HHS Public Access

Author manuscript

Lancet HIV. Author manuscript; available in PMC 2024 June 01.

Published in final edited form as:

Lancet HIV. 2023 June ; 10(6): e394–e403. doi:10.1016/S2352-3018(22)00290-9.

The effects of cash transfer programs on HIV/AIDS prevention and care outcomes: a systematic review and meta-analysis of intervention studies

Nathalia Sernizon Guimarães, PhD[1,§], **Laio Magno, PhD**[1,2], **Adelzon Assis de Paula, PhD**[1], **Miriam Silliman**[3], **Davide Rasella, PhD**[1,4], **James Macinko, PhD**[3], **Luís Eugênio de Souza, PhD**[1], **Inês Dourado, PhD**[1]

[1]Institute of Collective Health, Federal University of Bahia, Salvador, Brazil

[2]Department of Life Sciences, State University of Bahia, Salvador, Brazil

[3]Fielding School of Public Health, University of California, Los Angeles, USA

[4]Barcelona Institute for Global Health, Barcelona, Spain

Summary

Background: Poverty and social inequality are risk factors for poor health outcomes in patients with HIV/AIDS. Trials assessing the impact of cash transfer programs on HIV/AIDS outcomes have yielded divergent findings. This review aimed to summarize evidence to evaluate the effects of cash transfer on HIV/AIDS prevention and care outcomes.

Methods: Following a registered protocol (PROSPERO: CRD42021274452), we searched PubMed, EMBASE, Cochrane Library, LILACS, WHO IRIS, PAHO-IRIS, BDENF, *Sec. Est. Saúde SP, Localizador de Informação em Saúde, Coleciona SUS*, BINACIS, IBECS, CUMED, SciELO, and Web of Science until August 2021. We included randomized controlled trials (RCTs) that evaluated the effects of cash transfer programs on HIV incidence, HIV testing, retention in HIV care and antiretroviral therapy adherence, and conducted risk of bias and quality of evidence assessments using Cochrane Risk of Bias tool and Grading of Recommendations, Assessment, Development and Evaluations (GRADE). A random-effects meta-analysis model was used to combine studies and calculate risk ratios (RR). Subgroup analyses were performed using conditionality types (i.e., school attendance or healthcare).

[§]**Corresponding author:** Institute of Collective Health/Federal University of Bahia, Rua Basilio da Gama, Salvador/BA, 40110-040, nasernizon@gmail.com, Telephone: +55 031 997772844.

Contributors

NSG, LM and ID developed the study concept and designed the study. NSG, AAP and MS designed the investigation and did the data analysis. NSG wrote the first draft of the manuscript. All authors contributed to data interpretation, and reviewed and edited the manuscript. ID supervised the study process. All authors had full access to all data in the study and had the final responsibility for the decision to submit for publication.

Declaration of interests

The authors declare no competing interests. These analyses rely on de-identified, aggregated data and were therefore considered exempt from human subjects' review.

Findings: Sixteen RCTs, which included 5,241 individuals, fulfilled the inclusion criteria. Of these, 13 provided conditionalities for receiving cash transfers. The results showed that receiving a cash transfer was associated with lower HIV incidence when the conditionality was having an HIV test (RR=0.74, 95%CI, 0.56–0.98) and retention in HIV care (RR=1.29; 95%CI, 1.06–1.56). No difference was observed for antiretroviral therapy adherence (RR=1.12; 95%CI, 0.72–1.75).

Interpretation: Cash transfer programs have a positive effect on mitigating HIV incidence and increasing retention in HIV care. These results show the potential of cash transfer programs for HIV prevention and care, especially among people in extreme poverty, and highlight that cash transfer programs must be considered when creating policies for HIV/AIDS control, as indicated by the UNAIDS 95-95-95 Target of the HIV Care Continuum.

Funding: National Institute of Allergy and Infectious Diseases (NAIDS/NIH)

Keywords

Cash transfer programs; HIV; Public policy; Systematic review

Introduction

Globally, the HIV/AIDS pandemic remains an urgent societal challenge[1–4]. Poverty and social inequality exacerbate most HIV/AIDS indicators and act as not only determinants or contributors to new infections[5] but also barriers to effective HIV management; that is, they reduce access to healthcare, retention in HIV care, adherence to antiretroviral therapy (ART), and sustained viral suppression, potentially increasing disease progression[6–7] and mortality[8]. The role of poverty is highlighted by the global distribution of the approximately 37.7 million people living with HIV (PLHIV) worldwide, 85% of whom live in sub-Saharan Africa, Southeast Asia, and Latin America[2]. Moreover, the burden of HIV/AIDS within countries is generally highest in areas of higher poverty[1–4].

Income poverty is a dimension of poverty, and its consequences can affect population health through complex and nonlinear relationships that link socioeconomic status to other health determinants (e.g., housing, nutrition, stable employment, or access to healthcare), including health behaviors[3–4,9]. Observational studies have shown that people with lower incomes and lower education levels are more likely to become infected with HIV, develop more severe complications requiring hospitalization, and are more likely to die from AIDS[10–11].

Government agencies have developed social protection programs to reduce income inequality and improve beneficiaries' access to essential goods, such as healthcare and education[12]. In low- and middle-income countries, some social protection programs include cash transfers that are either conditional (i.e., conditional cash transfers [CCTs]) or provided to beneficiaries without specific requirements beyond eligibility (i.e., unconditional cash transfers [UCTs]). Common CCTs requirements include education (e.g., children attending school) and healthcare (e.g., undergoing an HIV test)[13–15]. Poverty alleviation through CCTs can potentially address economic barriers, lead to better healthcare access, impact credit, increase empowerment among women, and improve mental health. CCTs may impact HIV prevention (e.g., delayed sexual debut, less transactional sex, condom use) and care

outcomes (e.g., access to testing, ART adherence) in different ways. Appendix 1 (p. 01) presents a conceptual model illustrating mechanisms by which CCTs can affect HIV/AIDS prevention and care outcomes.

Cash transfer programs are thought to promote desired health behaviors through several mechanisms. First, they create immediate rewards that encourage individuals to take desired health actions[16]. Second, they reduce the real and opportunity costs of seeking healthcare or attending school. Third, they signal the social desirability of these conditional behaviors by presenting them as positive social norms[14]. Given the potential of cash transfer programs to improve health outcomes, there is a growing interest in evaluating the effects of these programs on HIV/AIDS outcomes. The first clinical trial to address this issue yielded divergent evidence. While Baird et al.[17] indicated that receipt of cash transfers reduced HIV prevalence, Pettifor et al.[18] observed no reduction in HIV incidence among young women.

Previous systematic reviews have yielded conflicting results[19–20]. The pooled evidence included a variety of study designs (both observational and experimental), including a range of cash transfer programs (i.e., government programs and single alone/research studies) aimed at reducing school costs and matched savings programs. Therefore, it was impossible to perform a meta-analysis. Despite their limitations, previous systematic reviews did not separately process data on HIV/AIDS prevention and care.

