV/AIDS ON CHILDREN’S EDUCATIONAL ATTAINMENT: A SYSTEMATIC LITERATURE REVIEW

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Abstract. Over the last three decades, 35 million people have died of AIDS. As a result, HIV/AIDS has brought about a significant reduction in human capital, especially in sub-Saharan Africa. Several studies have examined the effects of HIV/AIDS on human capital, in particular educational attainment. These studies have examined different countries, datasets, and educational outcomes. This systematic literature review provides a comprehensive up-to-date overview of peer-reviewed papers published in English by focusing on the main mechanisms that influence the effects of HIV/AIDS on educational outcomes. These are sickness of the child, orphanhood, and sickness of parents. The results show that educational outcomes of HIV-infected children, AIDS orphans, and children with HIV-infected parents are affected differently. HIV-infected children mainly miss school days due to illness and medical appointments, and orphans mainly face financial problems and lack motivation in their education, while children with HIV-infected parents may have to take care of their sick parents or face financial problems that affect their education. Distinguishing these groups of children could help to formulate policies that adequately improve schooling outcomes of these vulnerable children.

Keywords. children; education; HIV/AIDS; human capital investment; intergenerational transmission

1. Introduction

About 17 million children have lost one or both parents to HIV/AIDS since the eruption of the epidemic (USAID, 2016). Most of these children (about 90%) reside in sub-Saharan Africa (SSA). An estimated 3.4 million children under 15 years are currently living with HIV (USAID, 2016). HIV-infected children,
AIDS-orphaned children, and children with HIV-infected parents may be deprived of opportunities that lead them to become economically productive adults (UNAIDS, 2016). In particular, HIV/AIDS may impede children’s schooling, through childhood illness, orphanhood, and parental illness. The effects may further differ by gender, thereby inducing a gender gap in schooling among children affected by HIV. Given the various ways in which HIV disrupts children’s schooling, it is important to know the impact of HIV/AIDS on life chances of boys and girls; specifically, on their educational attainment, enrollment, and attendance.

The literature on the educational attainment of orphans and children living with HIV-infected adults has been reviewed before by Guo et al. (2012). They include 23 quantitative studies that analyzed the impact of HIV/AIDS on educational attainment of children affected by HIV. Most of the literature in this review analyzed educational attainment of orphans only. The review showed that educational attainment of children differed by type of orphan (i.e., double orphan, maternal orphan, or paternal orphan). However, results on gender gaps in educational attainment were mixed and also varied by type of orphan. This review study excluded qualitative papers that capture issues that may not be identified by quantitative studies. These include pathways through which HIV affects children’s education.

While the extant health literature has largely focused on inter alia, general disease burden (Lopez and Murray, 1998; Kassebaum et al., 2017; Rajasingham et al., 2017), health care reform (Simms et al., 2001; Jakovljevic et al., 2016), health policy (Yamada et al., 2015), universal health coverage (Largomarsino et al., 2012; Ranabhat et al., 2018), and HIV mortality (Wang et al., 2016), this study aims to provide a systematic review of the effects of HIV on children’s educational attainment. Goldeberg and Short (2016) conducted a systematic review that included 45 articles. The study examined physical and emotional health as well as schooling of children living with HIV-infected or AIDS-ill adults. The studies highlighted factors that influence these outcomes, including poverty, transmission of opportunistic diseases, caring for sick adults, stigma, and lack of support. Only 10 out of 45 studies (nine quantitative and one qualitative) reported results on educational outcomes. This left out many important and relevant studies on educational attainment of HIV/AIDS-affected children. This review showed that children who live with HIV-infected parents and adults attended school less frequently and had deficits in grade progression. Other important forms of educational attainment such as dropout, enrollment, and years of schooling were not discussed in this review.

From the literature, three main underlying mechanisms by which HIV affects educational attainment of children can be identified. These are: sickness of the child, orphanhood, and HIV infection of parents (UNICEF, 2006). These mechanisms may have different effects on educational outcomes of children. By systematically reviewing peer-reviewed English language publications, we examine the extent to which HIV affects children’s schooling differs by these three mechanisms. We focus on three main effects:

1. Effects on children: Due to illness, HIV-infected children may miss school days and perform academically less than non-HIV children. Correspondingly, orphans – even when they are not sick themselves – generally obtain less schooling compared to nonorphans (Case et al., 2004; Evans and Miguel, 2007; Ardington and Leibbrandt, 2010). Hence, it is important to further analyze the effects of HIV on various educational outcomes so as to identify the most vulnerable groups.

2. Effects of HIV on gender gaps in educational outcomes: Because of HIV, women and girls are more likely to lose jobs, lose income, miss school, and primarily take care of sick people due to patriarchal norms that subordinate women (Madiba and Ngwenya, 2017). In addition, women and girls are the majority of the HIV-affected population (UNWOMEN, 2016); therefore, they are more likely to suffer from the effects of this disease.

3. Intergenerational (parent-to-child) transmission of education in case of HIV/AIDS: Children with HIV/AIDS-ill parents may observe that their parents physically deteriorate from the disease and may experience both parents’ deaths, sometimes in quick succession. This may lead to posttraumatic stress syndrome, depression, poverty, and stigma (Cluver et al., 2012; Anabwani et al., 2016;
UNAIDS, 2016). To the extent that children’s educational attainment is highly correlated with parental education (Becker and Tomes, 1986; Björklund and Salvanes, 2011), HIV may interfere with intergenerational (parent-to-child) transmission of human capital. Without parental human capital investment, chances of upward social mobility may decrease (Spiegler, 2018).

Our systematic review adds to the aforementioned reviews by: (i) including papers that examine sick children, AIDS-orphaned children, children living with HIV-infected parents or caregivers, or children living with an HIV-infected family member; (ii) distinguishing three pathways through which HIV/AIDS affects children’s educational attainment; (iii) focusing on direct effects of HIV on educational attainment by only including studies that have information on HIV/AIDS infection or confirm AIDS deaths of the parent/guardian; (iv) analyzing results based on the type of educational outcome; (v) including quantitative, mixed-methods, and qualitative studies that discuss educational attainment of children affected by HIV; and (vi) updating and expanding the literature in the aforementioned reviews. The review increases our knowledge and insight on the underlying mechanisms and is relevant for future studies and policy makers.

2. Methodology

This literature review follows the guidelines of the Preferred Reporting Items for Systematic Reviews (PRISMA). PRISMA guidelines were developed using an evidence-based approach. They consist of a 27-item checklist and a four-phase flow diagram of items that are deemed essential for a thorough and transparent systematic review (Moher et al., 2009).

The search of relevant articles was conducted in six databases, namely, EconLit, ERIC, PubMed, SocINDEX, Web of Science (WoS), and Google Scholar. The search and review of the articles was conducted between December 2017 and July 2018, and was updated in June 2019. Table 1 shows the exact search terms that were used in each database. In each column, the table shows: (i) terms for HIV, (ii) terms for schooling and socioeconomic outcomes, and (iii) terms for children and gender. In some cases, truncations were used to ensure that all relevant papers were included. To optimize the results, the searches in EconLit and ERIC were performed in the title and abstract, and the searches in PubMed, WoS, and SocINDEX were performed in the title. Searches in Google Scholar used similar terms as in the other databases. A university librarian verified and approved the combinations used.

2.1 Inclusion and Exclusion Criteria

Papers were included in the review if they analyzed the direct relationship between HIV and schooling outcomes. There were no time or language restrictions imposed in the search. Articles were excluded if they were nonempirical, discussed the relationship between HIV and psychological or cognitive issues, only focused on perceptions of HIV risk, if there was no HIV-testing done on either parent or child, or if there was no confirmation of AIDS-related death of parent or guardian. Books, working papers, conference papers/abstracts, and meeting papers/abstracts were also excluded. We only included peer-reviewed papers because the peer review process adds to the quality of the studies reviewed. As in the other databases, papers in Google Scholar were included if the title and abstract discussed the relationship between HIV and educational attainment and if they were peer-reviewed. Papers were excluded if there was no information on HIV infection or no confirmed AIDS deaths (see Figure 1).

2.2 Selection Process

The selection process consisted of several phases. Once all papers were extracted from the databases, duplicates were removed in EndNote. The first selection was based on the title and the abstract. Two
Table 1. Search Terms Used in Each Database.

| Database             | HIV terms                              | Education and socioeconomic terms | Child and gender terms |
|----------------------|----------------------------------------|-----------------------------------|------------------------|
| EconLit, ERIC,       | HIV OR HIV/AIDS OR HIV-affected OR     | Education* OR School* OR Learn*   | Child* OR Adolescent*  |
| SocINDEX, and Web of | OR HIV-infected OR AIDS-iIl OR HIV-positive OR AIDS-affected OR Parental-AIDS OR Maternal-AIDS OR Paternal-HIV OR Paternal-AIDS | “Human Capital” OR “Drop-out” OR OR Dropout OR Truancy OR Absenteeism OR Absence or “School leaving” OR Intergenerational OR Parental-education OR Maternal-education OR Paternal-education or Socio-economic OR Socioeconomic OR Economic | OR Youth* OR OR Orphan* OR “Vulnerable” Children” OR Boy* OR OR Girl* OR Gender-gap* OR Gender-difference* |
| Science              | [Title] OR AIDS [Title] OR HIV-affected [Title] OR HIV-infected [Title] OR AIDS-iIl [Title] OR HIV-positive [Title] OR AIDS-affected [Title] OR Parental-AIDS [Title] OR Parental-HIV [Title] OR Maternal-HIV [Title] OR Paternal-HIV [Title] OR Paternal-AIDS [Title] | [Title] OR School [Title] OR Schooling OR [Title] OR Dropout [Title] OR OR “Drop-out” [Title] OR Learning [Title] OR “Human Capital” [Title] OR OR Truancy [Title] OR Absenteeism [Title] OR Absence [Title] OR “School leaving” OR OR Enrollment [Title] OR Educational [Title] OR “Educational Attainment” [Title] OR Intergenerational [Title] OR OR Parental-education mater [Title] OR OR Paternal-education [Title] OR OR Socio-economic [Title] OR OR Socioeconomic [Title] OR Economic [Title] | [Title] OR Children [Title] OR Adolescent* [Title] OR OR Infant* [Title] OR OR Youth* [Title] OR OR Orphan* [Title] OR OR “Non-orphan*” [Title] OR OR Vulnerable [Title] OR Boys [Title] OR Girls [Title] OR Gender-gap* [Title] OR OR Gender-difference* [Title] |

Reviewers independently screened the papers to be included in the review. The independently screened lists were compared and discussed, leading to a final selection of papers to be included in the review. The remaining papers were fully reviewed by one researcher. The results were discussed with all researchers to assure the consistency in the selection process. The reference lists of the selected papers and previous reviews were then screened for relevant publications applying the same inclusion and exclusion criteria.
Figure 1. Flow Chart of the Selection Process. [Colour figure can be viewed at wileyonlinelibrary.com]

Again, the results were discussed with all researchers to make sure that no relevant papers were left out. The final list of publications included in the review can be found in Appendix A.

2.3 Analysis

The selected papers were categorized into quantitative, mixed-methods, and qualitative studies. We applied the method of directed qualitative content analysis (Hsieh and Shannon, 2005) for the analysis of the papers selected for the review. Specifically, we extracted information related to the key themes identified in the introduction (I) HIV-affected versus HIV-unaffected children, (II) gender gaps in educational attainment, and (III) intergenerational transmission of education. During the data extraction phase, all interim results were reviewed by all researchers and discussed to assure the quality of data extraction.

From the quantitative papers, the following information was extracted: country of analysis, children’s level of schooling, education variables used, HIV status, gender and age of the child, income and education of the parents, income and education information of caregivers, type of orphan, information on intergenerational transmission of education, type of data, number of observations, method of analysis,
comparisons made in the analysis, and summary of the results. From the qualitative papers, the following information was extracted: country of analysis, HIV status method of data collection, type of individuals interviewed, education outcome analyzed, and summary of results. From the mixed-methods papers, a combination of information from quantitative and qualitative results was extracted. The results were synthesized and were presented in the form of tables and narrative descriptions (see Appendix B).

2.4 Assessment of Publication Quality

The quality of the papers selected for the review was assessed using the Mixed-Methods Appraisal Tool (MMAT) (Pluye et al., 2011). The MMAT is used for complex systematic literature reviews that include quantitative, mixed-methods, and qualitative studies. It accounts for five common methodologies, qualitative (section 1), quantitative randomized (section 2), quantitative nonrandomized (section 3), descriptive (section 4), and mixed (section 5). Each section is composed of three to four questions related to data sources, data collection, and outcome data. A quality score between 0% and 100% is assigned for each study component. An answer of “yes,” “no,” or “I can’t tell” is assigned for each question in the corresponding study component (see Appendix C). Papers of good quality met all criteria (i.e., had a score of 100%) and papers of poor quality did not meet any criteria (i.e., had a score of 0%). We also checked the quality of our review by using the PRISMA 2009 checklist (see Appendix D).

3. Results

Figure 1 shows a flow chart of the selection process as per PRISMA guidelines. Using the search terms in Table 1, a total of 5961 papers were extracted from EconLit, ERIC, PubMed, SocINDEX, WoS, Google Scholar, and references of selected papers. After duplicates were removed, the exclusion criterion was applied and full texts were read. This left 62 papers (46 quantitative, 7, mixed-methods, and 9 qualitative). Of these 62 papers, there were seven mixed-methods papers that were included in both the quantitative and qualitative groups distinguished in the analysis.

3.1 General Characteristics of the Selected Papers

Table 2 shows the characteristics of 52 selected quantitative papers (45 were purely quantitative and 7 were mixed-methods papers). The papers used randomized, nonrandomized, and descriptive methods. These studies were published between 1994 and 2019. About 60% (31 out of 52) of these papers reported studies conducted in Southern and East Africa. Most of the papers used attendance, enrollment, correct grade for age, and years of schooling as measures of schooling. In some cases, studies used multiple educational outcomes. Regression analysis was the most common form of analysis applied in these papers (51 out 52).

Table 3 shows the characteristics of the 16 papers that report qualitative results (nine were purely qualitative and seven were mixed-methods). The papers were published between 2005 and 2017. All of the studies were conducted in Southern and East Africa. Almost all (14 out of 16) of the studies included various forms of interviews and focus group discussions. The main education variables were attendance and dropout.

The quality of the quantitative, qualitative, and mixed-methods papers is assessed and presented in Appendix C. In short, the assessment tool provides a score based on the data and methodological quality of quantitative, qualitative, and mixed-methods papers. Approximately 52% (24 out of 46) of the purely quantitative papers had a score of 100% (i.e., they met all four criteria), followed by about 20% (9 out of 46) that met three criteria, 13% (6 out of 46) met two criteria, 11% met one criterion, and about 3% met none. Only one out of seven papers (14%) of the mixed-methods papers met all criteria, 57% (4 out of 7)
### Table 2. General Characteristics of the Quantitative and Mixed-Methods Papers (Quantitative Part) Included in the Review ($n = 52$).

|                          | Number of publications | Publication reference in Appendix A                                                                 |
|--------------------------|------------------------|------------------------------------------------------------------------------------------------------|
| **Year of publication**  | $N = 52$               |                                                                                                      |
| 2015–2019                | 16                     | 2, 16, 20, 21, 23, 24, 25, 35, 36, 40, 42, 45, 46, 51, 55, 56                                         |
| 2010–2014                | 21                     | 1, 4, 5, 7, 8, 10, 15, 18, 26, 29, 31, 33, 34, 41, 44, 48, 49, 53, 58, 59, 60                         |
| 2005–2009                | 9                      | 6, 11, 14, 17, 39, 54, 57, 61, 62                                                                  |
| 2000–2004                | 2                      | 12, 38                                                                                              |
| 1995–1999                | 3                      | 3, 9, 37                                                                                           |
| 1990–1994                | 1                      | 50                                                                                                  |
| **Region/country of study** | $N = 52$               |                                                                                                      |
| Multiple African countries (more than 1 country) | 3                      | 1, 25, 51                                                                                           |
| Southern Africa          | 19                     | 2, 4, 7, 8, 14, 16, 17, 29, 32, 33, 35, 36, 40, 42, 44, 48, 49, 50, 55                           |
| East Africa              | 19                     | 3, 6, 10, 23, 24, 31, 34, 39, 45, 54, 55, 62                                                       |
| West Africa (Guinea, Côte d’Ivoire) | 2                      | 11, 15                                                                                              |
| East Asia (China)        | 8                      | 20, 21, 26, 57, 58, 59, 60, 61                                                                   |
| South Asia (India, Myanmar) | 4                        | 5, 18, 41, 46, 53                                                                                  |
| Latin America (Brazil)   | 1                      | 53                                                                                                  |
| North America (USA)      | 4                      | 9, 12, 37, 38                                                                                       |
| **Sample size**          | $N = 52$               |                                                                                                      |
| 0–10                     | 1                      | 12                                                                                                  |
| 10–50                    | 1                      | 53                                                                                                  |
| 50–100                   | 6                      | 3, 9, 18, 37, 38, 50                                                                               |
| 100–200                  | 1                      | 60                                                                                                  |
| 200–500                  | 17                     | 5, 10, 11, 15, 26, 29, 32, 34, 40, 42, 45, 46, 54, 58, 59, 61, 62                                   |
| 500–1000                 | 10                     | 2, 7, 20, 21, 23, 25, 36, 41, 44, 51                                                               |
| 1000+                    | 16                     | 1, 4, 6, 8, 14, 16, 17, 24, 31, 33, 35, 39, 49, 48, 49, 55, 56, 57                                |
| **Analytical model/statistical methods** | $N = 52$               |                                                                                                      |
| RCT                      | 5                      | 20, 21, 45, 54, 55                                                                                 |
| Regression (GLM/random effects/fixed effects, logit, maximum likelihood, difference in differences) | 31                      | 1, 4, 6, 7, 8, 10, 11, 14, 15, 16, 17, 23, 24, 25, 26, 31, 33, 34, 35, 36, 39, 42, 44, 46, 48, 49, 51, 56, 57, 58, 62 |
| Statistical tests (Chi-square, T-test/ F-test, Pearson’s correlation, ANOVA, Fisher’s exact test, Mann-Whitney U test) | 11                      | 2, 3, 5, 12, 29, 32, 37, 41, 50, 53, 59, 61                                                       |
| Descriptive statistics   | 5                      | 9, 18, 38, 40, 60                                                                                  |