This study aimed to evaluate the effect of cash transfer programs on HIV/AIDS prevention and care outcomes to inform the decision-making processes of policymakers, healthcare providers, and stakeholders and provide insights into this field of research.

Methods

This systematic review and meta-analysis followed the recommendations of the Cochrane Guidelines for Systematic Reviews of Interventions[21] and was developed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[22]. The study protocol was registered on the PROSPERO platform (#CRD42021274452).

Search strategy and selection criteria

To identify clinical trials evaluating the effects of cash transfers on HIV/AIDS prevention and care outcomes, we searched 15 independent databases: PubMed/MEDLINE, EMBASE, Cochrane Library (Central), Latin American and Caribbean Health Science Information (LILACS), WHO IRIS, PAHO-IRIS, BDENF, *Sec. Est. Saúde SP, Localizador de Informação em Saúde, Coleciona SUS*, BINACIS, IBECS, CUMED, SciELO, and Web of Science. Additionally, we manually searched for randomized clinical trials (RCTs) using the references of the selected studies as a sample.

There were no restrictions on the language, date, document type, or publication status for record inclusion. The literature search was conducted in August 2021. Descriptors were identified in the Medical Subject Headings (MeSH), Health Sciences Descriptors, and EMBASE Subject Headings (Emtree). The search strategy was adapted based on the descriptors in each database, and is presented in Appendix 2 (p. 02-12).

We included RCTs with cluster, parallel, or crossover designs that examined the effect of cash transfers on HIV/AIDS outcomes. Studies that were not eligible for this review included studies that examined healthcare without monetary transfers (e.g., government payments to healthcare providers) or tax incentives and financial incentives that primarily target a specific behavior without the goal of poverty reduction per se, as this is not continuous (e.g., studies that provide initial cost support to participants); studies with more than one intervention where it is not possible to isolate the effect of cash transfer programs; observational studies (i.e., cross-sectional, cohort, case-control and case reports), cost-effectiveness studies, reviews of all types with or without meta-analyses, editorials, letters, qualitative studies, protocols without results, and studies that did not assess the outcomes of interest.

Data analysis

We uploaded the electronic search results from the defined databases to the Rayyan Qatar Computing Research Institute app for systematic reviews[26]. Two reviewers (NSG and MS) independently screened titles and abstracts. These reviewers independently assessed each eligible study to determine whether they met the inclusion criteria. A third independent reviewer (AAP) addressed any discrepancy. To create the extraction table, the following information was collected: first author's name, year of publication, title, journal, country, number of registration trials, type of trial, setting, follow-up time, subject age and sex, CD4+ count, viral load, number of participants in each group, mean and standard deviation of outcome measures at baseline and end of follow-up, and changes in outcome measures from baseline to the end of follow-up (new cases of HIV, HIV test, retention of HIV care ART adherence, HIV/AIDS-related hospitalizations, and all-cause mortality).

We defined a cash transfer program as monetary transfers to poor families or individuals to alleviate poverty and provide social protection. We did not include interventions to reduce school costs only (i.e., scholarships, school uniforms, and school fees) or matched savings accounts that allow families or individuals to save or generate money for specific savings[12, 23–24]. Purchasing power parities (PPPs) are currency conversion rates that attempt to equalize the purchasing power of different currencies by eliminating the differences in price levels between countries. To facilitate comparisons between different studies, cash transfer monetary amounts were converted to 2011 USD using PPP conversion rates published by the World Bank[25].

HIV/AIDS prevention outcome was HIV incidence, that is, the number of new cases of HIV infection after receipt of the cash transfer.

HIV/AIDS care outcomes were (i) having an HIV test (proportion of people tested for HIV or all people offered HIV testing); (ii) retention in HIV care (i.e., PLHIV retention in healthcare), (iii) HIV/AIDS-related hospitalizations, and (iv) all-cause mortality. The secondary outcomes were (i) ART adherence, CD4+ cell count, and viral load.

Two investigators (NSG and AAP) independently assessed the risk of bias in the selected studies using an algorithm described elsewhere[27]. Potential sources of bias in RCTs included problems with random sequence generation, concealed allocation blinding of participants

and staff, and blinding of outcome assessment, as well as incomplete outcome data, selective reporting, and other biases. Three response scores (yes, no, and unclear) were assigned to each source, designated as high, low, and unknown risks, respectively. The overall quality of evidence was assessed using the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) approach[28].

Analyses were performed using the Cochrane RevMan 5.4 software[29]. Treatment effects were expressed as risk ratios (RR). The pooled RR was calculated using a random-effects model and the Mantel-Haenszel method to pool results of the included studies because heterogeneity was expected. Forest plots were used to visualize the treatment effects. Statistical heterogeneity between study effects was assessed using the Cochran Q test and I^2 statistics. The latter was used to assess the extent of heterogeneity between studies.

Heterogeneity was considered low when $I^2 < 30\%$, moderate when $I^2 \geq 30$ and $\leq 75\%$, and high when $I^2 > 75.0\%$. Prediction intervals were not used in each meta-analysis owing to the small number of studies. Subgroup analyses were performed to determine whether conditionalities for education (children attending school) and healthcare (having an HIV test) explained our results and accounted for the source of heterogeneity. The risk of publication bias between studies was examined using asymmetry of the funnel plot and Egger's test.

Role of the funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

We retrieved 5,230 studies through 15 selected database searches: (i) 1,218 studies in PubMed/MEDLINE, 1,404 studies in EMBASE, and 11 studies in the Cochrane Library; (ii) 2,412 searches in the Virtual Health Library (Lilacs; WHO; BDENF; BVS SMS *São Paulo; Localizador de Informação em Saúde*; IRIS; *Coleciona Sistema Único de Saúde*; BINACIS; IBECS; CUMED, and SciELO); and (iii) 185 articles in Web of Science.

After excluding 556 duplicates and 5 records deemed ineligible by the automation tools, 4,669 titles and abstracts were screened. Full-text articles were retrieved from the remaining 71 records, and 60 were excluded. The reasons for this are described in Appendix 3 (p. 13-15) and Appendix 4 (p.16). Therefore, 11 studies were eligible for inclusion in this systematic review. Thirteen studies were also identified via a manual search of the references of the selected studies, and five of them met the inclusion criteria. Thus, 16 studies were included in this systematic review (Figure 1)[17–18, 30–43].

Of the included studies (n=16), 14 were full RCTs, one was a pilot study RCT, and one was a cluster randomized study. Most studies were conducted in sub-Saharan Africa (n=15), and only one study was conducted in North America (Table 1) (Appendix 5; p.17). Seven studies examined PLHIV aged ≥ 18 years[30–35;42], and nine studies examined HIV-uninfected individuals[17,18, 36–41; 43] at baseline. A total of 20,234 participants were included,

of which 4,121 were PLHIV and 16,113 were uninfected. The sample size ranged from 392 to 1,084 for PLHIV studies[30–35;42] and from 162 to 3,184 for studies on uninfected individuals[17–18, 36–41,43].