(Continued)
Table 2. Continued.

| Number of publications | Publication reference in Appendix A |
|------------------------|------------------------------------|
| **Education variables analyzed** |  
| Enrollment, dropout, years of schooling | $N = 89$ (Some studies analyzed multiple outcomes) |
| 25 | 1, 3, 5, 7, 15, 16, 18, 29, 31, 33, 35, 36, 37, 41, 44, 46, 48, 49, 51, 53, 54, 58, 59, 60, 61 |
| Attendance, absenteeism, truancy | 2 |
| 2 | 1, 2, 5, 7, 11, 12, 14, 15, 18, 24, 29, 39, 40, 41, 44, 45, 46, 48, 49, 51, 53, 56, 58, 59, 60, 61, 62 |
| Grades, correct grade for age, highest grade level, grade repetition, grade progression | 25 |
| 25 | 1, 2, 4, 5, 10, 12, 14, 16, 20, 21, 23, 26, 35, 36, 37, 38, 42, 46, 48, 49, 51, 53, 54, 56, 57 |
| Other | 4 |
| 4 | 6, 22, 29, 30 |

Table 3. General Characteristics of the Qualitative and Mixed-Methods Papers (Qualitative Part) Included in the Review ($n = 16$).

| Number of publications | Publication reference in Appendix A |
|------------------------|------------------------------------|
| **Year of publication** | $N = 16$ |
| 2015–2017 | 3 |
| 2010–2014 | 6 |
| 2005–2009 | 7 |
| **Region/country of study** | $N = 16$ |
| Multiple Countries (Eswatini and South Africa) | 1 |
| Southern Africa | 10 |
| 2, 4, 7, 13, 17, 22, 24, 29, 32, 43 |
| East Africa | 5 |
| 19, 27, 28, 30, 52 |
| **Method of data collection** | $N = 17$ (Ref. #32 used both methods) |
| Interviews (interviews, semi-structured interviews, focus group discussions, in-depth interviews, exit interviews, informal interviews) | 14 |
| 2, 4, 7, 13, 17, 19, 4, 2, 27, 28, 29, 30, 32, 43, 47 |
| Other (letter writing, case studies) | 3 |
| 22, 32, 52 |
| **Education variables analyzed** | $N = 28$ (Some papers analyzed multiple variables) |
| Attendance | 12 |
| 2, 4, 7, 13, 17, 19, 22, 24, 27, 30, 32, 47 |
| Absenteeism | 3 |
| 19, 29, 32 |
| Dropout | 6 |
| 7, 13, 29, 30, 32, 52 |
| Enrollment | 1 |
| 17 |
| Other | 6 |
| 2, 27, 28, 29, 43, 52 |
met two, and 29% (two out of seven) met one. For the purely qualitative papers, about 33% (three out of nine) met all four, 44% (four out of nine) met three, and 22% (two out of nine) met two criteria.

3.2 Relevant Findings Reported in the Papers Reviewed

Table 4 shows the main findings of the 52 quantitative studies. There were seven mixed-methods studies included in this group that were also included in the qualitative study group. The three main results categories are (i) HIV-affected and HIV-unaffected children, (ii) gender comparisons in schooling outcomes, and (iii) and intergenerational transmission of education. The table lists the effects of HIV on five main educational outcomes and indicates whether effects or no effects were found.

There were 16 papers included in the qualitative study group. This included nine purely qualitative papers and seven mixed-methods studies that are also found in the quantitative study group. Of these studies, 14 studies conducted interviews. Individuals who participated in the qualitative studies included HIV-infected children, HIV-infected parents, non-HIV parents, adult caregivers, child carers, teachers, and pupils.

- Summary of educational outcomes of HIV-affected children

Twenty out of the 28 quantitative results on HIV-affected children (Category 1 in Table 4) found that HIV-infected children and AIDS orphans attained less education than HIV-unaffected children. This is in comparison to one paper that found a positive effect and four papers that found no effect. Bhargava (2005) found that AIDS orphans were more likely to participate in school than children with parents who died of non-AIDS-related illnesses. However, Pufall et al. (2014a, 2014b) found no relationship between being HIV-positive and educational outcomes. Some studies (e.g., Bandason et al., 2013) showed that being HIV-infected delayed schooling. However, studies listed in the table went further by comparing different groups of HIV-affected children. For example, Cohen et al. (1997) compared HIV-infected children with mild, moderate, and severe symptoms, and found that children with severe symptoms missed more school. Mayes et al. (1996) compared 66 American boys diagnosed with hemophilia, of which 18 were HIV-positive. The results showed that HIV-positive boys missed more school days than non-HIV boys. However, there were no differences in academic grades. On the other hand, Delva et al.’s 2009 comparison of AIDS orphans and non-AIDS orphans to nonorphans showed that AIDS orphans in Guinea missed more school than nonorphans and other orphans. Kidman et al. (2012) went further by examining different types of orphans and found that double orphans and maternal orphans in Malawi experienced more educational deprivation compared to nonorphans. However, Orkin et al. (2014) found that HIV/AIDS orphanhood was not associated with nonenrollment or nonattendance in South Africa. They found that HIV/AIDS affected educational outcomes indirectly via orphanhood and parental/caregiver illness through poverty and internalization of problems.

Among the qualitative studies, Anabwani et al. (2016) found that HIV-infected children in Botswana reported no major problems in school performance. Other studies showed that HIV-infected children were missing school days due to illness and parental illness (Poulsen, 2006; Skovdal and Ogutu, 2009; Harms et al., 2010; Cluver et al., 2012; Bandason et al., 2013; Anabwani et al., 2016).

- Summary of gender comparisons of all children affected by HIV

Table 4 shows that 6 out of 10 (60%) papers found negative effects of HIV on gender differences in educational attainment within the group of HIV-infected children and children with HIV-infected parents. The results were mixed. Delva et al.’s (2009) analysis of different types of orphans in Guinea showed that regardless of orphan status, boys were significantly more likely to attend school on a daily basis than girls. Similarly, Harrison et al. (2017) found that HIV-affected girls in China reported lower grades and had less interest in school. However, Henning et al. (2016) found that gender did not affect school attendance.
Table 4. Main Findings of Selected Quantitative Papers (Publication Reference in Appendix A).

| Category 1: HIV-affected and HIV-unaffected | Category 2: Gender comparisons in schooling outcomes | Category 3: Intergenerational transmission of education |
|-------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Positive effect                          | Negative effect | No effect | Positive effect | Negative effect | No effect | Positive effect | Negative effect | No effect |
| Attendance                                | 2, 8, 9, 14, 15, 32, 37, 48, 56, 62              | 2, 49     | 11          | 24          | 1, 8, 9, 24, 39, 44, 48 |
| Enrollment                                | 3, 8, 31, 41, 46                                    | 33        | 35          | 3, 8         | 17, 33, 44 |
| Dropout                                   | 5, 15, 41, 46, 50, 53                               | 48        | 48          | 1            | 33, 44 |
| Correct grade for age                    | 4, 8, 16, 23, 31, 38, 46, 49                         | 49        | 57          | 42          | 14, 17, 42, 44 |
| Years of schooling                       |                                                      |           | 10, 25      | 6, 20, 21, 44 |           |
| Other                                     | 6, 53                                               | 12, 14, 33, 55 | 6, 20, 21, 44 | 57, 42       | 14, 17, 42, 44 |
in Zambia. Orkin et al. (2014) showed that HIV-affected boys in South Africa reported difficulties with grade progression. Pufall et al. (2014a) also showed that girls were more likely to be in correct grade for age compared to boys in Zimbabwe. Hensels et al. (2016) found that being a girl was significantly associated with better educational functioning and being a boy was associated with more educational risks. Zivin et al. (2009) is the one of the few studies that analyzes effects of antiretrovirals (ARVs) on children’s education. They found that ARV treatment effects were significant for Kenyan girls in early ARV treatment stages, and not significant for boys.

Only two qualitative studies reported on gender gaps in educational attainment. Jepkemboi and Aldridge (2009) found that HIV-affected boys performed better in math and science. However, Jepkemboi and Aldridge (2014) found that HIV-affected girls were more persistent and had a more positive attitude toward school than HIV-affected boys.

**Summary of intergenerational (parent-to-child) transmission of education**

Category 3 in Table 4 shows that 8 out of 16 quantitative papers that examined how HIV-infected parents transmit education to their children found that HIV had negative effects. Akbulut-Yuksel and Turan’s (2013) comprehensive analysis of 11 countries in SSA showed that children with HIV-positive mothers attained 30% less education than the general population. Additionally, Cluver et al. (2013) and Mishra et al. (2007) showed that children with AIDS-ill parents had low attendance rates. Orkin et al. (2014) found that caregiver HIV/AIDS illness was associated with concentration problems via poverty and internalization of problems among South African adolescents. Zivin et al. (2009) found that children in early-stage ARV households and children in later-stage ARV households had similar increase in school attendance. Comparisons between orphans and children with HIV-infected parents by Tu et al. (2009) revealed that Chinese orphans have lower grades compared to children with HIV-infected parents. Ryder et al. (1994) also found that Congolese maternal orphans withdrew from school more often than children with HIV-positive mothers. On the contrary, Floyd et al.’s (2007) study in Malawi found no evidence of low grades among male and female children of HIV-positive individuals. Similarly, Grant (2008) found no differences in school enrolment between children with HIV-positive mothers and HIV-negative mothers.

Grant’s mixed-methods study of mothers who were tested for HIV found that these parents were dedicated to ensuring that their children obtained their schooling, while they were still in control of their children’s matters. Additionally, qualitative studies showed that caregivers (such as relatives and grandparents) reported that children were frequently out of school due to financial problems (e.g., Kakooza and Kimuna, 2006; Nyasani et al., 2009; Kembo, 2010; Fauk et al., 2017).

4. Discussion

Guo et al. (2012) and Goldberg and Short (2016) produced systematic literature reviews similar to this study. Our study adds to these earlier reviews by distinguishing three mechanisms through which HIV affects children’s educational attainment. These are sickness of the child, orphanhood, and parental illness. Our study also adds to the literature by distinguishing three main effects of HIV on educational attainment of children: effects on sick children and orphans, effects on gender-gaps, and effects on the intergenerational transmission of education. This study employed more databases than the previous reviews that resulted in the inclusion of additional studies, including additional quantitative studies some of them published recently, as well as qualitative and mixed-methods studies. Results from these latter studies complemented the results of quantitative studies by providing explanations of the three mechanisms through which HIV affects educational attainment. In addition, papers were included in this review if there was confirmation of HIV/AIDS infection of the child, HIV/AIDS infection of the parent, AIDS death of the parent, or AIDS-illness in the family. This helped establish the direct effects of HIV on educational attainment of children.
The results from this systematic literature review show that the three mechanisms have different effects on different types of children and educational outcomes. However, in some cases, certain groups of children face similar issues. For example, HIV orphans and children with HIV-positive parents may be living with grandparents or other relatives. These two groups of children are likely to face similar problems with their education. One of the mechanisms that affect children’s schooling is HIV-related sickness. Studies included in this review showed that HIV-infected children attended fewer school days (Mayes et al., 1996; Cohen et al., 1997; Anabwani et al., 2016), dropped out of school more frequently (Bele et al., 2011; Parchure et al., 2016), were more likely not to be in the correct grade for their age or to have repeated a grade (Bandason et al., 2013; Henning et al., 2018), and had low grades while in school (Ellis, 2004). These results indicate that physical illness is the main barrier to HIV-infected children’s schooling. Anabwani et al. (2016) found that HIV-infected children’s absenteeism from school was mainly due to frequent medical appointments and illness. One solution to this issue may be to increase access to ARV treatment and extra lessons for HIV-infected children. Souza et al. (2010) found that about 90% of Brazilian adolescents who were on highly active antiretroviral therapy were attending school. Voluntary teaching programs in some African countries (e.g., Zambia, Uganda, and Malawi) could also be a viable solution to the issue of absenteeism and attendance among HIV-infected children.

The results also showed that orphans were more likely to dropout or not be enrolled in school (Aaspsas, 1999; Bele et al., 2011), experience grade delay (Kasirye and Hisali, 2010; Cluver et al., 2013), and have low attendance (Delva et al., 2009). This is in contrast to the fact that HIV-infected children faced delays to their education mainly due to illness. These results were complemented by qualitative results that showed that AIDS orphans’ education is interrupted due to financial problems (Nyasani et al., 2009; Kembo 2010; Faulk et al., 2017), lack of motivation (Jepkemboi and Aldridge, 2014), and disciplinary issues (Nyasanli et al., 2009). These qualitative studies were based on interviews with AIDS orphans, their teachers, and their caregivers. They provided an overview of the issues faced by AIDS orphans. The studies showed that issues faced by orphans are complex and that the mere provision of food and shelter is not necessarily sufficient. They may also need assistance with school fees and school supplies. Some international organizations such as SOS Children’s Villages have initiated programs that meet the educational needs of orphans. Their programs provide comprehensive services to orphans by building family environments and providing a holistic approach to child-centered education. Collaboration with such organizations may ensure that orphans and children at risk have the comprehensive care needed to achieve their educational goals. Free universal education may also help. For example, the Universal Primary Education Program in Uganda provides tuition assistance to all eligible primary school children. However, with such programs, many children need further assistance with school supplies and uniforms (Kakooza and Kimuna, 2006). School children with HIV/AIDS-ill parents may miss school or may not be in the correct grade due to the need to provide care to parents (Harms et al., 2010; Cluver et al., 2012; Pufall et al., 2014a, 2014b). ARV treatment has been shown to reverse HIV-related adult morbidity and mortality (Zivin et al., 2009; Wang et al., 2016). Zivin et al. (2009) found that providing Kenyan children with HIV-positive parents ARV treatment led to a significant increase in weekly hours of schooling. Scaling up ARV treatment for parents living with HIV could help them remain healthy and economically active, thereby avoiding delays to their children’s education (Delva et al., 2009). As in the case of orphans, children of HIV positive parents are also likely to live with their grandparents (Floyd et al., 2007). This is supported by the qualitative study conducted by Harms et al. (2010) who found that HIV/AIDS orphans stated that their orphanhood status started with the illness of their parents as opposed to the death of their parents. Children living with sick adults, particularly girls face the burden of providing care and performing adult chores (Yamano and Jayne, 2005). In addition, they are also more likely to be living with their grandparents or other relatives. Grandparents are likely to have only limited resources and may be too frail to work. Therefore, children living with grandparents, even when their AIDS-ill parents are alive, may face similar
issues as AIDS orphans living with their grandparents. Floyd et al. (2007) suggested that foster carers (including grandparents) should be supported regardless of age and relationship to the child. Projects such as the Young Carers South Africa that help governments identify children who live in AIDS-sick homes and provide them with social welfare grants, home visits, and free school meals may help reduce these problems.

Most of the papers in this study examined effects of HIV on sick children, orphans, and children with HIV/AIDS-ill parents. A few studies (5 out of 57) mainly discussed effects on gender gaps in educational attainment (Bhargava, 2005; Poulsen, 2006; Zivin et al., 2009; Kitara et al., 2013; Hensels et al., 2016). Most of the studies that discussed gender issues controlled for the gender variable or gender of the household head. Bhargava (2005) found that girls who were maternal orphans were less likely to participate in school. On the other hand, Hensels et al. (2016) found that girls had better educational outcomes than boys. Kitara et al. (2013) examined nonorphaned, non-HIV-orphaned, and HIV-orphaned girls. They found that nonorphaned and non-HIV-orphaned girls had a more positive attitude toward school compared to HIV orphaned girls. These few studies indicate that results on intergender and intragender issues among children affected by HIV are complex and remain underexplored. Examination of gender gaps and gender issues among children affected by HIV requires attention, given the fact that HIV-affected girls are also likely to experience the effects of patriarchal norms and stigma that could significantly affect their education (Cluver et al., 2013; Madiba and Ngwenya, 2017).

Despite the advantages of our review design, there are also a few limitations that need to be acknowledged. Specifically, we only included studies that confirmed HIV infection of the child or parent/guardian and HIV/AIDS death of a parent. This leaves out studies that examined effects of orphanhood on educational attainment. Additionally, our systematic literature review includes quantitative, mixed-methods, and qualitative papers, which makes difficult to standardize the comparisons among the papers. Despite these limitations, we were able to have a comprehensive set of studies that provided insight on issues faced by children affected by HIV.

5. Conclusion

The results of our systematic review showed the mechanisms that influence the relationship between HIV/AIDS and children’s education. Differences were observed between HIV-infected and uninfected children, between HIV-affected boys and HIV-affected girls, and children with HIV-infected parents and other groups of children. HIV-infected children mainly miss school days due to illness, orphaned children mainly lack financial means and motivation, and children with HIV-infected parents may care for their parents and or face similar issues as orphans. It is important to distinguish these mechanisms and groups of children so as to adequately formulate policy prescriptions (Evans and Miguel, 2007). Orkin et al. (2014) is the only study that conducted path analyses between familial HIV/AIDS and educational outcomes. They found that HIV/AIDS affected educational outcomes indirectly via orphanhood and parental/caregiver illness through poverty and internalization of problems. Therefore, it is advisable to focus on interventions that reduce stigma rather than targeting individual families (Orkin et al., 2014). More studies on path analyses are needed so as to further inform policy.