Conditionalities observed in the studies were education (children's school attendance)[17,18,43] and healthcare (receiving an HIV test) behavior change (testing negative for curable STIs[36,39], maintaining HIV status[37]), reproductive health (e.g., STI clinic attendance)[30–33,38,40,42], annual HIV testing, performance on school tests, and submitting a written report on a community involvement project[41].

The effect of UCTs on PLHIV was investigated in two studies[34–35]. The effect of CCTs has been investigated in six studies on PLHIV[30–33,10,42] and six studies on uninfected individuals[18, 36–39,41]. One study evaluated the effects of UCTs and CCTs on uninfected individuals[17]. Of the studies that examined CCTs, two studied conditioned cash transfers on children staying in school[17–18], five studies were conditioned on health behaviors[36–39,41], and seven studies were conditioned on scheduling clinical visits[30–33, 40, 42–43].

In this review, we found that the average value of incentives offered in the 16 trials was U$20.9, with an average follow-up of 13 months. The average value offered by UCTs[34–35] was US$4.9, which is equivalent to $6,416.6 after adjustment for PPP. The value offered by CCTs for PLHIV[30–33,40,42] ranged from US$5 to US$24 ($5,482.8, PPP adjusted) whereas the value offered by CCTs for uninfected individuals[18, 36–39,41] ranged from $6 to $160 ($3,541.1, PPP adjusted) (Table 1; Appendix 6; p.18).

No study examined hospitalizations or mortality associated with HIV/AIDS, and only one study examined viral suppression[35] and CD4+ counts[34]. Therefore, these outcomes were not included in this meta-analysis.

Of the 16 studies that met the eligibility criteria, only four provided information on new HIV cases[18,37,39–40]. Pooled results from the random-effects model indicated that receipt of cash transfers had a statistically significant effect on lower HIV incidence when individuals had to meet healthcare conditionalities (RR=0.74; 95% CI, 0.56–0.98). There was moderate heterogeneity between studies (I^2 = 67.9 %) (Figure 2).

Three studies included information about undergoing an HIV test[17,40,43]. No differences (RR=0.69; 95% CI, 0.41–1.17) were found between individuals who chose to test themselves after receiving the cash transfer and those who did not. There was significant heterogeneity between studies (I^2 = 96 %) (Figure 3).

Three studies provided information on retention in HIV care[30,32–33]. The pooled results suggest that those who received cash transfers were also more likely to use health services than non-recipients of cash transfers (RR=1.29; 95% CI, 1.06–1.56). When subgroups were considered, this effect was also observed among pregnant women living with HIV who aimed to prevent mother-to-child transmission (RR=1.36; 95% CI, 1.13–1.64) and among other PLHIV in general (RR=1.17; 95% CI, 1.10–1.24). Moderate heterogeneity was observed between the studies (I^2 = 59%) (Figure 4).

Three studies had information on ART adherence[33–34,42], but because absolute numbers were not available from the study by Kadota et al. [42] (ART adherence was measured by a medication possession ratio of ≥95%), only two studies were included in the meta-analysis[32–33]. No difference was found between cash transfer recipients and non-cash transfer recipients (RR=1.12; 95% CI, 0.72–1.75). However, in the study by McCoy et al., ART adherence was measured by medication possession ratio of ≥ 95%[33], and in the study by Mills et al., ART adherence was measured using 3-day adherence recall[34]. Moderate heterogeneity was found between studies (I^2 = 72%, Figure 5).

The risk of bias for each study is shown in Appendix 7 (p.19). The overall risk of bias for the randomized controlled trials varied from low to high. Nine studies were included, which show a lower risk of bias for HIV incidence and had an HIV test. Moderate risks were observed for variation in missing outcome data and randomization process, particularly due to a lack of information on concealment of the randomization sequence and retention in HIV care. Regarding retention in HIV care, the moderate risk of bias in most studies was attributed to the selection process of the reported outcomes.

Table 2 summarizes the quality of evidence assessed using GRADE. These results suggest that cash transfer programs have a positive effect on reducing HIV incidence and increasing retention in HIV care for treatment. However, no difference was observed between seeking HIV testing and ART adherence. The results indicated that the evidence for all outcomes can be classified as moderate. Visual inspection of the funnel plots (Appendix 8–11; p.20-23) and Egger's test indicated that there was no potential for publication bias for the four outcomes at the end of the intervention period (i.e., analysis with a smaller number of trials).

Discussion

The results of our systematic review and meta-analysis showed that cash transfer programs are associated with lower HIV incidence. Additionally, the benefits of this type of social protection program are associated with increased retention in care among PLHIV. To the best of our knowledge, no study has systematically examined the extent to which such programs affect HIV outcomes using a robust meta-analysis approach. The general finding that cash transfer programs can contribute to improved HIV/AIDS prevention and care outcomes is consistent with existing evidence on the impact of cash transfer programs on patient health outcomes related to other infectious diseases[44,45]. Through cash transfer programs, poorer and lower socioeconomic populations can be on par with other segments of the population with regards to healthcare[44,45].

In this review, we observed a low value of cash transfer programs offered for the studies and a short follow-up duration. Moreover, our data suggest that these factors may have underestimated the observed effects on the evaluated HIV/AIDS prevention and care outcomes. Thus, studies that offer cash payments over a longer period are needed to understand the real impact of cash transfers for HIV prevention, as they can help in understanding the magnitude of benefit (what is the minimum amount necessary to achieve the desired social outcome) and duration (for how long are transfers made to recipients?)[46]. The protocol of a Brazilian study's large longitudinal dataset of linked socioeconomic and

health data intended to assess the effects of cash transfer program for a long period on outcomes of HIV/AIDS morbidity and mortality was recently published [47]. An ecologic panel data study with all 5,507 Brazilian municipalities in 2004–2012 described that the *Bolsa Família* Programme (Brazil's cash transfer program) reduced AIDS incidence, hospitalizations, and mortality in Brazil, which could be explained by both its monetary allowances and conditionalities[48].

Cash transfers may be the main mechanism by which such programs affect HIV/AIDS prevention and care outcomes. For HIV prevention, our data suggest that the effect of increased income on a continuous basis may allow HIV-negative individuals to remain negative due to better access to healthcare and educational information and potentially reduce the need for transactional sex in order to make ends meet[38]. The cash benefit may also allow HIV-positive individuals to obtain treatment, reach undetectable viral loads, and therefore not transmit the infection to other people.

Regarding outcomes related to HIV/AIDS care (retention in HIV care and ART adherence), our data suggest that cash transfer programs may enhance ART adherence[49]. Silva et al. (2015), who evaluated PLHIV of low socioeconomic level in the first six months of ART, observed that the low schooling of individuals created difficulty in understanding the importance of ART adherence[50]. Economic factors, such as unemployment, poverty, food insecurity, and transport costs, which limit access to health services, contribute to ART non-adherence[51]. ART non-adherence may also be related to depressive disorders, in which poverty, unemployment, and poor health often precipitate among PLHIV[52]. Other clinical conditions may also result in lower ART adherence, such as co-infection with tuberculosis (in high-incidence African settings) or hepatitis C (in high-incidence injection drug user populations). For such populations, CCTs may be useful in keeping up with their motivation to take medications regardless of adverse outcomes, fatigue, or life circumstances (poverty)[53,54].

We emphasize that these results could be strengthened if, in addition to the provision of financial benefits, there were health promotion interventions to improve the individuals' knowledge of the disease and their capacity to take preventive actions. To date, no studies have explored this type of activity[55].

Participation in CCTs may also result in the empowerment of women, where the economic benefits of such programs may facilitate women's power to have more choices in sexual partners and decrease the need to practice commercial sex work (or transactional sex) to obtain income or essential goods, both of which are associated with a greater risk of HIV infection[5–56].

Cash benefits can also improve the management of existing HIV infections by facilitating access to HIV services and testing. Access to HIV services and testing within a short period between infection and ART use is associated with a better prognosis and non-progression to AIDS because early treatment optimizes the process of CD4+ count recovery to immune restoration with clinical benefits[57].

This study has some limitations. First, we employed jargon as a surrogate marker while building the search strategy, since the intervention in question, namely, cash transfer, is not indexed at the descriptor banks. However, to circumvent this limitation, a manual search was conducted to identify local studies or those published in non-indexed journals. While several thousands of studies were screened, few were eligible, demonstrating a lack of literature on the topic. This low number of eligible papers could also have contributed to the lower statistical power. Another important limitation concerns the interpretation of findings. Although the findings for incidence and healthcare demand were statistically significant in the subgroups of interest, the results should be interpreted cautiously due to the poor statistical power, possibly caused by the small number of studies and, consequently, small sample size, limited financial incentive to participants, and short follow-up period. Another limitation is found in ART adherence outcomes. We note that studies employ different assessment methods (medication possession ratio, pill count, and self-report).

No restrictions were imposed based on the year of publication. There is a possibility that this introduced bias as behaviors in the spectrum of HIV care have varied considerably over the years. Moreover, the present study likely included interventions based on a low risk of bias and moderate evidence, especially because of the short follow-up period of the studies. Finally, there is a limitation in that these studies only measure outcomes among beneficiaries, and because transfers are typically pooled within households or families, benefits may extend beyond the direct beneficiary.

Despite its limitations, the current study has several positive features: a rigorous methodology was used based on the PRISMA guidelines[22]; a comprehensive literature search included 15 independent databases; search, selection, and data extraction applied to the selected studies were performed separately, and in duplicate, by two researchers; a third party was accessed to solve disagreements. Furthermore, the present study likely included the largest effect size for each outcome assessed through the meta-analysis performed, since the inclusion criteria encompassed adequate design, cash transfer type, and subgroup analysis by conditionalities[21].

In conclusion, this systematic review and meta-analysis identified that cash transfers with healthcare conditionalities have a positive effect in mitigating HIV incidence and retention in care. These results show, for the first time, the potential of cash transfer on HIV prevention and treatment and highlight that cash transfer must be considered when creating policies for HIV/AIDS epidemic control, as already indicated in the UNAIDS Fast-Track 95-95-95 Target of the HIV Care Continuum, which aims to continue HIV care by ensuring that 30 million PLHIV have access to treatment by meeting the assurance that 95% of PLHIV know their HIV status, 95% of people who know their HIV status are on ART, and 95% of people on ART have their viral load suppressed until 2030. In an effort to increase patient engagement and retention and meet the UNAIDS 95-95-95 targets post COVID-19 pandemic, the findings will be relevant[2]. Poverty is a social determinant of health, and marginalized populations living with HIV globally will benefit from conditional cash transfers to ameliorate transportation expenses or some of their incidental expenses and maintain motivation to stay in care. Overall, this study strengthens the knowledge that cash

transfer programs that cover these individuals, especially in the context of vulnerability, are important tools for controlling the HIV/AIDS epidemic.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledges

This study was supported by the National Institute of Allergy and Infectious Diseases (NAIDS), National Institute of Health (NIH), USA. Grant Number: 1R01AI152938. We thank the data production team and our colleagues from the DSAIDS Project (Federal University of Bahia, Salvador, Brazil) for their valuable contributions during the development of the study.

Data Sharing

This study used data available from public websites and electronic database. The Embase platform was accessed by Brazilian government (CAPES site).

References

1. WHO. Data on the size of the HIV/AIDS epidemic. 2021. https://www.who.int/data/gho/data/themes/hiv-aids/data-on-the-size-of-the-hiv-aids-epidemic (accessed Jan 25, 2022).
2. UNAIDS. Fact Sheet 2021. 2021. https://www.unaids.org/sites/default/files/media_asset/UNAIDS_FactSheet_en.pdf (accessed Jan 25, 2022).
3. Parker R. The global HIV/AIDS pandemic, structural inequalities, and the politics of international health. Am J Public Health 2002; 92: 343–6. [PubMed: 11867304]
4. Parker R, Camargo KR. Poverty and HIV/AIDS: anthropological and sociological aspects. Cad Saude Publica 2000; 16: 89–102.
5. Heise L, Lutz B, Ranganathan M, Watts C. Cash transfers for HIV prevention: considering their potential. J Int AIDS Soc 2013; 16: 18615. [PubMed: 23972159]
6. Wainwright JJ, Beer L, Tie Y, Fagan JL, Dean HD. Socioeconomic, behavioral, and clinical characteristics of persons living with HIV who experience homelessness in the United States, 2015-2016. AIDS Behav 2020; 24: 1701–8. [PubMed: 31628555]
7. Menza TW, Hixson LK, Lipira L, Drach L. Social Determinants of Health and Care Outcomes Among People With HIV in the United States. Open Forum Infect Dis 2021; 8: ofab330. [PubMed: 34307729]
8. Edmonds A, Breskin A, Cole SR, Westreich D, Ramirez C, Cocohoba J, et al. Poverty, Deprivation, and Mortality Risk Among Women With HIV in the United States. Epidemiology 2021; 32: 877–85. [PubMed: 34347686]
9. Hogan JW, Galai N, Davis WW. Modeling the Impact of Social Determinants of Health on HIV. AIDS Behav 2021; 25: 215–24.
10. Nyein PP, Aung E, Aung NM, Kyi MM, Boyd M, Lin KS, et al. The impact of gender and the social determinants of health on the clinical course of people living with HIV in Myanmar: an observational study. AIDS Res Ther 2021;18: 50–7. [PubMed: 34372879]
11. Serra M, Milhomem AB, Oliveira SB, Santos F, Silva RAE, Costa A, et al. Sociodemographic and Behavioral Factors Associated with HIV Vulnerability according to Sexual Orientation. AIDS Res Treat 2020; e5619315.
12. Sun S, Huang J, Hudson DL, Sherraden M. Cash Transfers and Health. Annu Rev Public Health 2021; 42: 363–80. [PubMed: 33395543]
13. García S, Saavedra JE. Educational Impacts and Cost-Effectiveness of Conditional Cash Transfer Programs in Developing Countries: A Meta-Analysis. Review of Educational Research 2017; 87: 921–65.