Only a few studies examined gender gaps in educational attainment among children affected by HIV. Therefore, there is no conclusive evidence on whether HIV-infected girls, female AIDS-orphans, or girls with HIV-positive parents face more delays in schooling compared to their male counterparts. Additionally, because issues faced by children affected by HIV are complex, more mixed-methods and qualitative studies are needed to further understand the pathways that influence the relationship between HIV/AIDS and educational attainment of children. In particular, qualitative studies (through interviews and focus groups) could provide insight on these mechanisms by highlighting stories of different groups of children and caregivers.
References

Akbulut-Yuksel, Mevlude and Turan, Belgı (2013) Left Behind: Intergenerational Transmission of Human Capital in the Midst of HIV/AIDS. *Journal of Population Economics* 26(4): 1523–1547.

Anabwani, G., Karugaba, G. and Gabaitiri, L. (2016) Health, schooling, needs, perspectives and aspirations of HIV infected and affected children in Botswana: a cross-sectional survey. *BMC Pediatrics* 16: 106.

Ardington, C. and Leibrandt, M. (2010) Orphanhood and schooling in South Africa: trends in the vulnerability of orphans between 1993 and 2005. *Economic Development and Cultural Change* 58(3): 507–536.

Aspaas, H.R. (1999) AIDS and orphans in Uganda: geographical and gender interpretations of household resources. *The Social Science Journal* 36(2): 201–226.

Bandason, T., Langhaug, L.F., Makamba, M., Laver, S., Hatzold, K., Mahere, S., Munyati, S., Mungofa, S., Corbett, E.L. and Ferrand, R.A. (2013) Burden of HIV among primary school children and feasibility of primary school-linked HIV testing in Harare, Zimbabwe: a mixed methods study. *AIDS Care* 25(12): 1520–1526.

Becker, G.S. and Tomes, N. (1986) Human capital and the rise and fall of families. *Journal of labor economics* 4(3, Part 2): S1–S39.

Bele, S.D., Valsangkar, S. and Bodhare, T.N. (2011) Impairment of nutritional, educational status and quality of life among children infected with and belonging to families affected by human immunodeficiency virus/acquired immune deficiency syndrome. *Vulnerable Children & Youth Studies* 6(4): 284–292.

Bhargava, A. (2005) AIDS epidemic and the psychological well-being and school participation of Ethiopian orphans. *Psychology, Health & Medicine* 10(3): 263–275.

Björklund, A. and Salvanes, K.G. (2011) Education and family background: Mechanisms and policies. In E.A. Hanushek, S. Machin and L. Woessmann (eds), *Handbook of the Economics of Education*, Vol. 3 (pp. 201–247). Amsterdam: Elsevier.

Case, A., Paxson, C. and Alekseevsky, J. (2004) Orphans in Africa: parental death, poverty, and school enrollment. *Demography* 41(3): 483–508.

Cluver, L., Operario, D., Lane, T. and Kganakga, M. (2012) “I Can’t Go to School and Leave Her in So Much Pain”: educational shortfalls among adolescent ‘Young Carers’ in the South African AIDS epidemic. *Journal of Adolescent Research* 27(5): 581–605. https://doi.org/10.1177/0743558411417868

Cluver, L., Orkin, M., Boyes, M.E., Sherr, L., Makasi, D. and Nikelo, J. (2013) Pathways from parental AIDS to child psychological, educational and sexual risk: developing an empirically-based interactive theoretical model. *Social Science & Medicine* 87: 185–193. https://doi.org/10.1016/j.socscimed.2013.03.028

Cohen, J., Reddington, C., Jacobs, D., Meade, R., Picard, D., Singleton, K., Smith, D., Caldwell, M.B., DeMaria, A., Hsu, H.-W. and Health, M.D.o.P. (1997) School-related issues among HIV-infected children. *Pediatrics* 100(1): e8. https://doi.org/10.1542/peds.100.1.e8

Curley, J., Ssewamala, F. and Han, C.-K. (2010) Assets and educational outcomes: Child Development Accounts (CDAs) for orphaned children in Uganda. *Children and Youth Services Review* 32(11): 1585–1590.

Delva, W., Vericotere, A., Loua, C., Lamah, J., Vansteelant, S., De Koker, P., Claey, P., Temmerman, M. and Annemans, L. (2009) Psychological well-being and socio-economic hardship among AIDS orphans and other vulnerable children in Guinea. *Aids Care-Psychological and Socio-Medical Aspects of AIDS/Hiv* 21(12): 1490–1498.

Ellis, W.L. (2004) Factors associated with the academic achievement of perinatally HIV-infected elementary and middle school children. *Negro Educational Review* 55(1): 51–58.

Evans, D.K. and Miguel, E. (2007) Orphans and schooling in Africa: a longitudinal analysis. *Demography* 44(1): 35–57.

Fauk, N.K., Mwakinyali, S.E., Putra, S. and Mwanri, L. (2017) The socio-economic impacts of AIDS on families caring for AIDS-orphaned children in Mbeya rural district, Tanzania. *International Journal of Human Rights in Healthcare* 10(2): 132–145.

Floyd, S., Crampin, A.C., Glynn, J.R., Madise, N., Mwenebabu, M., Mnkhwenda, S., Ngwira, B., Zaba, B. and Fine, P.E. (2007) The social and economic impact of parental HIV in children in northern Malawi: retrospective population-based cohort study. *AIDS Care* 19(6): 781–790.

Fofana, N.B., van Ophem, J.A., Niehof, A. and Antonides, G. (2014) Effects of HIV/AIDS and microfinance of women on income, medical expenditures and schooling in Côte d’Ivoire. *African Development Review* 26(2): 322–332.

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Fotso, A.S., Banjo, O. and Akmyemi, J.O. (2018) HIV and adolescents’ educational attainment in South Africa: disentangling the effect of infection in children and household members. *South African Journal of Child Health* 12(SPE): s4–s9.

Goldberg, R.E. and Short, S.E. (2016) What do we know about children living with HIV-infected or AIDS-ill adults in sub-Saharan Africa? A systematic review of the literature. *AIDS Care* 28(sup2): 130–141.

Grant, M.J. (2008) Children’s school participation and HIV/AIDS in rural Malawi: the role of parental knowledge and perceptions. *Demographic Research* 19: 1603–1634.

Guo, Y., Li, X. and Sherr, L. (2012) The impact of HIV/AIDS on children’s educational outcome: a critical review of global literature. *AIDS Care* 24(8): 993–1012.

Gupta, A.K., Rawat, N., Rai, K., Rana, S. and Chakraborty, S. (2013) Orphan and vulnerable children infected or affected by HIV/AIDS in Delhi – situational analysis and state government’s initiative of household economic strengthening. *Vulnerable Children & Youth Studies* 8(2): 161–170.

Harms, S., Jack, S., Šsebunnya, I. and Kizza, R. (2010) The orphaning experience: descriptions from Ugandan youth who have lost parents to HIV/AIDS. *Child and Adolescent Psychiatry and Mental Health* 4(1): 1–10.

Harrison, S.E., Li, X., Zhang, J., Chi, P., Zhao, J. and Zhao, G. (2017) Improving school outcomes for children affected by parental HIV/AIDS: evaluation of the ChildCARE intervention at 6-, 12-, and 18-months. *School Psychology International* 38(3): 264–286.

Harrison, S.E., Li, X.M., Zhang, J.J., Zhao, J.F. and Zhao, G.X. (2018) A randomized controlled trial of a resilience-based intervention for children affected by parental HIV: educational outcomes at 24-, 30-, and 36-months. *School Psychology International* 39(2): 170–195.

Hartell, C.G. and Chabilall, J.A. (2005) HIV/AIDS in South Africa: a study of the socio-educational development of adolescents orphaned by AIDS in child-headed households. *International Journal of Adolescence and Youth* 12(3): 213–229.

Henning, M.J., Betancourt, T.S. and Khanna, S.K. (2016) Protective factors that contribute to improved school attendance for children that are HIV/AIDS affected in Zambia. *International Journal of Health Promotion and Education* 54(6): 318–334.

Henning, M., Kirk, C.M., Franchett, E., Wilder, R., Sezibera, V., Ukundineza, C. and Betancourt, T. (2018) Over-age and underserved: a case control study of HIV-affected children and education in Rwanda. *Vulnerable Children & Youth Studies* 13(1): 81–93.

Hensels, I.S., Sherr, L., Skeeen, S., Macedo, A., Roberts, K.J. and Tomlinson, M. (2016) Do not forget the boys–gender differences in children living in high HIV-affected communities in South Africa and Malawi in a longitudinal, community-based study. *AIDS Care* 28(sup2): 100–109.

Hong, Y. (2011) Care arrangements of AIDS orphans and their relationship with children’s psychosocial well-being in rural China. *Health Policy and Planning* 26(2): 115–123.

Hsieh, H. F. and Shannon, S. E. (2005) Three approaches to qualitative content analysis. *Qualitative Health Research* 15(9): 1277–1288.

Jakovljevic, M., Vukovic, M., Chen, C.C., Antunovic, M., Simic, V.D., Radovanovic, R.V., Jankovic, N., Rankovic, A., Kovacevic, A., Antunovic, M., Milovanovic, O., Markovic, V., Dasari, B.N. and Yamada, T. (2016) Do health reforms impact cost consciousness of health care professionals? Results from a nation-wide survey in the Balkans. *Balkan Medical Journal* 33(1): 8–17.

Jefferson, T., Austen, S., Sharp, R., Ong, R., Lewin, G. and Adams, V. (2014) Mixed-methods research: what’s in it for economists? *The Economic and Labour Relations Review* 25(2): 290–305.

Jepkemboi, G. and Aldridge, J. (2009) Teachers and caregivers perceptions of gender differences in educational experiences of children affected by parental AIDS in western Kenya. *Educational Research and Reviews* 4(5): 285–288.

Joint United Nations Programme. (2014) UNAIDS Fact Sheet 2015. [cited 2018 August 12]. Available from: https://www.unaids.org/en/resources/publications/reference-reports
Kakooza, J. and Kimuna, S.R. (2006) HIV/AIDS Orphans’ education in Uganda: the changing role of older people. *Journal of Intergenerational Relationships* 3(4): 63–81.

Kasirye, I. and Hisali, E. (2010) The socioeconomic impact of HIV/AIDS on education outcomes in Uganda: school enrolment and the schooling gap in 2002/2003. *International Journal of Educational Development* 30(1): 12–22.

Kassebaum, N., Kyu, H.H., Zeeckler, L., Olsen, H.E., Thomas, K., Pinho, C., Bhutta, Z.A., Dandona, L., Ferrari, A., Ghimot, T.T., Hay, S.I., Kinfu, Y., Liang, X., Lopez, A., Malta, D.C., Mokdad, A.H., Naghavi, M., Patton, G.C., Salomon, J., Sartorius, B., Topor-Madry, R., Vollset, S.E., Werdecker, A., Whiteford, H.A., Abate, K.H., Abbas, K., Damtew, S.A., Ahmed, M.B., Akseer, N., Al-Raddadi, R., Alemayehu, M.A., Altirkawi, K., Abajobir, A.A., Amare, A.T., Antonio, C.A.T., Arnljot, J., Artaman, A., Asayesh, H., Avokpah, E.F.G.A., Awasthi, A., Ayala Quintanailla, B.P., Bacha, U., Betsu, B.D., Barac, A., Bärnighausen, T.W., Baye, E., Bedi, N., Bensonor, I.M., Berhane, A., Bernabe, E., Bernal, O.A., Beyene, A.S., Biadgilign, S., Bikbov, B., Boyce, C.A., Brazinova, A., Castañeda-Orjuela, C.A., Catalá-López, F., Charlson, F.J., Chitheer, A.A., Choi, J.J., Ciomanu, L.G., Crump, J., Dandona, R., Dellavalle, R.P., Deribew, A., deVeber, G., Dicker, D., Ding, E.L., Dubey, M., Endries, A.Y., Erskine, H.E., Faro, E.J.A., Faro, A., Farzadfar, F., Fernandes, J.C., Fijabi, D.O., Fitzmaurice, C., Fleming, T.D., Flor, L.S., Foreman, K.J., Franklin, R.C., Fraser, M.S., Frostad, J.J., Fullman, N., Gebregergs, G.B., Gebri, A.A., Geleijnse, J.M., Gibney, K.B., Gidey Yihdego, M., Gishu, M.D., Gizaachew, T.A., Glaser, E., Gold, A.L., Goldberg, E., Gona, P., Goto, A., Gugnani, H.C., Jiang, G., Gupta, R., Tesfay, F.H., Hankey, G.J., Havmoeller, R., Hijar, M., Horino, M., Hosgood, H.D., Hu, G., Jacobsen, K.H., Jakovljevic, M.B., Jayaraman, S.P., Jha, V., Jibat, T., Johnson, C.O., Jonas, J., Kasaeian, A., Kawakami, N., Keiyoro, P.N., Khalil, I., Khand, Y.H., Khubchandani, J., Ahmad Kiadaliri, A.A., Kieling, C., Kim, D., Kissoon, N., Knibbs, L.D., Koyanagi, A., Krohn, K.J., Kuate Debo, B., Kucuk Bicer, B., Kulikoff, R., Kumar, G.A., Lal, D.K., Lam, H.Y., Larson, H., Larsson, L., Laryea, D.O., Leung, J., Lim, S.S., Lo, L.T., Lo, W.D., Looker, K.J., Lotufo, P.A., Magdy Abd El Razeq, H., Malekzadeh, R., Marks Shifit, D., Mazidi, M., Meaney, P.A., Meles, K.G., Memiah, P., Mendoza, W., Abera Mengistie, M., Mengistu, G.W., Mensah, G.A., Miller, T.R., Mock, C., Mohammadi, A., Mohammed, S., Monasta, L., Mueller, U., Nagata, C., Naheed, A., Nguyen, G., Nguyen, Q.L., Nsoesie, E., Oh, I.H., Okoro, A., Olusanya, J.O., Olusanya, B.O., Ortiz, A., Paudel, D., Pereira, D.M., Perico, N., Petzold, M., Phillips, M.R., Polanczyk, G.V., Pourmalek, F., Qorbani, M., Rafay, A., Rahimi Movaghar, V., Rahman, M., Rai, R.K., Ram, U., Rankin, Z., Renzaho, A.M.N., Roba, H.S., Rojas-Rueda, D., Ronfani, L., Sagar, R., Sanabria, J.R., Kedir Mohammed, M.S., Santos, I.S., Satpathy, M., Sawhney, M., Schöttker, B., Schwebel, D.C., Scott, J.G., Seglan, S.G., Shaheen, A., Shaikh, M.A., She, J., Shiri, R., Shiue, I., Sigfusdottir, I.D., Singh, J., Silpakit, N., Smith, A., Sreeramareddy, C., Stanaway, J.D., Stein, D.J., Steiner, C., Suthiyen, M.B., Swanianathan, S., Tabarés-Seisdedos, R., Tabb, K.M., Tadesse, F., Tavakkoli, M., Taye, B., Teplee, S., Tegegne, T.K., Temam Shifa, G., Terkawi, A.S., Thomas, B., Thomson, A.J., Tober, M., Tran, B.X., Troeger, C., Ukwa, K.N., Uthman, O., Vasanakari, T., Venketasubramanian, N., Vlassov, V.V., Weiderpass, E., Weintraub, R., Gebrehiwot, S.W., Western, A., Williams, H.C., Wolfe, C.D.A., Woodbrook, R., Yano, Y., Yonemoto, N., Youn, S.J., Younis, M.Z., Yu, C., Zaki, M.E.S., Zegeye, E.A., Zuhike, L.J., Murray, C.J.L., and Vos, T. (2017) Child and adolescent health from 1990 to 2015: findings from the global burden of diseases, injuries, and risk factors 2015 study. *JAMA Pediatrics* 171(6): 573–592.

Kembo, J. (2010) Social and economic consequences of HIV and AIDS on children: case study of a high-density community in Harare, Zimbabwe. *Sahara J-Journal of Social Aspects of HIV–Aids* 7(4): 39–46.

Kidata, D.L., Amongin, H.C., Oonyu, J.C. and Baguma, P.K. (2013) Assertiveness and attitudes of HIV/AIDS orphaned girls towards education in Kampala (Uganda). *African Journal of Infectious Diseases* 7(2): 36–43.

Lagomarsino, G., Garabrant, A., Aadyas, A., Muga, R. and Otoo, N. (2012) Moving towards universal health coverage: health insurance reforms in nine developing countries in Africa and Asia. *The Lancet* 380(9854): 933–943.
Lopez, A.D. and Murray, C.C. (1998) The global burden of disease, 1990–2020. *Nature Medicine* 4(11): 1241–1243.

Lucas, A.M., Chidothe, M. and Wilson, N.L. (2019) Effects of adult health interventions at scale on children’s schooling: evidence from antiretroviral therapy in Zambia. *Economics of Education Review* 72: 107–120.

Luseno, W., Zhang, L., Rusakaniko, S., Cho, H. and Hallfors, D. (2015) HIV infection and related risk behaviors: does school support level the playing field between orphans and nonorphans in Zimbabwe? *Aids Care-Psychological and Socio-Medical Aspects of Aids/Hiv* 27(9): 1191–1195.

Madiba, S. and Ngwenya, N. (2017) Cultural practices, gender inequality and inconsistent condom use increase vulnerability to HIV infection: narratives from married and cohabiting women in rural communities in Mpumalanga province, South Africa. *Global Health Action* 10(sup2): 1341597.

Mayes, S.D., Handford, H.A., Schaefer, J.H., Scogno, C.A., Neagley, S.R., MichaelGood, L. and Pelco, L.E. (1996) The relationship of HIV status, type of coagulation disorder, and school absenteeism to cognition, educational performance, mood, and behavior of boys with hemophilia. *Journal of Genetic Psychology* 157(2): 137–151.

Mialky, E., Vagnoni, J. and Rutstein, R. (2001) School-age children with perinatally acquired HIV infection: medical and psychosocial issues in a Philadelphia cohort. *Aids Patient Care and Stds* 15(11): 575–579.

Mishra, V., Arnold, F., Otieno, F., Cross, A. and Hong, R. (2007) Education and nutritional status of orphans and children of HIV-infected parents in Kenya. *Aids Education and Prevention* 19(5): 383–395.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G. and The PRISMA Group. (2009) Preferred Reporting Items for Systematic Reviews and meta-analyses: the PRISMA statement. *PLoS Medicine* 6(7): e1000097.

Mokgatle, M.M. and Madiba, S. (2015) The burden of disease on HIV-infected orphaned and non-orphaned children accessing primary health facilities in a rural district with poor resources in South Africa: a cross-sectional survey of primary caregivers of HIV-infected children aged 5–18 years. *Infectious Diseases of Poverty* 4(1): 1–13.

Mon, M.M., Saw, S., Nu-Oo, Y.T., San, K.O., Myint, W.W. and Nge, P.T. (2013) Threat of HIV/AIDS in children: social, education and health consequences among HIV orphans and vulnerable children in Myanmar. *WHO South-East Asia Journal of Public Health* 2(1): 1–8.

Nicholson, L., Chisenga, M., Siame, J., Kasonka, L. and Filteau, S. (2015) Growth and health outcomes at school age in HIV-exposed, uninfected Zambian children: follow-up of two cohorts studied in infancy. *BMC Pediatrics* 15. https://bmcpediatr.biomedcentral.com/articles/10.1186/s12887-015-0386-8

Nyasani, E., Sterberg, E. and Smith, H. (2009) Fostering children affected by AIDS in Richards Bay, South Africa: a qualitative study of grandparents’ experiences. *African Journal of AIDS Research* 8(2): 181–192.

Orkin, M., Boyes, M.E., Cluver, L.D. and Zhang, Y. (2014) Pathways to poor educational outcomes for HIV/AIDS-affected youth in South Africa. *AIDS Care* 26(3): 343–350.

Osuji, H.L., Nabunya, P., Byansi, W., Parchment, T.M., Ssewamala, F., McKay, M.M. and Huang, K.Y. (2018) Social support and school outcomes of adolescents orphaned and made vulnerable by HIV/AIDS living in South Western Uganda. *Vulnerable Children and Youth Studies* 13(3): 228–238.

Parchure, R., Jori, V., Kulkarni, S. and Kulkarni, V. (2016) Educational outcomes of family-based HIV-infected and affected children from Maharashtra, India. *Vulnerable Children and Youth Studies* 11(4): 332–338.

Pluye, P., Robert, E., Cargo, M., Bartlett, G., O’cathain, A., Griffiths, F., Boardman, F., Gagnon, M.P., Rousseau, M.C. and Robert, E. (2011) Proposal: a mixed methods appraisal tool for systematic mixed studies reviews. *Montréal: McGill University* 2: 1–8.

Poulsen, H. (2006) The gendered impact of HIV/AIDS on education in South Africa and Swaziland: save the children’s experiences. *Gender & Development* 14(1): 47–56.

Pufall, E.L., Gregson, S., Eaton, J.W., Masoka, T., Mpandaguta, E., Andersen, L., Skovdal, M., Nyamukapa, C. and Campbell, C. (2014a) The contribution of schools to supporting the well being of children affected by HIV in eastern Zimbabwe. *Aids* 28: S379–S387.

Pufall, E.L., Nyamukapa, C., Eaton, J.W., Campbell, C., Skovdal, M., Munyati, S., Robertson, L. and Gregson, S. (2014b) The impact of HIV on children’s education in eastern Zimbabwe. *Aids Care-Psychological and Socio-Medical Aspects of Aids/Hiv* 26(9): 1136–1143.

Rajasingham, R., Smith, R.M., Park, B.J., Jarvis, J.N., Govender, N.P., Chiller, T.M., Denning, D.W., Loyse, A. and Boulware, D.R. (2017) Global burden of disease of HIV-associated cryptococcal meningitis: an updated analysis. *The Lancet Infectious Diseases* 17(8): 873–881.
Ranabhat, C.L., Joel, A., Park, M.B., Kim, C.B. and Jakovljevic, M.M. (2018) Influences of universal health coverage on long-term health outcome, the life expectancy: multi-country analysis. *Frontiers in Pharmacology* 9: 960.

Ryder, R.W., Kamenga, M., Nkusu, M., Batter, V. and Heyward, W.L. (1994) Aids orphans in Kinshasa, Zaire - incidence and socioeconomic consequences. *Aids* 8(5): 673–679.

Sherr, L., Tomlinson, M., Mcedo, A., Skeen, S., Hensels, I.S. and Cluver, L.D. (2017) Can cash break the cycle of educational risks for young children in high HIV-affected communities? A cross-sectional study in South Africa and Malawi. *Journal of Global Health* 7(2): 020409.

Simms, C., Rowson, M. and Peattie, S. (2001) The bitterest pill of all: the collapse of Africa’s health system. *SOS Children’s Villages International* [cited 2018 August 12]. Available from: https://www.sos-childrensvillages.org/

Souza, E., Santos, N., Valentini, S., Silva, G. and Falbo, A. (2010) Long-term follow-up outcomes of perinatally HIV-infected adolescents: infection control but school failure. *Journal of Tropical Pediatrics* 56(6): 421–426.

Spiegler, T. (2018) Resources and requirements of educational upward mobility. *British Journal of Sociology of Education* 39: 860–875.

Skovdal, Morten and Ogutu, Vincent O. (2009) I washed and fed my mother before going to school: understanding the psychosocial well-being of children providing chronic care for adults affected by HIV/AIDS in Western Kenya. *Globalization and health* 5: 8–8.

Ssewamala, F.M. and Ismayilova, L. (2009) Integrating children’s savings accounts in the care and support of orphaned adolescents in rural Uganda. *Social Service Review* 83(3): 453–472.

Ssewamala, F.M., Wang, J.S.-H., Neilands, T.B., Bermudez, L.G., Garfinkel, I., Waldfogel, J., Brooks-Gunn, J. and Kirkbride, G. (2018) Cost-effectiveness of a savings-led economic empowerment intervention for AIDS-affected adolescents in Uganda: implications for scale-up in low-resource communities. *Journal of Adolescent Health* 62(1): S29–S36.

Toska, E., Cluver, L., Orkin, M., Bains, A., Sherr, L., Berezin, M. and Gulaid, L. (2019) Screening and supporting through schools: educational experiences and needs of adolescents living with HIV in a South African cohort. *BMCP Public Health* 19(1): 272.

Tu, X., Lv, Y., Li, X., Fang, X., Zhao, G., Lin, X., Hong, Y., Zhang, L. and Stanton, B. (2009) School performance and school behaviour of children affected by acquired immune deficiency syndrome (AIDS) in China. *Vulnerable Children and Youth Studies* 4(3): 199–209.

UNAIDS. (2016) HIV prevention among adolescent girls and young women: putting HIV prevention among adolescent girls and young women on the fast-track and engaging men and boys. UNAIDS. [cited 2018 August 12]. Available from: http://www.unaids.org/sites/default/files/media_asset/UNAIDS_HIV_prevention_among_adolescent_girls_and_young_women.pdf.

UNICEF. (2006) *Africa’s Orphaned and Vulnerable Generations: Children Affected by AIDS*. [cited 2018 August 12]. Available from: https://www.unicef.org/publications/index_35645.html

UNWOMEN. (2016) *Facts and Figures: HIV and AIDS*. [cited 2019 November 19]. Available from: https://www.unwomen.org/en/what-we-do/hiv-and-aids/facts-and-figures

USAID. (2016) *Orphans and Vulnerable Children Affected by HIV and AIDS*. [cited 2018 August 12]. Available from: https://www.usaid.gov/what-we-do/global-health/hiv-and-aids/technical-areas/orphans-and-vulnerable-children-affected-hiv

Wang, H., Wolock, T.M., Carter, A., Nguyen, G., Kyu, H.H., Gakidou, E., Hay, S.I., Mills, E.J., Trickey, A., Msamburi, W., Coates, M.M., Mooney, M.D., Fraser, M.S., Slight, A., Salomon, J., Larson, H.J., Friedman, J., Abajobir, A.A., Abate, K.H., Abbass, K.M., Razek, M.M.A.E., Abd-Allah, F., Abdulle, A.M., Abere, S.F., Abubakar, I., Abu-Raddad, L.J., Abu-Rmeileh, N.M.E., Abu, G.Y., Adebiyi, A.O., Adeyemi, I.A., Adelekan, A.L., Adofo, K., Adou, A.K., Ajala, O.N., Akinyemiju, T.F., Akseer, N., Lam, H., Al-Aly, Z., Alam, K., Alam, N.K.M., Alasfoor, D., Aldhahri, S.F.S., Aldridge, R.W., Alegregti, M.A., Aleman, A.V., Alemu, Z.A., Alfonso-Cristancho, R., Ali, R., Alkerwi, A., Allen, F., Mohammad, R., Al-Raddadi, S., Alsharif, U., Alvarez, E., Alvis-Guzman, N., Amare, A.T., Amberbir, A., Amegah, A.K., Ammar, W., Amrock, S.M., Antonio, C.A.T., Anvari, P., Arrânov, J., Artaman, A., Asayesh, H., Asgari, R.J., Assadi, R., Atique, S., Atkins, L.S., Avokpocha, E.F.G.A., Awasthi, A., Quintanilla, B.P.A., Bacha, U., Badawi, A., Barac, A., Bärnighausen, T., Basu, A., Bayou, T.A., Bayou, Y.T., Bazargan-Hejazi, S., Beardsley, J.,
EFFECTS OF HIV/AIDS ON CHILDREN’S EDUCATIONAL ATTAINMENT

Bedi, N., Bennett, D.A., Bensenor, I.M., Betsu, B.D., Beyene, A.S., Bhatia, E., Bhutta, Z.A., Biadgilign, S., Bikbov, B., Birlik, S.M., Bisanzo, D., Brainin, M., Brazinova, A., Breitborde, N.J.K., Brown, A., Burch, M., Butt, Z.A., Campuzano, J.C., Cárdenas, R., Carrero, J.J., Castañeda-Orguella, C.A., Cavas, J.C., Catalá-López, F., Chang, H.Y., Chang, J.C., Chavan, L., Chen, W., Chiang, P.P., Chibabalaba, M., Chisumpa, V.H., Choi, J.J., Christopher, D.J., Ciobanu, L.G., Cooper, C., Dahiru, T., Damtew, S.A., Dandona, L., Dandona, R., das Neves, J., de Jager, P., De Leo, D., Degenhardt, L., Delavalle, R.P., Deribe, K., Deribew, A., Des Jarlais, D.C., Dharmaratne, S.D., Ding, E.L., Doshi, P.P., Doyle, K.E., Driscoll, T.R., Dubey, M., Elshrek, Y.M., Elyazar, I., Endries, A.Y., Ernakov, S.P., Esrhati, B., Esteghamati, A., Fahmouth, I.D.A., Farinha, C.S.E.S., Faro, A., Farvid, M.S., Farzadfar, F., Fereshtehnejad, S.M., Fernandes, J.C., Fischer, F., Fitchett, J.R.A., Foigt, N., Fullman, N., Fürst, T., Gankpé, F.G., Gebre, T., Gebremedhin, A.T., Gebru, A.A., Geleijnse, J.M., Gessner, B.D., Gething, P.W., Ghisot, T.T., Giroud, M., Gishu, M.D., Glaser, E., Goenka, S., Goodridge, A., Gopalan, S.V., Goto, A., Gugnani, H.C., Guimarães, M.D.C., Gupta, R., Gupta, R., Gupta, V., Haagsma, J., Haefeli-Nejad, N., Hagan, H., Hailu, G.B., Hamadeh, R.R., Hamidi, S., Hammami, M., Hankey, G.J., Hao, Y., Harb, H.L., Harikrishnan, S., Haro, J.M., Harun, K.M., Havmoeller, R., Hedayati, M.T., Heredia-Pi, I.B., Hoek, H.W., Horino, M., Horita, N., Hosgood, H.D., Hoy, D.G., Hsairi, M., Hu, G., Huang, H., Huang, J.J., Iburg, K.M., Idrisov, B.T., Innos, K., Iyer, V.J., Jacobsen, K.H., Jahanghiri, N., Jakovljevic, M.B., Janavakhit, M., Jayatilleke, A.U., Jeon, P., Jha, V., Jiang, G., Jiang, Y., Jibat, T., Jonas, J.B., Kabir, Z., Kamal, R., Kan, H., Karch, A., Karena, C.K., Karletos, D., Kasaeian, A., Kaul, M., Kawukami, N., Kayibanda, J.F., Keiyoro, P.N., Kemp, A.H., Kengne, A.P., Kesavachandran, C.N., Khader, Y.S., Khalil, I., Khan, A.R., Khan, E.A., Khan, Y.H., Khubchandani, J., Kim, Y.J., Kinsf, Y., Kivipelto, M., Kokubu, Y., Kosen, S., Koul, P.A., Koyanagi, A., Defo, B.K., Bicer, B.K., Kulkarni, V.S., Kumar, G.A., Lal, D.K., Lam, H., Lam, J.O., Langan, S.M., Lansingh, V.C., Larsson, A., Leigh, J., Leung, R., Li, Y., Lim, S.S., Lipshultz, S.E., Liu, S., Lloyd, B.K., Logrosino, G., Lotufo, P.A., Lunevicius, R., Razev, H.M.A.E., Mahdavi, M., Mahesh, P.A., Majdan, M., Majeed, A., Makhouf, C., Malekzadeh, R., Mapoma, C.C., Marcenes, W., Martinez-Raga, M., Marzan, M.B., Masiyi, F., Mason-Jones, A.J., Mayosi, B.M., McKe, M., Meany, P.A., Mehdidiouti, M.A.M., Mekonnen, A.B., Melakou, Y.A., Memish, Z.A., Mendoza, W., Meretoja, A., Meretoja, T.J., Mhimbira, F.A., Miller, T.R., Mikessell, J., Mirarefin, M., Mohammad, K.A., Mohammed, S., Mokdad, A.H., Monasta, L., Moradi-Lakeh, M., Mori, R., Mueller, U.O., Murimira, B., Murthy, G.V.S., Naheed, A., Nald, Nangia, V., Nash, D., Nawaz, H., Nejari, C., Ngalesoni, F.N., Den Dieu Ngirabega, J., Nguyen, Q.L., Nisar, M.I., Norheim, O.F., Norman, R.E., Nyakarachuka, L., Ogbo, F.A., Olu, I.H., Ojelabi, F.A., Olu, B.O., Olusanya, J.O., Opio, J.N., Oren, E., Ota, E., Park, H.Y., Park, J.H., Patil, S.T., Patten, S.B., Paul, V.K., Pearson, K., Pepah, E.K., Pereira, D.M., Perico, N., Pesudovs, K., Petzold, M., Phillips, M.R., Pillay, J.D., Plass, D., Polinder, S., Pourmalek, F., Prokop, D.M., Qorbani, M., Rafay, A., Rahimi, M., Rahimi-Movaghar, V., Rahman, M., Rahman, M.H.U., Rahman, S.U., Rai, R.K., Rajic, S., Ram, U., Rana, S.M., Rao, P.V., Remuzzi, G., Rojas-Rueda, D., Ronfani, L., Roschanel, G., Roy, A., Ruhago, G.M., Saedi, M.Y., Saeed, A., Sagar, R., Saleem, M.A., Sanabria, J.R., Santos, I.S., Sarmento-Suarez, R., Sartorius, B., Sawhney, M., Schwebel, D.C., Seedat, S., Sepanlou, S.G., Serban-Mori, E.E., Shai, M., Sharma, R., She, J., Shiikbae, S., Shen, J., Shibu, K., Shin, H.H., Sifgudottir, I.D., Sipak, N., Silva, D.A., Silveira, D.G.A., Simard, E.P., Sindi, S., Singh, A., Singh, O.P., Singh, P.K., Skibbe, V., Sliwa, K., Soneji, S., Sorensen, R.J.D., Sori, J.A., Soti, D.O., Steer, C.T., Stathoupoulou, V., Steel, N., Sun, G., Sungu, B.F., Swaminathan, S., Sykes, B.L., Tabarés-Seisdedos, R., Talongwag, R.T., Tavakkoli, M., Taye B., Telila, B.A., Tekle, T., Thina, G.T., Temesgen, A.M., Terkawi, A.S., Tesfaye, F.H., Tessema, G.A., Thapa, K., Thomson, A.J., Thorne-Lyman, A.L., Tohe-Maey, R., Topor-Madry, R., Towbin, J.A., Tran, B.X., Dimbuena, Z.T., Tsliliparnis, N., Tura, A.K., Ukwaja, K.N., Uneke, C.J., Uthman, O.A., Veldesubramanian, N., Vlkonimirov, S.K., Vlassov, V.V., Vollset, S.E., Wang, L., Werderpass, E., Weintraub, R.G., Werdecker, A., Westerman, R., Wijeratne, T., Wilkinson, J.D., Wijesinghe, C.S., Wolfe, C.D.A., Won, S., Wong, J.Q., Xu, G., Yadav, A.K., Yakob, B., Yarow, A.Z., Yano, Y., Yaseri, M., Yehyo, H.G., Yip, P., Yonemoto, N., Yoon, S.J.Y., Younis, M.Z., Yu, C., Yu, S., Zaidi, Z., Zaki, M.E.S., Zeeb, H., Zhang, H., Zhao, Y., Zodpey, S., Zockl, L., Zuhlke, L.J., Lopez, A.D. and Murray, C.J.L. (2016) Estimates of global, regional, and national incidence, prevalence, and mortality of HIV, 1980–2015: the global burden of disease study 2015. The Lancet HIV 3(8): e361–e387.