14. Lagarde M, Haines A, Palmer N. The impact of conditional cash transfers on health outcomes and use of health services in low and middle income countries. Cochrane Database Syst Rev 2009; 4: Cd008137.
15. Pullar J, Allen L, Townsend N, Williams J, Foster C, Roberts N, et al. The impact of poverty reduction and development interventions on non-communicable diseases and their behavioural risk factors in low and lower-middle income countries: A systematic review. PLoS One 2018; 13: e0193378. [PubMed: 29474454]
16. Green L, Myerson J, Ostaszewski P. Discounting of delayed rewards across the life span: age differences in individual discounting functions. Behav Processes 1999; 46:89–96. [PubMed: 24925501]
17. Baird SJ, Garfein RS, McIntosh CT, Ozler B. Effect of a cash transfer programme for schooling on prevalence of HIV and herpes simplex type 2 in Malawi: a cluster randomised trial. Lancet 2012; 379: 1320–9. [PubMed: 22341825]
18. Pettifor A, MacPhail C, Hughes JP, Selin A, Wang J, Gómez-Olivé FX, et al. The effect of a conditional cash transfer on HIV incidence in young women in rural South Africa (HPTN 068): a phase 3, randomised controlled trial. Lancet Glob Health 2016; 4: e978–e88. [PubMed: 27815148]
19. Krishnamoorthy Y, Rehman T, Sakthivel M. Effectiveness of financial incentives in achieving UNAID Fast-Track 90-90-90 and 95-95-95 target of HIV care continuum: a systematic review and meta-analysis of randomized controlled trials. AIDS Behav 2021; 25:814–25. [PubMed: 32968885]
20. Stoner MCD, Kilburn K, Godfrey-Faussett P, Ghys P, Pettifor AE. Cash transfers for HIV prevention: A systematic review. PLoS Med 2021; 18: e1003866. [PubMed: 34843468]
21. Higgins J, Thomas J, Chandler J, Cumpston M, Li T, Page M, et al. Cochrane Handbook for Systematic Reviews of Interventions. Cochrane Handbook for Systematic Reviews of Interventions. 2019.
22. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021; 372: 71–80.
23. Pettifor A, MacPhail C, Nguyen N, Rosenberg M. Can money prevent the spread of HIV? A review of cash payments for HIV prevention. AIDS Behav 2012; 16: 1729–38. [PubMed: 22760738]
24. Bastagli F, Hagen-Zanker J, Harman L, Barca V, Sturge G, Schmidt T, et al. Cash transfers: What does the evidence say? A rigorous review of programme impact and of the role of design and implementation features. 2016.
25. World Bank. PPP conversion factor. 2022. https://data.worldbank.org/indicator/PA.NUS.PPP (accessed Jun 08, 2022).
26. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan-a web and mobile app for systematic reviews. Syst Rev 2016; 5: 210. [PubMed: 27919275]
27. Sterne JAC, Savović J, Page MJ, Elbers RG, Blencowe NS, Boutron I, et al. RoB 2: a revised tool for assessing risk of bias in randomized trials. BMJ 2019; 366: 14898.
28. Schünemann HJ, Vist GE, Higgins JP, Santesso N, Deeks JJ, Glasziou P, et al. Interpreting results and drawing conclusions. Cochrane Handbook for Systematic Reviews of Interventions 2019.
29. Cochrane. Cochrane RevMan 2021. https://training.cochrane.org/online-learning/core-software-cochrane-reviews/revman (accessed Jan 25, 2022).
30. Yotebieng M, Thirumurthy H, Moracco KE, Kawende B, Chalachala JL, Wenzi LK, et al. Conditional cash transfers and uptake of and retention in prevention of mother-to-child HIV transmission care: a randomised controlled trial. Lancet HIV 2016; 3:e85–93. [PubMed: 26847230]
31. Saleska JL, Turner AN, Gallo MF, Shoben A, Kawende B, Ravelomanana NLR, et al. Role of temporal discounting in a conditional cash transfer (CCT) intervention to improve engagement in the prevention of mother-to-child transmission (PMTCT) cascade. BMC Public Health 2021; 21: 477–87. [PubMed: 33691667]
32. Liu JX, Shen J, Wilson N, Janumpalli S, Stadler P, Padian N. Conditional cash transfers to prevent mother-to-child transmission in low facility-delivery settings: evidence from a randomised controlled trial in Nigeria. BMC Pregnancy Childbirth 2019; 19: 32–44. [PubMed: 30651080]