Journal of Economic Surveys (2020) Vol. 34, No. 1, pp. 35–84

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Xu, T., Wu, Z.Y., Duan, S., Han, W.X. and Rou, K.M. (2010a) The situation of children affected by HIV/AIDS in Southwest China: schooling, physical health, and interpersonal relationships. *Jaids-Journal of Acquired Immune Deficiency Syndromes* 53: S104–S110.

Xu, T., Wu, Z., Rou, K., Duan, S. and Wang, H. (2010b) Quality of life of children living in HIV/AIDS-affected families in rural areas in Yunnan, China. *AIDS Care* 22(3): 390–396.

Xu, T., Wu, Z., Yan, Z., Rou, K. and Duan, S. (2010c) Measuring health-related quality of life in children living in HIV/AIDS-affected families in rural areas in Yunnan, China: preliminary reliability and validity of the Chinese version of PedsQL™ 4.0 generic core scales. *Journal of Acquired Immune Deficiency Syndromes* 53(Suppl 1): S111.

Yamada, T., Chen, C.C., Naddeo, J.J. and Harris, J.R., III. (2015) Changing healthcare policies: implications for income, education, and health disparity. *Frontiers in Public Health* 3: 195.

Yamano, T. and Jayne, T.S. (2005) Working-age adult mortality and primary school attendance in rural Kenya. *Economic Development and Cultural Change* 53(3): 619–653.

Yang, H., Wu, Z., Duan, S., Li, Z., Li, X., Shen, M., Mathur, A. and Stanton, B. (2006) Living environment and schooling of children with HIV-infected parents in southwest China. *Aids Care-Psychological and Socio-Medical Aspects of Aids/Hiv* 18(7): 647–655.

Young Carers Project South Africa. http://www.youngcarers.org.za/

Zivin, J.G., Thirumurthy, H. and Goldstein, M. (2009) AIDS treatment and intrahousehold resource allocation: children’s nutrition and schooling in Kenya. *Journal of Public Economics* 93(7–8): 1008–1015.

**Appendix A**

**List for quantitative, mixed-methods, and qualitative papers included in the review**

1. Akbulut-Yuksel, Mevlude, & Turan, Belgi. (2013). Left Behind: Intergenerational Transmission of Human Capital in the Midst of HIV/AIDS. *Journal of Population Economics*, 26(4), 1523–1547.
2. Anabwani, Gabriel, Karugaba, Grace, & Gabaitiri, Lesego. (2016). Health, schooling, needs, perspectives and aspirations of HIV infected and affected children in Botswana: a cross-sectional survey. *BMC Pediatrics*, 16(1), 132–132.
3. Aspaas, Helen Ruth. (1999). AIDS and orphans in Uganda: Geographical and gender interpretations of household resources. *The Social Science Journal*, 36(2), 201–226.
4. Bandason, T., Langhaug, L. F., Makamba, M., Laver, S., Hatzold, K., Mahere, S., . . . & Ferrand, R. A. (2013). Burden of HIV among primary school children and feasibility of primary school-linked HIV testing in Harare, Zimbabwe: a mixed methods study. *AIDS Care*, 25(12), 1520–1526.
5. Bele, Samir D., Valsangkar, Sameer, & Bodhare, Trupti N. (2011). Impairment of nutritional, educational status and quality of life among children infected with and belonging to families affected by human immunodeficiency virus/acquired immune deficiency syndrome. *Vulnerable Children & Youth Studies*, 6(4), 284–292.
6. Bhargava, Alok. (2005). AIDS epidemic and the psychological well-being and school participation of Ethiopian orphans. *Psychology, Health & Medicine*, 10(3), 263–275.
7. Cluver, L., Operario, D., Lane, T., & Kganakga, M. (2012). “I Can’t Go to School and Leave Her in so Much Pain”: Educational Shortfalls among Adolescent “Young Carers” in the South African AIDS Epidemic. *Journal of Adolescent Research*, 27(5), 581–605.
8. Cluver, Lucie, Orkin, Mark, Boyes, Mark E., Sherr, Lorraine, Makasi, Daphne, & Nikelo, Joy. (2013). Pathways from parental AIDS to child psychological, educational and sexual risk: developing an empirically-based interactive theoretical model. *Social Science & Medicine* (1982), 87, 185–193.
9. Cohen, J., Reddington, C., Jacobs, D., Meade, R., Picard, D., Singleton, K., Hsu, H. W. (1997). School-related issues among HIV-infected children. *Pediatrics*, 100(1), E8–E8.
10. Curley, Jami, Ssewamala, Fred, & Han, Chang-Keun. (2010). Assets and educational outcomes: Child Development Accounts (CDAs) for orphaned children in Uganda. *Children and Youth Services Review*, 32(11), 1585–1590.
11. Delva, Wim, Vercoutere, An, Loua, Catherine, Lamah, Jonas, Vansteelandt, Stijn, De Koker, Petra, Annemans, Lieven. (2009). Psychological well-being and socio-economic hardship among AIDS orphans and other vulnerable children in Guinea. *AIDS Care*, 21(12), 1490–1498.
12. Ellis, Walter L. (2004). Factors Associated with the Academic Achievement of Perinatally HIV-Infected Elementary and Middle School Children. *Negro Educational Review*, 55(1), 51–58.
13. Fauk, Nelsensius Klau, Mwakinyali, Silivano Edson, Putra, Sukma, & Mwanri, Lillian. (2017). The socio-economic impacts of AIDS on families caring for AIDS-orphaned children in Mbeya rural district, Tanzania. *International Journal of Human Rights in Healthcare*, 10(2), 132–145.
14. Floyd, S., Crampin, A. C., Glynn, J. R., Madise, N., Mwenebabu, M., Mnkhondia, S., Fine, P. E. M. (2007). The social and economic impact of parental HIV on children in northern Malawi: retrospective population-based cohort study. *AIDS Care*, 19(6), 781–790.
15. Fofana, N. B., van Ophem, J. A., Niehof, A., & Antonides, G. (2014). Effects of HIV/AIDS and microfinance of women on income, medical expenditures and schooling in Côte d’Ivoire. *African Development Review*, 26(2), 322–332.
16. Fotso, A. S., Banjo, O., & Akmyemi, J. O. (2018). HIV and adolescents’ educational attainment in South Africa: Disentangling the effect of infection in children and household members. *South African Journal of Child Health*, 12(SPE), s4–s9.
17. Grant, Monica J. (2008). Children’s school participation and HIV/AIDS in rural Malawi: The role of parental knowledge and perceptions. *Demographic Research*, 19, 1603–1634.
18. Gupta, Anil K., Rawat, Nidhi, Rai, Kuldeep, Rana, Surendra, & Chakraborty, Sabyasachi. (2013). Orphan and vulnerable children infected or affected by HIV/AIDS in Delhi – situational analysis and state government’s initiative of household economic strengthening. *Vulnerable Children & Youth Studies*, 8(2), 161–170.
19. Harms, Sheila, Jack, Susan, Ssebunnya, Joshua, & Kizza, Ruth. (2010). The orphanging experience: Descriptions from Ugandan youth who have lost parents to HIV/AIDS. *Child and Adolescent Psychiatry and Mental Health*, 4(1), 6.
20. Harrison, Sayward E., Li, Xiaoming, Zhang, JiaJia, Chi, Peilian, Zhao, Junfeng, & Zhao, Guoxiang. (2017). Improving School Outcomes for Children Affected by Parental HIV/AIDS: Evaluation of the ChildCARE Intervention at 6-, 12-, and 18-Months. *School Psychology International*, 38(3), 264–286.
21. Harrison, Sayward E., Li, Xiaoming, Zhang, JiaJia, Zhao, Junfeng, & Zhao, Guoxiang. (2018). A Randomized Controlled Trial of a Resilience-Based Intervention for Children Affected by Parental HIV: Educational Outcomes at 24-, 30-, and 36-Months. *School Psychology International*, 39(2), 170–195.
22. Hartell, C. G., & Chabilall, J. A. (2005). HIV/AIDS in South Africa: A study of the socio-educational development of adolescents orphaned by AIDS in child-headed households. *International Journal of Adolescence and Youth*, 12(3), 213–229.
23. Henning, Margaret J., Betancourt, Theresa S., & Khanna, Sunil K. (2016). Protective factors that contribute to improved school attendance for children that are HIV/AIDS affected in Zambia. *International Journal of Health Promotion and Education*, 54(6), 318–334.
24. Henning, Margaret, Kirk, Catherine M., Franchett, Emily, Wilder, Rose, Sezibera, Vincent, Ukundineza, Christian, & Betancourt, Theresa. (2018). Over-age and underserved: a case control study of HIV-affected children and education in Rwanda. *Vulnerable Children & Youth Studies*, 13(1), 81–93.
25. Hensels, IS, Sherr, L, Skeen, S, Macedo, A, Roberts, KJ, & Tomlinson, M. (2016). Do not forget the boys–gender differences in children living in high HIV-affected communities in South Africa and Malawi in a longitudinal, community-based study. AIDS Care, 28(sup2), 100–109.

26. Hong, Yan. (2011). Care Arrangements of AIDS Orphans and Their Relationship with Children’s Psychosocial Well-Being in Rural China. Health Policy and Planning, 26(2), 115–123.

27. Jepkemboi, Grace, & Aldridge, Jerry. (2014). Effect of HIV/AIDS on Children’s Attitudes toward Learning: Voices of Teachers and Caregivers in Western Kenya. Childhood Education, 90(3), 219–224.

28. Jere, Catherine M. (2012). Improving Educational Access of Vulnerable Children in High HIV Prevalence Communities of Malawi: The Potential of Open and Flexible Learning Strategies. International Journal of Educational Development, 32(6), 756–763.

29. Kakooza, J., & Kimuna, S. R. (2006). HIV/AIDS orphans’ education in Uganda: the changing role of older people. Journal of Intergenerational Relationships, 3(4), 63–81.

30. Kasirye, Ibrahim, & Hisali, Eria. (2010). The socioeconomic impact of HIV/AIDS on education outcomes in Uganda: School enrolment and the schooling gap in 2002/2003. International Journal of Educational Development, 30(1), 12–22.

31. Kembo, Joshua. (2010). Social and economic consequences of HIV and AIDS on children: case study of a high-density community in Harare, Zimbabwe. Sahara J-Journal of Social Aspects of Hiv-Aids, 7(4), 39–46.

32. Kidman, Rachel, Hanley, James A., Foster, Geoff, Subramanian, S. V., & Heymann, S. Jody. (2012). Educational Disparities in AIDS-Affected Communities: Does Orphanhood Confer Unique Vulnerability? Journal of Development Studies, 48(4), 531–548.

33. Kitara, David Lagoro, Amongin, Hellen Christine, Oonyu, Joseph C., & Baguma, Peter K. (2013). Assertiveness and Attitudes of HIV/AIDS Orphaned Girls Towards Education in Kampala (Uganda). African Journal of Infectious Diseases, 7(2), 36–43.

34. Lucas, A. M., Chidothe, M., & Wilson, N. L. (2019). Effects of adult health interventions at scale on children’s schooling: Evidence from antiretroviral therapy in Zambia. Economics of Education Review, 72, 107–120.

35. Luseno, W., Zhang, L., Rusakaniko, S., Cho, H., & Hallfors, D. (2015). HIV infection and related risk behaviors: does school support level the playing field between orphans and nonorphans in Zimbabwe? AIDS Care, 27(9), 1191–1195.

36. Mayes, S. D., Handford, H. A., Schaefer, J. H., Scogno, C. A., Neagley, S. R., Michael-Good, L., & Pelco, L. E. (1996). The relationship of HIV status, type of coagulation disorder, and school absenteeism to cognition, educational performance, mood, and behavior of boys with hemophilia. The Journal of Genetic Psychology, 157(2), 137–151.

37. Mialky, E., Vagnoni, J., & Rutstein, R. (2001). School-age children with perinatally acquired HIV infection: medical and psychosocial issues in a Philadelphia cohort. AIDS patient care and STDs, 15(11), 575–579.

38. Mishra, V., Arnold, F., Otieno, F., Cross, A., & Hong, R. (2007). Education and nutritional status of orphans and children of HIV-infected parents in Kenya. AIDS Educ Prev, 19(5), 383–395.

39. Mokgatle, Mathildah M, & Madiba, Sphiwe. (2015). The burden of disease on HIV-infected orphaned and non-orphaned children accessing primary health facilities in a rural district with poor resources in South Africa: a cross-sectional survey of primary caregivers of HIV-infected children aged 5–18 years. Infectious Diseases of Poverty, 4(1), 18.

40. Mon, M. M., Saw, S., Nu-Oo, Y. T., San, K. O., Myint, W. W., & Nge, P. T. (2013). Threat of HIV/AIDS in children: social, education and health consequences among HIV orphans and vulnerable children in Myanmar. WHO South-East Asia journal of public health, 2(1), 41.
41. Nicholson, Laura, Chisenga, Molly, Siame, Joshua, Kasonka, Lackson, & Filteau, Suzanne. (2015). Growth and health outcomes at school age in HIV-exposed, uninfected Zambian children: follow-up of two cohorts studied in infancy. *BMC Pediatrics, 15*, 66-66.

42. Nyasani, Evalyne, Sterberg, Erna, & Smith, Helen. (2009). Fostering children affected by AIDS in Richards Bay, South Africa: A qualitative study of grandparents’ experiences. *African Journal of AIDS Research, 8*(2), 181–192.

43. Orkin, Mark, Boyes, Mark E, Cluver, Lucie D, & Zhang, Yuning. (2014). Pathways to poor educational outcomes for HIV/AIDS-affected youth in South Africa. *AIDS Care, 26*(3), 343–350.

44. Osuji, H. L., Nabunya, P., Byansi, W., Parchment, T. M., Ssewamala, F., McKay, M. M., & Huang, K. Y. (2018). Social support and school outcomes of adolescents orphaned and made vulnerable by HIV/AIDS living in South Western Uganda. *Vulnerable children and youth studies, 13*(3), 228–238.

45. Parchure, Ritu, Jori, Vijaya, Kulkarni, Sanjeevani, & Kulkarni, Vinay. (2016). Educational outcomes of family-based HIV-infected and affected children from Maharashtra, India. *Vulnerable Children & Youth Studies, 11*(4), 332–338.

46. Poulsen, Helen. (2006). The gendered impact of HIV/AIDS on education in South Africa and Swaziland: Save the Children’s experiences. *Gender & Development, 14*(1), 47–56.

47. Pufall, Erica L., Gregson, Simon, Eaton, Jeffrey W., Masoka, Tidings, Mpandaguta, Edith, Andersen, Louise, Campbell, Catherine. (2014). The contribution of schools to supporting the well being of children affected by HIV in eastern Zimbabwe. *AIDS (London, England), 28 Suppl 3*, S379–387.

48. Pufall, Erica L, Nyamukapa, Constance, Eaton, Jeffrey W, Campbell, Catherine, Skovdal, Morten, Munyati, Shungu, Gregson, Simon. (2014). The impact of HIV on children’s education in eastern Zimbabwe. *AIDS Care, 26*(9), 1136–1143.

49. Ryder, R. W., Kamenga, M., Nkusu, M., Batter, V., & Heyward, W. L. (1994). AIDS orphans in Kinshasa, Zaire: incidence and socioeconomic consequences. *AIDS (London, England), 8*(5), 673–679.

50. Santelli, J. S., Mathur, S., Song, X., Huang, T. J., Wei, Y., Lutalo, T., . . . & Serwadda, D. (2015). Rising school enrollment and declining HIV and pregnancy risk among adolescents in Rakai District, Uganda, 1994–2013. *Global Social Welfare, 2*(2), 87–103.

51. Sherr, Lorraine, Tomlinson, Mark, Macedo, Ana, Sreen, Sarah, Hensels, Imca Sifra, & Cluver, Lucie Dale. (2017). Can cash break the cycle of educational risks for young children in high HIV-affected communities? A cross-sectional study in South Africa and Malawi. *Journal of Global Health, 7*(2), 020409–020409.

52. Skovdal, Morten, & Ogutu, Vincent O. (2009). “I washed and fed my mother before going to school”: understanding the psychosocial well-being of children providing chronic care for adults affected by HIV/AIDS in Western Kenya. *Globalization and health, 5*, 8. https://doi.org/10.1186/1744-8603-5-8

53. Souza, Edvaldo, Santos, Nicole, Valentini, Sophia, Silva, Gerlane, & Falbo, Ana. (2010). Long-term follow-up outcomes of perinatally HIV-infected adolescents: infection control but school failure. *Journal of tropical Pediatrics, 56*(6), 421–426.

54. Ssewamala, Fred M., & Ismayilova, Leyla. (2009). Integrating Children’s Savings Accounts in the Care and Support of Orphaned Adolescents in Rural Uganda. *Social Service Review, 83*(3), 453–472.

55. Ssewamala, Fred M., Wang, Julia Shu-Huah, Neilands, Torsten B., Bermudez, Laura Gauer, Garfinkel, Irwin, Waldfogel, Jane, . . . Kirkbride, Gwyneth. (2018). Cost-Effectiveness of a Savings-Led Economic Empowerment Intervention for AIDS-Affected Adolescents in Uganda.
Implications for Scale-up in Low-Resource Communities. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*, 62(1S), S29–S36.