33. McCoy SI, Njau PF, Fahey C, Kapologwe N, Kadiyala S, Jewell NP, et al. Cash vs. food assistance to improve adherence to antiretroviral therapy among HIV-infected adults in Tanzania. Aids 2017; 31: 815–25. [PubMed: 28107221]
34. Mills EJ, Adhvaryu A, Jakiela P, Birungi J, Okoboi S, Chimulwa TNW, et al. Unconditional cash transfers for clinical and economic outcomes among HIV-affected Ugandan households. Aids 2018; 32: 2023–31. [PubMed: 29847330]
35. Thirumurthy H, Ndyabakira A, Marson K, Emperador D, Kamya M, Havlir D, et al. Financial incentives for achieving and maintaining viral suppression among HIV-positive adults in Uganda: a randomised controlled trial. Lancet HIV 2019; 6: e155–63. [PubMed: 30660594]
36. de Walque D, Dow WH, Nathan R, Abdul R, Abilahi F, Gong E, et al. Incentivising safe sex: a randomised trial of conditional cash transfers for HIV and sexually transmitted infection prevention in rural Tanzania. BMJ Open 2012; 2: e000747.
37. Kohler HP, Thornton R. Conditional Cash Transfers and HIV/AIDS Prevention: Unconditionally Promising? World Bank Econ Rev 2012; 26: 165–90. [PubMed: 24319306]
38. Minnis AM, vanDommelen-Gonzalez E, Luecke E, Dow W, Bautista-Arredondo S, Padian NS. Yo Puedo--a conditional cash transfer and life skills intervention to promote adolescent sexual health: results of a randomized feasibility study in san francisco. J Adolesc Health 2014; 55: 85–92. [PubMed: 24518532]
39. Nyqvist MB, Corno L, de Walque D, Svensson J. Incentivizing safer sexual behavior: evidence from a lottery experiment on HIV prevention. American Economic Journal: Applied Economics 2018; 10: 287–314.
40. Chamie G, Kwarisiima D, Ndyabakira A, Marson K, Camlin CS, Havlir DV, et al. Financial incentives and deposit contracts to promote HIV retesting in Uganda: A randomized trial. PLoS Med 2021; 18: e1003630. [PubMed: 33945526]
41. Karim QA, Kerry L, Ayesha K, Hilton H, Fanele N, Natasha S, et al. Impact of conditional cash incentives on HSV-2 and HIV prevention in rural South African high school students: results of the CAPRISA 007 cluster randomized controlled trial. Journal of the International AIDS Society 2015; 18.
42. Kadota JL, Fahey CA, Njau PF, Kapologwe N, Padian NS, Dow WH, et al. The heterogeneous effect of short-term transfers for improving ART adherence among HIV-infected Tanzanian adults. AIDS Care 2018; 30:18–26.
43. Schaefer R, Thomas R, Robertson L, Eaton JW, Mushati P, Nyamukapa C, et al. Spillover HIV prevention effects of a cash transfer trial in East Zimbabwe: evidence from a cluster-randomised trial and general-population survey. BMC Public Health 2020; 20:1599. [PubMed: 33097016]
44. Nery JS, Pereira SM, Rasella D, Penna MLF, Aquino R, Rodrigues LC, et al. Effect of the Brazilian conditional cash transfer and primary health care programs on the new case detection rate of leprosy. PLoS Negl Trop Dis 2014; 8e3357.
45. Richterman A, Steer-Massaro J, Jarolimova J, Luong Nguyen LB, Werdenberg J, Ivers LC. Cash interventions to improve clinical outcomes for pulmonary tuberculosis: systematic review and meta-analysis. Bull World Health Organ. 2018; 96(7): 471–83. [PubMed: 29962550]
46. Fieno J & Leclerc-Madlala S. The promise and limitations of cash transfer programs for HIV prevention. African Journal of AIDS Research 2014; 13 (2): 153–160. [PubMed: 25174632]
47. Rasella D, Morais GAS, Anderle RV, Lua I, Coelho R, Rubio FA, et al. Evaluating the impact of social determinants, conditional cash transfers and primary health care on HIV/AIDS: Study protocol of a retrospective and forecasting approach based on the data integration with a cohort of 100 million Brazilians. Plos One 2022; 17(3): e0265253. [PubMed: 35316304]
48. Morais GS, Magno L, Ferreira da Silva A, Anderle RV, Souza LE, Macinko J, Dourado I, Rasella D. Reduction trends in AIDS indicators (incidence, hospitalization and mortality rates) associated with conditional cash transfer measures in Brazil: an ecological study. IAS 2021.
49. Kalichman SC, Grebler T. Stress and poverty predictors of treatment adherence among people with low-literacy living with HIV/AIDS. Psychosom Med. 2010;72:810–6. [PubMed: 20716711]
50. Silva JAG, Dourado I, Brito AM, Silva CAL. Factors associated with non-adherence to antiretroviral therapy in adults with AIDS in the first six months of treatment in Salvador, Bahia State, Brazil. Cad Saúde Pública 31:188–98.

51. Mills EJ, Nachega JB, Bangsberg DR, et al. Adherence to HAART: A systematic review of developed and developing nation patient-reported barriers and facilitators. PLoS Med 2006; 3: 2039–2064.

52. Kulisewa K, Stockton MA, Hosseinipour MC, et al. The Role of Depression Screening and Treatment in Achieving the UNAIDS 90-90-90 Goals in Sub-Saharan Africa. AIDS Behav. 2019; 23 (Suppl 2): 153–161. [PubMed: 31317365]

53. Wouters E, van Rensburg AJ, Engelbrecht M, Buffel V, Campbell L, Sommerland N et al. How the 'HIV/TB co-epidemic–HIV stigma–TB stigma' syndemic impacts on the use of occupational health services for TB in South African hospitals: a structural equation modelling analysis of the baseline data from the HaTSaH Study (cluster RCT). BMJ Open 2022; 12: e045477.

54. Sacks-Davis R, Doyle JS, Rauch A, Beguelin C, Pedrana AE, Matthews GV, et al. Linkage and retention in HCV care for HIV-infected populations: early data from the DAA era. J Int AIDS Soc. 2018; 21 (Suppl Suppl 2): e25051. [PubMed: 29633559]

55. Dzinamarira T, Muvunyi CM, Mashamba-Thompson TP. Evaluation of a health education program for improving uptake of HIV self-testing by men in Rwanda: a pilot pragmatic randomized control trial. Pilot Feasibility Stud 2021; 7: 1–9. [PubMed: 33390191]

56. Handa S, Halpern CT, Pettifor A TH. The government of Kenya's cash transfer program reduces the risk of sexual debut among young people age 15-25. PLoS ONE 2014; 1: e8547

57. Grinsztejn B, Hosseinipour MC, Ribaudo HJ, Swindells S, Eron J, Chen YQ, et al. Effects of early versus delayed initiation of antiretroviral treatment on clinical outcomes of HIV-1 infection: results from the phase 3 HPTN 052 randomised controlled trial. Lancet Infect Dis 2014; 14: 281–90. [PubMed: 24602844]

Research in Context

Evidence before this study

Cash transfer programs are important poverty alleviation strategies that have been associated with improved health outcomes, particularly among people in extreme poverty. The current evidence on the effect of cash transfers on HIV outcomes was mostly from middle-income countries and spanned periods of up to 6 months, reflecting only short-term effects. We searched EMBASE for all existing systematic reviews with or without a meta-analysis of the effect of cash transfers on HIV/AIDS prevention and care outcomes. Using the search strategy “cash transfer” AND “HIV” AND “review” we found eight studies. The search was conducted in August 2021. After selection based on the title, abstract, and full text, seven studies were excluded. Only one systematic review assessed the effect of cash transfers on HIV prevention (Stoner et al., 2021). However, this systematic review only evaluated interventions to reduce school costs (e.g., scholarships), which is not comparable to providing cash payments to poor families to reduce poverty. Moreover, the identified review included both intervention and observational studies, which did not allow for a meta-analysis of its findings.

Added value of this study

This is the first meta-analysis of the effect of cash transfer programs on HIV outcomes. The strength of available evidence can be classified as moderate. The results of this meta-analysis showed that cash transfers have a positive effect on mitigating HIV incidence and, for those with healthcare conditionalities, increasing access to HIV testing. However, no effect was observed for antiretroviral therapy adherence. There is limited evidence on the effect of cash transfer programs on viral suppression or CD4 cell counts (CD4+), and no study has examined other outcomes related to HIV/AIDS care, such as hospitalization and HIV/AIDS-related mortality.