56. Toska, E., Cluver, L., Orkin, M., Bains, A., Sherr, L., Berezin, M., & Gulaid, L. (2019). Screening and supporting through schools: educational experiences and needs of adolescents living with HIV in a South African cohort. *BMC public health*, 19(1), 272.

57. Tu, Xiaoming, Lv, Yunfei, Li, Xiaoming, Fang, Xiaoyi, Zhao, Guoxiang, Lin, Xiuyun, . . . Stanton, Bonita. (2009). School performance and school behaviour of children affected by acquired immune deficiency syndrome (AIDS) in China. *Vulnerable Children and Youth Studies*, 4(3), 199–209.

58. Xu, T., Wu, Z., Duan, S., Han, W., & Rou, K. (2010). The situation of children affected by HIV/AIDS in Southwest China: Schooling, physical health, and interpersonal relationships. *J Acquir Immune Defic Syndr*, 53 Suppl 1, S104-110.

59. Xu, Tao, Wu, Zunyou, Rou, Keming, Duan, Song, & Wang, Huishan. (2010). Quality of life of children living in HIV/AIDS-affected families in rural areas in Yunnan, China. *AIDS Care*, 22(3), 390–396.

60. Xu, Tao, Wu, Zunyou, Yan, Zhihua, Rou, Keming, & Duan, Song. (2010). Measuring health-related quality of life in children living in HIV/AIDS-affected families in rural areas in Yunnan, China: preliminary reliability and validity of the Chinese version of PedsQL™ 4.0 Generic Core Scales. *Journal of Acquired Immune Deficiency Syndromes (1999)*, 53(Suppl 1), S111.

61. Yang, H., Wu, Z., Duan, S., Li, Z., Li, X., Shen, M., . . . Stanton, B. (2006). Living environment and schooling of children with HIV-infected parents in southwest China. *AIDS Care*, 18(7), 647–655.

62. Zivin, Joshua Graff, Thirumurthy, Harsha, & Goldstein, Markus. (2009). AIDS Treatment and Intrahousehold Resource Allocation: Children’s Nutrition and Schooling in Kenya. *Journal of Public Economics*, 93(7–8), 1008–1015.
### Appendix B: Summary of Quantitative Results

| Ref no. | Author(s) (year) | Country | Children’s age (years) | Education variable | HIV status or testing | Comparisons | Methods | Gender comparison of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results |
|---------|------------------|---------|------------------------|--------------------|-----------------------|-------------|---------|---------------------------------------------|-------------------------------------------------|--------------|
| 1       | Akbulut-Yuksel and Turan (2013) | SSA countries | 13–17 | Years of schooling, progress in school, and attendance | HIV-positive mothers vs. HIV-negative mothers | Cross-sectional data, N = 8992, fixed effects regression | No | No | Yes | Mother’s HIV status has significant effects on inheritability of education. The association between infected mothers’ education and their children’s education is 30% less than the general population. Children with HIV positive mothers had decreased school progress and attendance. |
| 2       | Anabwani et al. (2016) | Botswana | 6–18 | Attendance and grades | HIV-infected children vs. children living with an HIV-infected child in the household | Cross-sectional data, N = 984, chi-square test, and z-test | Yes | No | No | About 99% of HIV-infected and about 97% of HIV-affected children were attending school. Sixty percent of HIV-infected children missed at least one day of school due to illness or medical appointments. Seventy-eight percent of HIV-infected children and 62% of HIV-affected children reported facing problems at school. |
| 3       | Aspaas (1999) | Uganda | 0–17 | Enrollment | HIV/AIDS orphans vs. nonorphans | Cross-sectional data, N = 60, t-test | No | No | Yes | AIDS orphans in male-headed households were enrolled at lower rates than orphans in female-headed households. Being HIV-positive was significantly associated with being behind by at least 1 class grade for age. |
| 4       | Bandason et al. (2013) | Zimbabwe | 11–13 | Correct grade for age | Teachers, pupils, and their families received HIV testing | N/A | Cross-sectional data, N = 4386, logistic regression | Yes | No | No | (Continued) |
| Ref no. | Author (year) | Country     | Children's age (years) | Education variable | HIV status or testing | Comparisons                                                                 | Methods                                                                 | Mixed-methods study | Gender comparison of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results                                                                                                                                               |
|--------|---------------|-------------|------------------------|--------------------|----------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------|--------------------|-----------------------------------------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5      | Bele et al.   | India       | 5–11                   | Attendance, dropout, school performance | Children were HIV-infected or had lost a parent to HIV/AIDS | HIV-infected children vs. HIV orphans                                          | Cross-sectional, *N* = 387, *z*-scores                                     | No                 | No                                           | Yes                                             | The main reason for dropout in the HIV-infected group was illness. The main reason for dropout in the HIV orphan group was financial constraints. A mother’s premature death hindered children’s school participation. AIDS orphans were more likely to participate in school than non-AIDS orphans. Following the death of their mothers, girls were less likely than boys to participate in school. |
| 6      | Bhargava      | Ethiopia    | 10+                    | School participation before and after mother’s death | Children were AIDS orphans | AIDS orphans vs. non-AIDS orphans                                              | Cross-sectional data, *N* = 1053, bivariate logistic regression             | No                 | Yes                                          | Yes                                             | A mother’s premature death hindered children’s school participation. AIDS orphans were more likely to participate in school than non-AIDS orphans. Following the death of their mothers, girls were less likely than boys to participate in school. |
| 7      | Cluver et al. | South Africa| 10–20                  | Attendance, dropout, and inability to concentrate | Children lived in a household with an AIDS-ill individual | Adolescents in homes with AIDS-sickness vs. adolescents in other-sick homes vs. adolescents in healthy homes. | Cross-sectional data, *N* = 599, ANOVA, *t*-test, and multivariate regression | Yes                | No                                           | No                                              | Living in a home with an AIDS-ill person was significantly related to missing or dropping out of school. Living in a home with other sickness was also related to dropping out of school but this effect was less than that of living in a home with an AIDS-ill person. |
| 8      | Cluver et al. | South Africa| 10–17                  | Enrollment, attendance, and correct grade for age | AIDS-orphaned children vs. children who lived with AIDS-ill parents vs. non-HIV/AIDS affected children | Children were AIDS orphans or lived with an AIDS-ill parent                      | Cross-sectional data, *N* = 6002, maximum likelihood estimation, chi-square test, and ANOVA | No                 | No                                           | No                                              | AIDS-orphaned children showed that more grade delay and those with AIDS-ill parents had low attendance and enrollment. |
| Ref no. | Author (year) | Country | Children's age (years) | Education variable | HIV status or testing | Comparisons | Methods | Mixed-methods study | Gender comparison of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results |
|---------|---------------|---------|------------------------|--------------------|----------------------|-------------|---------|-------------------|---------------------------------------------|------------------------------------------------|--------------|
| 9       | Cohen et al. (1997) | USA (Massachusetts) | 5–17 | Attendance | Children were infected with HIV | HIV-infected children with mild symptoms vs. HIV-infected children with moderate symptoms vs. HIV-infected children with severe symptoms | Longitudinal data, \( N = 92 \), descriptive statistics | No | No | Yes | 48% of children missed two or more weeks of school, 12% missed more than eight weeks. Only three children missed school because of mother’s illness. 75% were absent for less than two weeks, compared to 51% of children moderate symptoms and 27% of children with severe symptoms. |
| 10      | Curley et al. (2010) | Uganda | 13.7 | Grades. | Self-identified AIDS orphans | Experimental group orphans vs. comparison group orphans | Longitudinal data, \( N = 274 \), quasi-experimental design/OLS | No | Yes | No | Children in the experimental group are more likely to have better grades, and have positive changes in their educational plans. Girls are more likely to positive changes in educational plans than boys. |
| 11      | Delva et al. (2009) | Guinea | 10–18 | Attendance | Self-identified AIDS orphans | AIDS-orphans vs. non-AIDS orphan vs. nonorphans | Cross-sectional data, \( N = 397 \), logistic regression | No | Yes | No | Compared to nonorphans, non-AIDS orphans and AIDS orphans were less likely to attend school. A trend of decreased attendance could be observed among AIDS orphans. Boys were more likely to attend school on a daily basis compared to girls. |
| 12      | Ellis (2004) | USA (North Carolina) | 9 years old | Truancy, and low grades | Children were perinatally infected with HIV | None | Cross-sectional data, \( N = 9 \), bivariate analysis, \( t \)-test | No | No | No | HIV-related medical factors were not associated with children making low grades. However, poor-study habits, disruptive behavior, and peer pressure were found to be associated with low grades. |

(Continued)
| Ref no. | Author (year) | Country | Children’s age (years) | Education variable | HIV status or testing | Comparisons | Methods | Mixed-methods study | Comparisons of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results |
|---------|----------------|---------|------------------------|-------------------|----------------------|-------------|---------|------------------|--------------------------------------|------------------------------------------|-------------|
| 14      | Floyd et al. (2007) | Malawi | 6–28 | Grades and attendance | Parents were tested for HIV during survey | HIV-positive parents vs. HIV-negative parents | Longitudinal data, N = 2525, logistic regression and linear regression | No | No | Yes | There was no evidence that the mean grade was lower among children of an HIV-positive individual, for both girls and boys. Secondary school attendance was lower in maternal and paternal orphans. |
| 15      | Fofana et al. (2014) | Côte d’Ivoire | 6–14 | Attendance | Mothers were HIV positive | HIV-positive women vs. HIV-negative women | Cross-sectional data, N = 439, Heckman’s two-step regression | No | No | Yes | HIV was found to be the main cause of children dropping out of school. In households with HIV-positive people, fewer children go to school. |
| 16      | Fotso et al. (2018) | South Africa | 10–19 | Enrollment and school progression (correct grade for age) | Children were tested for HIV | HIV-positive vs. HIV-negative children | Longitudinal data, N = 8835, logistic regression, multivariate decomposition | No | No | No | HIV contracted in childhood and early adolescence resulted in a significant school progression gap between HIV-negative and HIV-positive children. |
| 17      | Grant (2008) | Malawi | 6–16 | Enrollment | Mothers were tested for HIV during survey | HIV-positive mothers vs. HIV-negative mothers | Longitudinal data, N = 2308, logistic regression | Yes | No | Yes | A mother’s HIV status is not significantly associated with school enrollment of 6–10-year-old children. Women who reported a medium or high likelihood of future HIV infection had children with higher odds of being currently enrolled compared to children of women who reported no chance of future infection. There was no difference in school participation between children with HIV-positive mothers and HIV-negative mothers. |
| Ref no. | Author (year)      | Country    | Children’s age (years) | Education variable | HIV status or testing | Comparisons                                                                 | Methods                          | Gender comparison of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results                                                                                                                                                                                                 |
|---------|--------------------|------------|------------------------|--------------------|-----------------------|----------------------------------------------------------------------------|----------------------------------|---------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18      | Gupta et al. (2013)| India      | 2–18                   | Dropout and attendance | Children had lost one or both parents to HIV | Orphans and vulnerable children in institutional care vs. those in home-based care | Longitudinal data, N = 65, descriptive statistics | No                                           | No                                           | About 72% of Orphans and vulnerable children (OVC) in home-based care were going to school, whereas 98% of OVC in institutional care were attending school. |
| 20      | Harrison et al. (2017) | China    | 6–17                  | Grades             | Children had at least one HIV-positive biological parent or were AIDS orphans | Experimental group of HIV/AIDS affected children vs. comparison group of HIV/AIDS affected children | Longitudinal data, N = 790, RCT, random, and fixed effects | No                                           | Yes                                          | Child and caregiver interventions displayed improvements in academic performance. Girls reported lower grades and less interest in school.                     |
| 21      | Harrison et al. (2018) | China    | 6–17                  | Grades             | Children had at least one HIV-positive biological parent or were AIDS orphans | Experimental group of HIV/AIDS affected children vs. comparison group of HIV/AIDS affected children | Longitudinal data, N = 790, RCT, random, and fixed effects | No                                           | Yes                                          | The number of HIV infections in the family had a significant negative impact on school satisfaction and on children’s school interests. Boys reported more academic interests than girls. |
| 23      | Henning et al. (2018) | Rwanda   | 10–17                 | Correct grade for age | HIV positive children and parents were identified through an Electrical Medical Record for registered patients living with HIV | HIV-positive vs. HIV-affected vs. HIV-negative | Cross-sectional data, N = 681, logistic regression | No                                           | No                                           | HIV-positive children experienced higher levels of stigma and were twice as likely to be at least year older than their appropriate grade for age.         |
| 24      | Henning et al. (2016) | Zambia   | 5–17                  | Attendance         | Children lost one or more parents to HIV/AIDS or had a parent or household member who has been sick for three months or more | Orphans and vulnerable children vs. nonorphans and vulnerable children | Cross-sectional data, N = 1651, logistic regression | Yes                                          | Yes                                          | The number of orphans and vulnerable children in a household decreased the likelihood of school attendance. Gender did not affect school attendance. Teachers’ support was critical to the attendance of HIV/AIDS-affected children. |
| Ref no. | Author (year) | Country | Children’s age (years) | Education variable | HIV status or testing | Comparisons | Methods | Mixed-methods study | Gender comparison of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results |
|---------|---------------|---------|------------------------|-------------------|-----------------------|-------------|---------|-------------------|--------------------------------|--------------------------------|-------------|
| 25      | Hensels et al. (2016) | South Africa and Malawi | 4–13 | Nonspecific educational outcomes | HIV status was obtained using parental report | HIV (and non-HIV) girls vs. HIV (and non-HIV) boys | Longitudinal data, N = 989, t-test, chi-squared test, linear regression | No | Yes | No | Results showed that boys and girls differed significantly in educational outcomes. A carer’s HIV status had negative effect on children’s educational outcomes. However, after controlling for school attendance, cognitive abilities, and carer HIV status, being a girl was significantly associated with better educational outcomes. |
| 26      | Hong (2011) | China | 6–18 | Grades | Children had lost both parents to AIDS | AIDS orphans living in kinship care (or extended family care) vs. AIDS orphans in orphanages, vs. AIDS orphans in community-based group homes | Longitudinal data, N = 296, linear regression | No | No | No | Children who lived in group homes had the best school grades followed by those in orphanages and those in kinship care (or extended family care). |
| 29      | Jere (2012) | Malawi | Standard 6 pupils | Dropout, and absenteeism | Children are HIV-positive, have lost one parent to AIDS, children have an HIV/AIDS-ill parent or guardian, or live in a household affected by HIV/AIDS | Experimental group of HIV/AIDS-affected children vs. comparison group of HIV/AIDS-affected children | Cross-sectional data, N = 259, Mann–Whitney U-test | Yes | No | No | The mean of class dropout of the intervention group was lower than the control group. Pupil promotion was based on performance in school-based end-of-year exams. There was no significance in the difference in mean promotion rates between intervention and nonintervention. |
| 31      | Kasirye and Hisali (2010) | Uganda | 6–17 | Enrollment and grade progression | Children were HIV/AIDS orphans | HIV orphans vs. non-HIV orphans | Cross-sectional data, N = 1244, probit regression | No | No | No | HIV/AIDS orphans were about three years behind their appropriate grade. Poor HIV/AIDS orphans are likely to fall behind their appropriate grade. |
| Ref no. | Author (year) | Country     | Children’s age (years) | Education variable                        | HIV status or testing | Comparisons                      | Methods                  | Gender comparison of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results                                                                                                                                                                                                 |
|--------|---------------|-------------|------------------------|------------------------------------------|----------------------|----------------------------------|--------------------------|-----------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 32     | Kembo         | Zimbabwe    | 10–18                  | Dropout, attendance, and absenteeism     | Children were AIDS orphans or lived with a chronically-ill person | HIV-affected children vs. HIV-unaffected children | Cross-sectional data, N = 386, t-test | Yes                                           | No                                                | No                                                | About 72% of HIV-affected children were not in school compared to about 29% of HIV-unaffected children. The main reason was lack of money. About 13% of HIV-affected children were not in school because they did not have birth certificates. |
| 33     | Kidman et al. | Malawi      | 6–14                   | Enrollment and highest grade level attained | Children living with a parent with an AIDS-related illness were identified | Orphans vs. nonorphans | Cross-sectional data, N = 13,090, logistic and linear multilevel regression | No                                            | Yes                                            | Yes                                               | There is little evidence that living with a chronically ill parent or in a household experiencing a recent adult death negatively impacts children’s enrollment or grade attainment. Double and maternal orphans experience more educational deprivation compared to nonorphans. Being a maternal orphan, a stronger impact on enrollment on boys compared to girls. |
| 34     | Kitara et al. | Uganda      | 12–15                  | Attitude toward education               | Children were AIDS orphans | HIV-orphans vs. non-HIV-orphans vs. nonorphans | Cross-sectional data, N = 255, t-test, ANOVA, Pearson’s correlation, logistic regression | No                                            | Yes                                            | No                                                | Nonorphans had a more positive attitude toward education. Non-HIV orphaned girls had more positive attitude toward school compared to HIV orphaned girls. This is attributed to HIV/AIDS-related stigma. |
| Ref no. | Author (year) | Country     | Children’s age (years) | Education variable | HIV status or testing | Comparisons | Methods                        | Gender comparison of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results                                                                 |
|--------|---------------|-------------|------------------------|--------------------|----------------------|-------------|-------------------------------|--------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------|
| 35     | Lucas et al.  | Zambia      | 7–15                   | Enrollment and correct grade for age | Children lived in households with HIV-positive adults vs. children in households with non-HIV-positive heads | Cross-sectional data, $N = 12,128$, difference in difference regression | No | Yes | Yes | Children who live in households with HIV positive household heads were more likely to be attending school. |
| 36     | Luseno et al. | Zimbabwe    | 15–21                  | Dropout and years of schooling | Children’s HIV status were provided vs. Orphans vs. nonorphans | Cross-sectional and RCT, $N = 751$, logistic regression | No | No | No | Participants of experimental program had lower chances of school dropout compared to orphans from a nationally representative household survey. |
| 37     | Mayes et al.  | USA         | 5–17                   | Grades and absenteeism | 18 boys were HIV positive vs. HIV-negative hemophilic boys | Cross-sectional data, $N = 66$, t-test, Pearson’s correlation coefficients | No | No | No | All 66 boys who participated in the study were boys diagnosed with hemophilia. HIV-positive boys missed more school days (14.8%) compared to HIV-negative boys (7.9%). Academic grades did not suffer significantly between the two groups. |
| 38     | Mialky et al. | USA         | 5–18                   | Grade repetition     | Children were found to be HIV-positive | Cross-sectional data, $N = 85$, descriptive statistics | No | No | No | About 24% of HIV-infected children repeated at least one grade. 13.2% of caregivers described school performance of children as below average. The mean number of absences reported by caregivers was 5.2 times. |
| Ref no. | Author(s) (year) | Country | Children's age (years) | Education variable | HIV status or testing | Comparisons | Methods | Mixed-methods study | Gender comparison of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results |
|---------|------------------|---------|------------------------|--------------------|----------------------|-------------|---------|------------------|--------------------------------|--------------------------------|----------------|
| 39      | Mishra et al. (2007) | Kenya   | 6–14                   | Attendance         | Parents and children were tested during survey | Orphans vs. fostered children vs. children with HIV-positive parents | Cross-sectional data, $N = 6928$, logistic regression | No                 | No               | Yes                 | Orphaned children and fostered children are less likely to be attending school than children of HIV-negative parents. Children of HIV-positive parents are less likely to be attending school than children of HIV-negative parents. |
| 40      | Mokgatle and Madiba (2015) | South Africa | 5–17                  | Attendance         | Children were HIV-infected | None          | Cross-sectional data, $N = 406$, descriptive statistics | No                 | No               | No                  | There were no differences in schooling between HIV orphans and non-HIV-related children. However, there were differences in dropout, absenteeism, and enrollment. |
| 41      | Mon et al. (2013) | Myanmar | 6–17                   | Attendance, dropout, absenteeism, and enrollment | Children were AIDS orphans | HIV orphans vs. non-HIV-related children | Cross-sectional data, $N = 600$, descriptive statistics, $t$-tests | No                 | No               | Yes                 | There were no differences in schooling between in HIV orphans and non-HIV-related children. However, there were differences in dropout, absenteeism, and enrollment. |
| 42      | Nicholson et al. (2015) | Zambia | 6–12                   | Maths and English grades | Mothers were HIV-positive and children were exposed to HIV in utero | HIV-exposed children (in utero) vs. HIV-unexposed children | Longitudinal data, $N = 390$, linear regression model | No                 | No               | Yes                 | HIV-exposed children had lower math grades than HIV-unexposed children; however, there were no differences in English grades. |
| 44      | Orkin et al. (2014) | South Africa | 11–25                 | Attendance, enrollment, and grade progression | HIV/AIDS-related deaths required a conservative threshold of three or more HIV/AIDS defining symptoms | None          | Longitudinal data, $N = 723$, maximum likelihood estimation, Bayesian estimation, standardized regression | No                 | Yes              | No                  | Neither caregiver HIV/AIDS-sickness nor HIV/AIDS orphanhood was associated with nonenrollment, nonattendance, concentration problems, or grade progression. Caregiver sickness was indirectly associated with nonenrollment educational variables through internalizing problems and poverty. Boys reported more concentration problems and difficulties with grade progression. |
| Ref no. | Author (year) | Country | Children’s age (years) | Education variable | HIV status or testing | Comparisons | Methods | Gender comparison of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results |
|--------|---------------|---------|-----------------------|-------------------|---------------------|-------------|---------|-------------------------------------------|-----------------------------------------------|--------------|
| 45     | Osuji et al. (2018) | Uganda | 13.8 years | Attendance and academic attendance | None | Longitudinal, $N = 346$, multivariate regression analyses | No | No | Yes | Family cohesion, support from classmates was associated with more days of attending school. Support from caregivers, friends, and classmates was associated with fewer days of missed school. |
| 46     | Parchure et al. (2016) | India | 6–16 | Enrollment, dropout, and correct grade for age | Children were infected with HIV or had one or both parents infected with HIV (living or dead) | HIV-infected vs. HIV-affected | Cross-sectional data, $N = 472$, logistic regression | No | No | Yes | HIV-infected children were seven times more likely to be out of school compared to HIV-affected children. HIV-infected and maternal orphans were 2.82 and nine times more likely to not be in the correct grade for age, respectively. Child illness was that most common reason for low educational attainment. |
| 48     | Pufall et al. (2014a) | Zimbabwe | 6–17 | Attendance and correct grade for age | HIV tests were conducted on children aged 2–17 | Vulnerable children (i.e., HIV-positive, orphans, or had HIV-positive parents) vs. nonvulnerable children | Cross-sectional data, $N = 4577$, logistic regression | No | Yes | Yes | Vulnerable Children are likely to be in correct grade for age but not in regular attendance. Older children were less likely to be in correct grade for age. Females were more likely to be in the correct grade for age compared to males. Being HIV-positive was not associated with any education measures in youth and children. Young carers were less likely to attend secondary school. Orphans were less likely to be in the correct grade for age. |
| 49     | Pufall et al. (2014b) | Zimbabwe | 6–24 | Completion of primary school, attendance, and correct grade for age | HIV tests were conducted on children aged 2–17 | HIV-positive children vs. children with HIV positive parents vs. orphans vs. young carers | Cross-sectional data, $N = 5520$, logistic regression | No | No | No | (Continued) |
| Ref no. | Author (year) | Country | Children’s age (years) | Education variable | HIV status or testing | Comparisons | Methods | Gender comparison of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results |
|---------|---------------|---------|-----------------------|--------------------|---------------------|-------------|---------|--------------------------------|--------------------------------|-------------|
| 50 Ryder et al. (1994) | D.R. Congo | 0–15 | Dropout | Mothers were HIV-positive | HIV maternal orphans vs. children with HIV-positive mothers vs. children with HIV-negative mother | Longitudinal data, N = 78, Yates’ corrected chi-square test, and Fisher’s exact test | No | No | No | 55.6% of maternal orphans were forced to withdraw from school compared to 25.0% of children with HIV-positive mothers and 40% of children of HIV-negative mothers. |
| 51 Sherr et al. (2017) | Malawi and South Africa | 5–15 | Enrollment, attendance, and correct grade for age | Child HIV status was determined using caregiver reports | HIV-positive children vs. HIV-negative children with/without receipt of cash grant | Longitudinal data, N = 854, t-test, chi-square test, logistic regression, and multivariate regression | No | No | No | Among HIV-positive children, receiving a cash grant was associated with much more struggling in school than children who did not receive a grant. No effect was found on attendance, being in correct grade for age, or being a quick learner. |
| 53 Souza et al. (2010) | Brazil | 10–19 | Attendance, dropout, and failure | Children were HIV-positive | Adolescents with high viral loads vs. adolescents with low viral loads | Cross-sectional data, N = 49, ANOVA, t-test, chi-square test, and Fisher’s exact test | No | No | No | School failure and school dropout were reported by 51% and 28.6% of all participants. However, 30.8% of adolescents with a low viral load and 26.1% of those with high viral load reported school dropout. 46.2% of adolescents with high viral load and 56.5% of children with high viral load reported school failure. |