Implications of all available evidence

This systematic review suggests that cash transfers may have a positive effect on two HIV outcomes (HIV incidence and retention in HIV care), but this effect varies according to conditionality. Healthcare conditionalities (e.g., those requiring HIV testing) showed a positive effect, whereas those requiring school attendance did not. Evidence on the effect of cash transfers and social protection programs on other endpoints, such as AIDS morbidity and mortality, remains lacking.

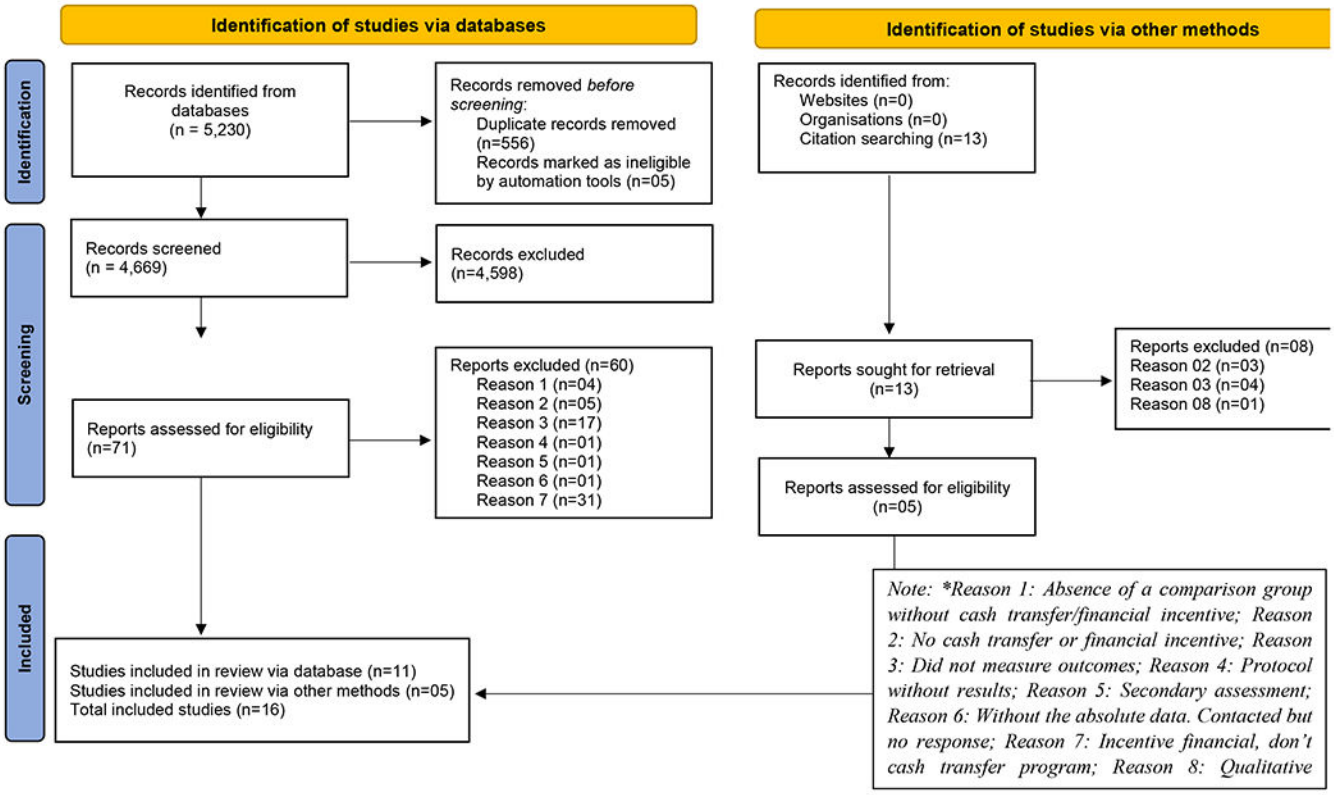

Figure 1 –.
PRISMA flow-chart of this *systematic review*.

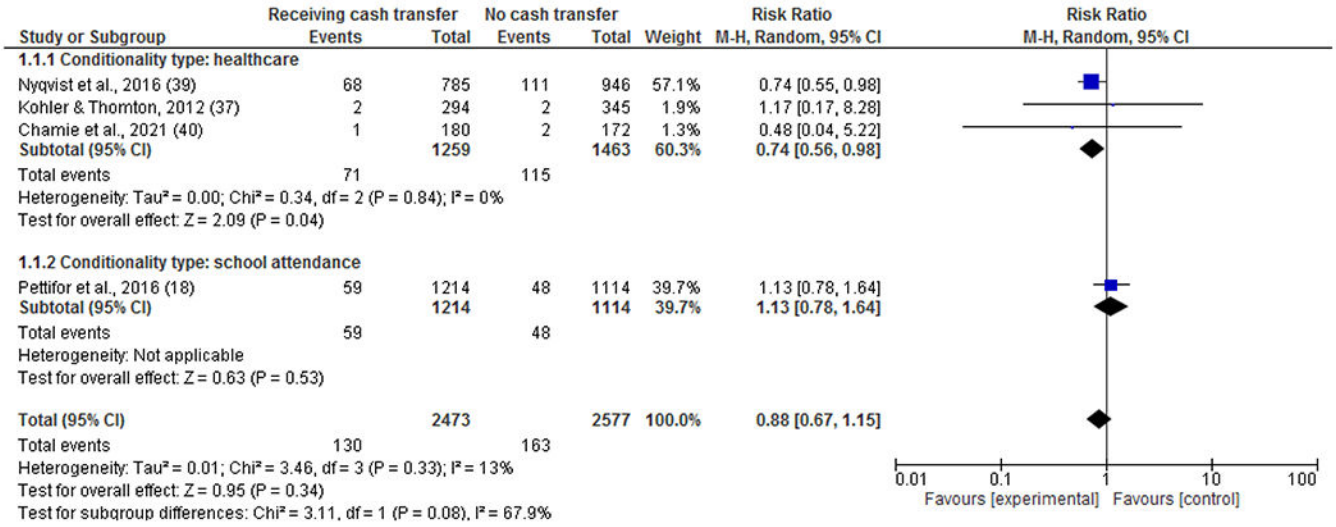

Figure 2 –.

Forest plot of the effect of receiving cash transfer programs *vs* not receiving cash transfer programs on incident HIV cases.

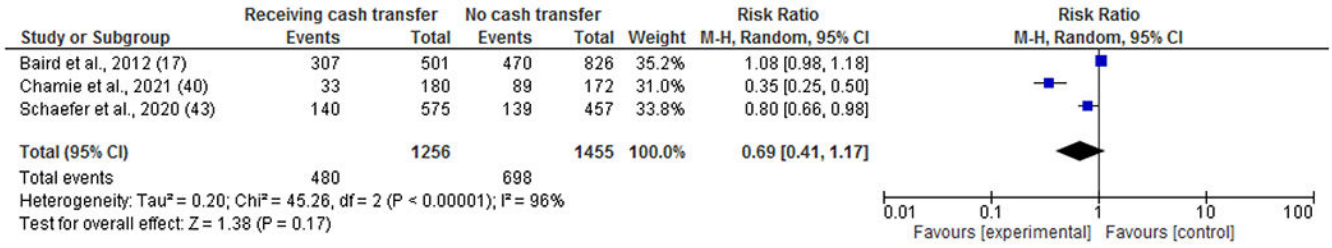

Figure 3 –.