(Continued)
| Ref no. | Author (year) | Country | Children’s age (years) | Education variable | HIV status or testing | Comparisons | Methods | Gender comparison of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results |
|---------|---------------|---------|------------------------|--------------------|----------------------|-------------|---------|---------------------------------------------|-------------------------------------------------|-------------|
| 54      | Ssewamala and Ismayilova (2009) | Uganda | 11–17 | Attendance and grades | Experimental group orphans vs. comparison group orphans | RCT, N = 277, analysis of variance | No | No | No | There was a 27-percentage point increase in experimental group’s certainty of accomplishing educational plans. The intervention did not have a significant effect on school attendance. |
| 55      | Ssewamala et al. (2018) | Uganda | 12 years (average) | Dropout and attendance | Experimental group orphans vs. comparison group orphans | RCT, N = 1410, multilevel regression | No | No | No | On average, adolescents receiving both interventions showed lower dropout rates, higher likelihood to take national exam, and score higher on the exam. However, intervention effects were not statistically significant. |
| 56      | Toska et al. (2019) | South Africa | Adolescents <18 years | Absenteeism and correct grade for age | Adolescents living with HIV vs. uninfected adolescents | Cross-sectional data, N = 1519, multivariate regression | No | No | No | Having disease burden resulted in more frequent need to miss school to attend clinics. |
| 57      | Tu et al. (2009) | China | 6–18 | Grades | Orphans/children with HIV positive parent vs. nonorphan | Cross-sectional data, N = 1625, linear regression model | No | No | No | Orphans had lower grades compared to children with HIV-infected parents and children with HIV-negative parents. There was no difference in educational expectation or student leadership. |
| 58      | Xu et al. (2010a) | China | 8–17 | Attendance dropout and | HIV-affected vs. HIV-unaffected | Cross-sectional data, N = 225, multivariate regression | No | No | No | Children living with grandparents reported higher scores in school functioning. Caregiver spending more time accompanying the child increased school functioning. |

(Continued)
| Ref no. | Author (year) | Country | Children’s age (years) | Education variable | HIV status or testing | Comparisons | Methods | Mixed-methods study | Gender comparison of educational attainment | Effects of parental HIV/AIDS on educational attainment | Main results |
|---------|---------------|---------|------------------------|--------------------|----------------------|-------------|---------|-------------------|---------------------------------------------|-----------------------------------------------|-------------|
| 59      | Xu et al. (2010b) | China   | 8–18                   | Attendance and dropout | Participants were recruited through health service providers who treat HIV-positive patients. | HIV-affected vs. HIV-unaffected children and caregivers | Cross-sectional data, N = 225, chi-square test | No     | No               | No                                          | 19% of HIV-unaffected children and 15% HIV affected children dropped out of school. |
| 60      | Xu et al. (2010c) | China   | 8–18                   | Attendance and dropout | Children had at least one HIV-positive parent or had lost on or both parents to AIDS. | Orphans vs. nonorphans | Cross-sectional data, N = 266, descriptive statistics | No     | No               | No                                          | 75% of nonorphans and 73.4 of orphans were attending school, whereas 25% of nonorphans and 26.6% of orphans dropped out of school. |
| 61      | Yang et al. (2006) | China   | 0–15                   | Attendance, truancy, and dropout | Rural household members contracted HIV through drug use | Orphans vs. nonorphans | Cross-sectional data, N = 266, chi-square test, Fisher’s exact test | No     | No               | No                                          | HIV-infected drug users between 16 and 50 years old were recruited. Orphans and older children between 6 and 15 years old were less likely to attend school and skip class compared to nonorphans. |
| 62      | Zivin et al. (2009) | Kenya   | 8–18                   | Attendance | Parents were on ARV treatment | Experimental group of HIV/AIDS affected children vs. comparison group of HIV/AIDS affected children | Longitudinal data, N = 480, quasi-experimental design, fixed effects | No     | Yes             | Yes                                         | There is a similar increase over time in school attendance for children in early-stage ARV households, relative to children in later-stage ARV households. Children in later-stage ARV households do not experience any significant change in attendance. ARV treatment effects are large and significant in early stages of ARV treatment for girls and not significant for boys. |
| Ref no. | Author (year)       | Country       | Method                                                                 | HIV-positive population/HIV-testing Description | Education variable | Mixed-methods study | Results                                                                 |
|--------|---------------------|---------------|------------------------------------------------------------------------|-----------------------------------------------|--------------------|---------------------|-------------------------------------------------------------------------|
| 2      | Anabwani et al. (2016) | Botswana      | Focus group discussions                                                | Children had documented HIV results           | Attendance         | Yes                 | HIV-infected children reported no major problem in school. However, some reported missing school for medical reasons. |
| 4      | Bandason et al. (2013) | Zimbabwe      | Focus group discussions, informal interviews, and exit interviews       | Children were HIV-infected                    | Attendance         | Yes                 | HIV-infected children missed school.                                    |
| 7      | Cluver et al. (2012)  | South Africa  | Interviews                                                              | Children lived in a household with an AIDS-ill individual | Attendance and dropout | Yes                 | Children missed school or dropped out of school to care for sick adults. |
| 13     | Fauk et al. (2017)   | Tanzania      | In-depth interviews                                                     | Children were HIV/AIDS orphans                | Attendance, dropout | No                  | Participants did not send their children to school due to school fees and other school-related expenses. |
| 17     | Grant (2008)         | Malawi        | Interviews                                                              | Mothers were tested for HIV                   | Enrollment and attendance | Yes                 | Parents were committed to ensure that their children were enrolled in school, while their children’s matters were still in their control. |
| 19     | Harms et al. (2010)  | Uganda        | Interviews                                                              | Youth had lost or both parents to HIV/AIDS    | Attendance and absenteeism | No                  | Six of the youth were not attending school at the time of the study. The most poignant losses were actual death of parent and loss of educational opportunities. The time of parental sickness was marked by extended periods of absenteeism. |
| 22     | Hartell and Chabilall (2005) | South Africa  | Case studies                                                            | Adolescents were AIDS orphans                 | Attendance and dropout | No                  | Two of the participants’ attendance was affected due to taking care of their critically ill parents, but attendance increased after death of parents. Two of the participants dropped out of school due to pregnancy. |
| 24     | Henning et al. (2016) | Zambia        | Focus group discussions and interviews                                   | Children have lost one or more parents to HIV/AIDS or have a parent or household member who’s been sick for three months or more | Attendance         | Yes                 | Households with HIV/AIDS-affected children were more likely to have all HIV/AIDS-affected children attending school if all of the HIV/AIDS-affected children were relate to household head. Key informant interviews focused on two key themes connected to school attendance: (1) training and (2) stigma. Teachers were overwhelmed by the number of HIV/AIDS-affected children. |
| Ref no. | Author (year)          | Country          | Method                        | HIV-positive population/HIV-testing | Description                                                                 | Education variable                        | Mixed-methods study | Results                                                                 |
|--------|------------------------|------------------|-------------------------------|-------------------------------------|------------------------------------------------------------------------------|---------------------------------------------|---------------------|------------------------------------------------------------------------|
| 27     | Jepkemboi and Aldridge (2009) | Kenya            | Interviews                    | Children had HIV-positive parents or were AIDS orphans | 12 teachers and eight caregivers from seven orphanages were interviewed | Attendance, math, science, and language grades | No                  | No gender differences were noted in preschool. However, for older children, boys performed better in math and science and girls were believed to be better in languages. Girls were likely to be taken out of school to take care of family needs when a parent became ill. |
| 28     | Jepkemboi and Aldridge (2014) | Kenya            | Interviews                    | Children were HIV/AIDS orphans or had at least one HIV/AIDS-ill parent | 12 teachers and eight caregivers from seven orphanages participated in study | Attitude toward school                      | No                  | A majority of children do not like to come to school. Teachers noticed that children's attitude toward school improves after two years being in orphanage. Girls were more persistent and had a more positive attitude. |
| 29     | Jere (2012)            | Malawi           | Focus group discussions and interviews | Children are HIV-positive, have lost one parent to AIDS, children have an HIV/AIDS-ill parent or guardian, or live in a household affected by HIV/AIDS | Key informant interviews were performed on teachers and school heads | Dropout, absenteeism, pupil promotion | Yes                  | Teachers attested that pupils targeted but the intervention became more capable and confident learners. Evidence from the interviews showed that this was a result of pupils' perception of their improved competency in English and Mathematics. |
| 30     | Kakooza and Kimuna (2006) | Uganda           | Focus group discussions       | Children were HIV/AIDS orphans     | 12 focus group discussions were held from two subcounties. Participants were heads of household, grandparents, caring or HIV/AIDS orphans, and were aged 50 years or over | Attendance, dropout                        | No                  | Grandparents had difficulty providing for children's education |
| 32     | Kembo (2010)           | Zimbabwe         | Semi-structured interviews and letter writing | Children were AIDS orphans or lived with a chronically ill person | Semi-structured interviews were conducted with children (aged 10–18 years). 12 children were asked to write letters to their parents, regardless of their survival status and tell them how they feel about their lives. | Dropout, attendance, absenteeism          | Yes                  | Qualitative data show that some children affected by HIV/AIDS lack money to attend school. They also face hunger that affects their performance in school. |
| 43     | Nyasani et al. (2009)  | South Africa     | Focus group discussions and interviews | Grandparents were registered as foster-careers to orphans affected by HIV/AIDS | Focus group discussions were conducted with a total of 45 participants. The groups were included elderly female foster-careers, community leaders, urban and rural elderly foster-careers. In-depth and key informant interviews were also performed. | Educational needs                         | No                  | Rural grandparents were concerned with meeting educational needs of children. The data revealed that the prospects for orphans' tertiary education were disquieting for both rural and urban grandparents. |
| Ref no. | Author (year)          | Country          | Method                  | HIV-positive population/HIV-testing | Description                                                                                                                                                                                                 | Education variable | Mixed-methods study | Results                                                                                           |
|--------|------------------------|------------------|-------------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 47     | Poulsen (2006)         | South Africa and Eswatini | Semi-structured interviews | Children were HIV/AIDS orphans, had parents who were AIDS-ill, or were HIV-infected | Interviews were conducted with head teachers, teachers, parents and caregivers, school committee members, members of Orphans and Vulnerable Children Committees, members of Child Care Forums, students, and out-of-school children | Attendance         | No                  | Children affected by HIV/AIDS were missing school or dropping out due to parental illness, abuse, disrupted family lives, lack of money, lack of support from home, living with grandparents, and household duties. |
| 52     | Skovdal and Ogutu (2009)| Kenya            | Case studies            | Children provide care for people chronically ill from AIDS | Data collection involved photography and three highlighted case studies                                                                                                                                   | Grade repetition and dropout | No                  | Being a child carer compromised education, for example, through grade repetition and dropout. Young carers juggle household duties, caregiving, and education. |
Appendix C

The MMAT used in this study can be found on this link:
https://mixedmethodsappraisaltoolpublic.pbworks.com/w/file/fetch/84371689/MMAT%202011%20criteria%20and%20tutorial%202011-06-29updated2014.08.21.pdf

There are four criteria (in question format) to be met for each qualitative or quantitative study component. A score of 25% is assigned for each criterion met. For mixed-methods study papers, there is an additional mixed-methods study component that contains three criteria. A score of 0 in the mixed-methods study component is equivalent to a score of 1 (or 25%) in the other study components; a score of 1 in the mixed-methods study component is equivalent to a score of 2 (or 50%); etc. (Pluye et al., 2011). The overall quality score for a mixed-methods paper is the lowest score of any of the three (qualitative, quantitative, or mixed) study components. For example, if the qualitative component of a mixed-methods study has a score of 2, the quantitative component has a score of 2, and the mixed-methods component has a score of 0, then overall score will be 25%.
Quality Assessment for Quantitative Studies Using the Mixed-Methods Appraisal Tool.

| Ref. no. | Author (year)            | Type of study       | Is there good description of randomization/minimum selection bias/ relevant sampling strategy? | Is there clear description of allocation concealment/appropriate measurements/representative sample? | Are there complete outcome data/comparable participants/appropriate measurements? | Is there low dropout rate/complete outcome data/acceptable response rate? | Score |
|----------|-------------------------|---------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------|
| 1        | Akbulut-Yuksel and Turan (2013) | Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 2        | Aspaas (1999)            | Descriptive         | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | I can’t tell                                                                     | 75%   |
| 5        | Bele et al. (2011)       | Nonrandomized       | I can’t tell                                                                                   | Yes                                                                                              | Yes                                                                             | No                                                                               | 50%   |
| 6        | Bhargava (2005)          | Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 8        | Cluver et al. (2013)     | Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 9        | Cohen et al. (1997)      | Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 10       | Curley et al. (2010)     | Nonrandomized       | No                                                                                             | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 11       | Delva et al. (2009)      | Nonrandomized       | No                                                                                             | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 75%   |
| 12       | Ellis (2004)             | Descriptive         | No                                                                                             | No                                                                                               | No                                                                              | Yes                                                                              | 50%   |
| 14       | Floyd et al. (2007)      | Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 15       | Fofana et al. (2014)     | Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | No                                                                               | 75%   |
| 16       | Fosco et al. (2018)      | Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 18       | Gupta et al. (2013)      | Nonrandomized       | No                                                                                             | No                                                                                               | No                                                                              | I can’t tell                                                                     | 0%    |
| 20       | Harrison et al. (2017)   | Randomized          | No                                                                                             | Yes                                                                                              | I can’t tell                                                                    | I can’t tell                                                                     | 25%   |
| 21       | Harrison et al. (2018)   | Randomized          | No                                                                                             | Yes                                                                                              | I can’t tell                                                                    | I can’t tell                                                                     | 25%   |
| 23       | Henning et al. (2018)    | Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 25       | Hensels et al. (2016)    | Nonrandomized       | Yes                                                                                           | No                                                                                               | I can’t tell                                                                    | Yes                                                                              | 100%  |
| 26       | Hong (2011)              | Nonrandomized       | No                                                                                             | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 31       | Kasirye and Hisali (2010)| Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 33       | Kidman et al. (2012)     | Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 34       | Kitara et al. (2013)     | Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 35       | Lucas et al. (2019)      | Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 36       | Luseno et al. (2015)     | Randomized          | Yes                                                                                           | I can’t tell                                                                                     | No                                                                              | Yes                                                                              | 50%   |
| 37       | Mayes et al. (1996)      | Descriptive         | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 38       | Mialky et al. (2001)     | Descriptive         | Yes                                                                                           | I can’t tell                                                                                     | No                                                                              | No                                                                               | 25%   |
| 39       | Mishra et al. (2007)     | Nonrandomized       | Yes                                                                                           | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 100%  |
| 40       | Mokgatle and Madiba (2015)| Descriptive         | Yes                                                                                           | No                                                                                               | Yes                                                                             | Yes                                                                              | 100%  |
| 41       | Mon et al. (2013)        | Nonrandomized       | Yes                                                                                           | No                                                                                               | No                                                                              | I can’t tell                                                                     | 25%   |
| 42       | Nicholson et al. (2015)  | Nonrandomized       | No                                                                                             | Yes                                                                                              | Yes                                                                             | Yes                                                                              | 75%   |

(Continued)
### Methodological quality criteria for randomized/nonrandomized/descriptive studies

| Ref. no. | Author (year)             | Type of study | Is there good description of randomization/minimum selection bias/relevant sampling strategy? | Is there clear description of allocation concealment/appropriate measurements/representative sample? | Are there complete outcome data/comparable participants/appropriate measurements? | Is there low dropout rate/complete outcome data/acceptable response rate? | Score |
|----------|---------------------------|---------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------|
| 44       | Orkin *et al.* (2014)    | Nonrandomized | No                                                                                           | Yes                                                                                           | Yes                                                                              | Yes                                                                              | 75%   |
| 46       | Parchure *et al.* (2016) | Nonrandomized | I can’t tell                                                                                | Yes                                                                                           | Yes                                                                              | I can’t tell                                                                     | 50%   |
| 45       | Osuji *et al.* (2018)    | Randomized    | No                                                                                           | Yes                                                                                           | Yes                                                                              | No                                                                               | 50%   |
| 48       | Pufall *et al.* (2014a)  | Nonrandomized | Yes                                                                                           | Yes                                                                                           | Yes                                                                              | Yes                                                                              | 100%  |
| 49       | Pufall *et al.* (2014b)  | Nonrandomized | Yes                                                                                           | Yes                                                                                           | Yes                                                                              | Yes                                                                              | 100%  |
| 50       | Ryder *et al.* (1994)    | Nonrandomized | Yes                                                                                           | Yes                                                                                           | Yes                                                                              | I can’t tell                                                                     | 75%   |
| 51       | Sherr *et al.* (2017)    | Nonrandomized | No                                                                                           | No                                                                                           | I can’t tell                                                                     | I can’t tell                                                                     | 0%    |
| 53       | Souza *et al.* (2010)    | Nonrandomized | Yes                                                                                           | Yes                                                                                           | Yes                                                                              | Yes                                                                              | 100%  |
| 54       | Ssewamala *et al.* (2018)| Randomized    | Yes                                                                                           | Yes                                                                                           | Yes                                                                              | Yes                                                                              | 100%  |
| 55       | Ssewamala *et al.* (2018)| Randomized    | Yes                                                                                           | Yes                                                                                           | Yes                                                                              | Yes                                                                              | 100%  |
| 56       | Toska *et al.* (2019)    | Nonrandomized | Yes                                                                                           | Yes                                                                                           | Yes                                                                              | Yes                                                                              | 100%  |
| 57       | Tu *et al.* (2009)       | Nonrandomized | Yes                                                                                           | Yes                                                                                           | Yes                                                                              | Yes                                                                              | 100%  |
| 58       | Xu *et al.* (2010a)      | Nonrandomized | No                                                                                           | Yes                                                                                           | Yes                                                                              | I can’t tell                                                                     | 75%   |
| 59       | Xu *et al.* (2010b)      | Descriptive   | Yes                                                                                           | No                                                                                           | Yes                                                                              | I can’t tell                                                                     | 25%   |
| 60       | Xu *et al.* (2010c)      | Descriptive   | Yes                                                                                           | No                                                                                           | Yes                                                                              | Yes                                                                              | 75%   |
| 61       | Yang *et al.* (2006)     | Nonrandomized | No                                                                                           | Yes                                                                                           | Yes                                                                              | Yes                                                                              | 75%   |
| 62       | Zivin *et al.* (2009)    | Nonrandomized | No                                                                                           | Yes                                                                                           | Yes                                                                              | I can’t tell                                                                     | 50%   |
Quality Assessment for Mixed-Methods Studies Using the Mixed-Methods Appraisal Tool.

| Ref. no. | Author (year) | Type | Methodological quality criteria for randomized/ nonrandomized/ descriptive studies | Methodological quality criteria for qualitative component of mixed-methods studies | Methodological quality criteria for mixed-methods studies |
|----------|---------------|------|-----------------------------------|-------------------------------------|-----------------------------------------------|
| 2        | Anabwani et al. (2016) | Quantitative descriptive and qualitative nonrandomized and qualitative | Yes | Yes | Yes | Yes | Yes | I can't tell | Yes | Yes | No | 75% |
| 4        | Bandason et al. (2013) | Qualitative nonrandomized and qualitative nonrandomized and qualitative | Yes | Yes | Yes | I can't tell | Yes | Yes | Yes | I can't tell | No | Yes | No | 50% |
| 7        | Chiver et al. (2012) | Quantitative nonrandomized and qualitative nonrandomized and qualitative | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes | 75% |
| 17       | Grant (2008) | Quantitative nonrandomized and qualitative nonrandomized and qualitative | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | 100% |
| 24       | Henning et al. (2016) | Quantitative nonrandomized and qualitative nonrandomized and qualitative | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | 75% |
| 29       | Jere (2012) | Quantitative nonrandomized and qualitative nonrandomized and qualitative | Yes | Yes | No | Yes | I can’t tell | Yes | Yes | Yes | Yes | Yes | No | 75% |
| 32       | Kembo (2010) | Quantitative descriptive and qualitative descriptive and qualitative | No | Yes | No | Yes | No | Yes | I can’t tell | Yes | Yes | I can’t tell | 50% |
### Quality Assessment of Qualitative Studies Using the Mixed-Methods Appraisal Tool.

| Ref. no. | Author (year)                      | Are sources of data relevant? | Is the process of analyzing data relevant? | Is consideration given to how findings relate to context? | Is consideration given to how findings relate to researchers’ influence? | MMAT score |
|----------|-----------------------------------|-------------------------------|-------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------|------------|
| 13       | Fauk et al. (2017)                | Yes                           | Yes                                       | Yes                                                      | I can’t tell                                                             | 75%        |
| 19       | Harms et al. (2010)               | Yes                           | Yes                                       | Yes                                                      | Yes                                                                     | 100%       |
| 22       | Hartell and Chabilall (2005)      | Yes                           | Yes                                       | Yes                                                      | I can’t tell                                                             | 75%        |
| 27       | Jepkemboi and Aldridge (2009)     | Yes                           | Yes                                       | Yes                                                      | No                                                                      | 75%        |
| 28       | Jepkemboi and Aldridge (2014)     | Yes                           | Yes                                       | I can’t tell                                             | No                                                                      | 50%        |
| 30       | Kakooza and Kimuna (2006)         | Yes                           | Yes                                       | Yes                                                      | Yes                                                                     | 100%       |
| 43       | Nyasani et al. (2009)             | Yes                           | Yes                                       | Yes                                                      | Yes                                                                     | 100%       |
| 47       | Poulsen (2006)                    | Yes                           | Yes                                       | I can’t tell                                             | I can’t tell                                                             | 50%        |
| 52       | Skovdal and Ogutu (2009)          | Yes                           | Yes                                       | I can’t tell                                             | Yes                                                                     | 75%        |
### Appendix D

Prisma 2009 Checklist

| Section/topic                  | # | Checklist item                                                                                   | Reported on page # |
|-------------------------------|---|--------------------------------------------------------------------------------------------------|-------------------|
| **TITLE**                     | 1 | Identify the report as a systematic review, meta-analysis, or both.                              | 1                 |
| **ABSTRACT**                  | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. | 1                 |
| **INTRODUCTION**              | 3 | Describe the rationale for the review in the context of what is already known.                    | 2                 |
| Rationale                     | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). | 3                 |
| **METHODS**                   | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number. | 4                 |
| Protocol and registration     | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. | 4                 |
| Eligibility criteria          | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. | 4                 |
| Information sources           | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. | 5                 |
| Search                        | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | 5                 |

(Continued)
Continued.

| Section/topic                          | #  | Checklist item                                                                                                                                                                                                 |
|---------------------------------------|----|-------------------------------------------------------------------------------------------------------------------------------- Eve Entertainment the educational attainment of children due to HIV/AIDS. |
| Data collection process               | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. |
| Data items                            | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.                        |
| Risk of bias in individual studies    | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. |
| Summary measures                      | 13 | State the principal summary measures (e.g., risk ratio, difference in means).                                                                                                                                 |
| Synthesis of results                  | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I²) for each meta-analysis.        |
| Risk of bias across studies           | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).               |
| Additional analyses                   | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, metaregression), if done, indicating which were prespecified.             |

**RESULTS**

| Study selection                       | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. |
| Study characteristics                 | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.                      |
| Risk of bias within studies           | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).                                                                                                           |
| Results of individual studies         | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. |
| Synthesis of results                  | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency.                                                                                                           |
| Section/topic                  | # | Checklist item                                                                 | Reported on page # |
|-------------------------------|---|--------------------------------------------------------------------------------|-------------------|
| Risk of bias across studies   | 22| Present results of any assessment of risk of bias across studies (see Item 15).   |                   |
| Additional analysis           | 23| Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, metaregression [see Item 16]). |                   |
| DISCUSSION                    |   |                                                                                  |                   |
| Summary of evidence           | 24| Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). | 12                |
| Limitations                   | 25| Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias). | 13                |
| Conclusions                   | 26| Provide a general interpretation of the results in the context of other evidence, and implications for future research. | 13                |
| FUNDING                       |   |                                                                                  |                   |
| Funding                       | 27| Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. |                   |

*From: Moher et al. (2009).*

**Appendix E**

**Review Protocol**

**Review title:** Effects of HIV on Children’s Educational Attainment: A Systematic Literature Review

**Review question(s):** What are the effects of HIV on children’s schooling outcomes? Specifically,

1. What are the effects on HIV-affected children?
2. What are the effects of HIV on gender gaps in educational outcomes?
3. What are the effects of HIV on intergenerational (parent-to-child) transmission of education in case of HIV/AIDS?

**Searches**

Main Databases: PubMed, ERIC, EconLit, SocIndex, and WoS. Supplementary database: Google Scholar
Keywords
HIV/AIDS, children, education, intergenerational transmission, human capital investment

Types of study to be included
Peer-reviewed papers, papers, and reports from international organizations. There is no time restriction. Papers will be included if they examine the relationship between HIV (or being HIV-affected through parents being sick or parental death) and educational attainment. Papers will be excluded if there is no confirmation of HIV-infection or AIDS death.

Condition or domain being studied
The disease being examined is HIV infection and the outcome is schooling, that is, school enrollment, dropout, absenteeism, and correct grade for age.

Participants/population
The participants are school-going aged children (orphans and nonorphans), HIV-infected parents, and caregivers/guardians for HIV-infected children.

Intervention(s), exposure(s)
Papers that confirm HIV-infection or AIDS-related death (of parents) and papers that have interventions that target or translate to educational outcomes of children affected by HIV.

Comparator(s)/control
HIV-negative children (orphans and nonorphans), HIV-negative parents/guardians, and HIV-positive or HIV-negative children of the opposite gender.

Context
Papers that discuss cognitive issues in HIV-infected children and those that discuss HIV risk will be excluded.

Outcome(s)
Primary outcomes
Educational outcomes: years of schooling, enrollment, school dropout, absenteeism, correct grade for age, school grades, and school progression.

Data extraction (selection and coding)
This review follows the guidelines of the PRISMA. Papers will be selected by title and then exported to EndNote. Two reviewers will filter papers by abstract to select papers for full text reading.

Risk of bias assessment
The quality of the papers selected for the review was assessed using the MMAT (Pluye et al., 2011). The MMAT is used for complex systematic literature reviews that include quantitative, mixed-methods, and qualitative studies. It accounts for five common methodologies, qualitative (Section 1), quantitative randomized (Section 2), quantitative nonrandomized (Section 3), descriptive (Section 4), and mixed (Section 5). Each section is composed of three to four questions related to data sources, data collection, and outcome data. A quality score between 0% and 100% is assigned for each study component. An answer of “yes,” “no,” or “I can’t tell” is assigned for each question in the corresponding study component. Papers of good quality met all criteria (i.e., had a score of 100%) and papers of poor quality did not meet any criteria (i.e., had a score of 0%).

Analysis of subgroups or subsets
None

Dissemination plans
The review will be published in a peer-reviewed journal for academics, policy workers, and members of civil society.
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Organizational affiliation of the review
United Nations University-MERIT and Maastricht University School of Governance

Funding sources
N/A

Conflicts of interest
None

Collaborators/review team
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Professor Wim Groot, Maastricht University and United Nations University-Merit
Associate Professor Milena Pavlova, Maastricht University, Maastricht University

Language
English

Country
The Netherlands

Stage of review
Complete

Stage of review at time of this submission

| Activity                                                      | Started | Completed |
|---------------------------------------------------------------|---------|-----------|
| Preliminary searches                                          | Yes     | Yes       |
| Piloting of the study selection process                      | Yes     | Yes       |
| Formal screening of search results against eligibility criteria | Yes     | Yes       |
| Data extraction                                               | Yes     | Yes       |
| Quality assessment                                            | Yes     | Yes       |
| Data analysis                                                 | Yes     | Yes       |