Forest plot of the effect of receiving cash transfer programs *vs* not receiving cash transfer programs on had an HIV testing.

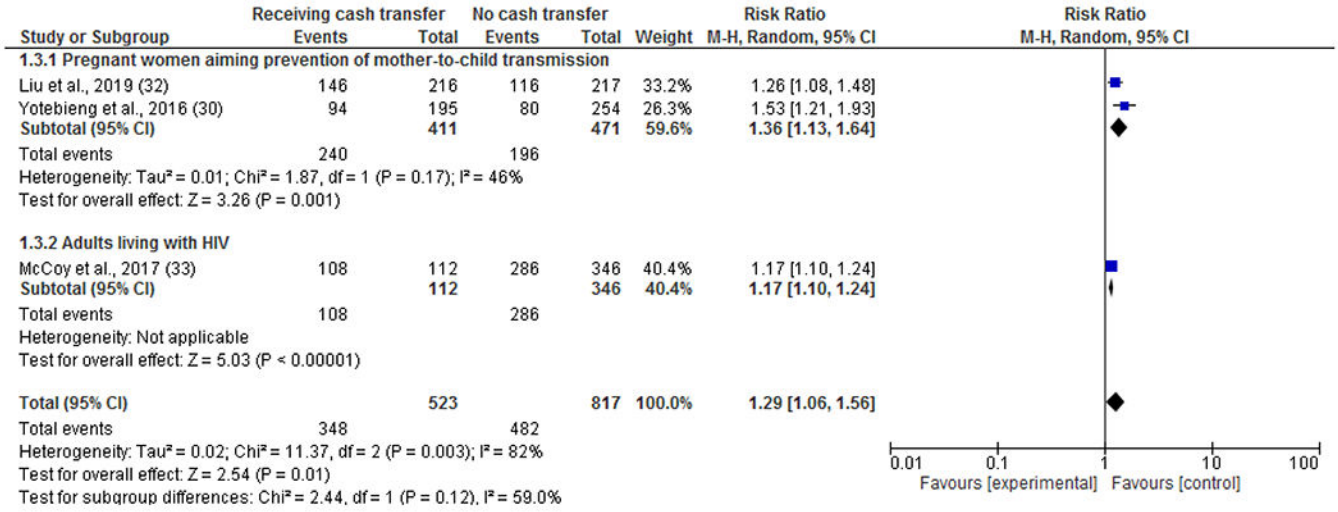

Figure 4 –.

Forest plot of the effect of receiving cash transfer programs *vs* not receiving cash transfer programs on retention in HIV care.

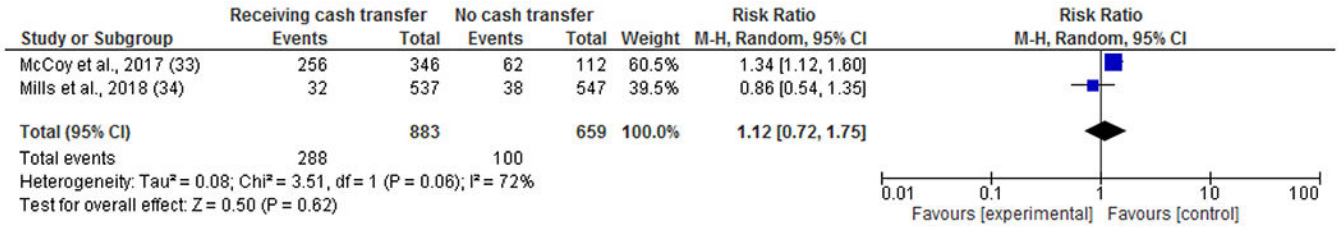

Figure 5 –.

Forest plot of the effect of receiving cash transfer programs *vs* not receiving cash transfer programs on ART adherence.

Table 1 -

Characteristics of the included studies.

Reference and location	Population	Cash transfer program, follow-up and conditionalities	Value (and frequency)	PPP value in 2011	Outcomes evaluated	Effect numbers
Baird et al., 2012[17] Malawi, sub-Saharan Africa	Females 13 to 22 years	Zomba cash transfer programme (18 months) Conditionality: School attendance	$1-5 girls /$ 4-10 parents (Monthly)	$ 312.31-1,561.55 girls / $ 1,249.29-3,123.1 parents (Monthly)	Had an HIV test	Intervention: 307/501 Control: 470/826
de Walque et al., 2012[35] Tanzania, East Africa	Females and males 18 to 30 years	Conditional cash transfer program via Tanzania Social Action Fund (TASAF) (12 months) Conditionality: Behavior change: Testing negative for curable STIs	$20 per testing round (Monthly)	$17,811.6 per testing round (Monthly)	HIV prevalence	Intervention: 17/615 Control: 41/1124
Kohler & Thornton, 2012[36] Malawi, sub-Saharan Africa	Females and males 16 to 75 years	Malawi Incentive Program (12 months) Conditionality: Behavior change: To maintain HIV status	$32 (Monthly)	$9993,92 (Monthly)	HIV incidence	Intervention: 2/294 Control: 2/345
Minnis et al., 2014[37] California, United States	Females and males 16 to 21 years	Yo Puedo (06 months) Conditionality: Behavior change: reproductive health wellness (e.g., clinic visit)	$160 + $5 attendance at life skills groups (8-session weekly)	$160 + $5 attendance at life skills groups (8-session weekly)	Retention in HIV care	Intervention: 52/79 Control: N.I.
Karim et al., 2015[40] Durban, South Africa	Females and males scholing <18 years	My Life! My Future (24 months) Conditionality: Combination of conditions: annual HIV testing, performance in school tests and a written report on their community involvement project	$14 (Monthly)	$100.38 (Monthly)	HIV incidence	1.6 per 100 person-years (IRR=1.26, 95% CI: 0.66–2.39; p=0.419)
Yotebieng et al., 2016[29] Democratic Republic of Congo, Central Africa	PLHIV pregnant	Humanitarian assistance in the Democratic Republic of Congo (12 months) Conditionality: Attended scheduled clinic visits and accepted offered PMTCT services	$5 plus $1 at each visit (Monthly)	$4,767.2 plus $953.44 at each visit (Monthly)	Retention in HIV care	Intervention: 94/195 Control: 80/254
Pettifor et al., 2016[18] Mpumalanga, South Africa	Females 13 to 20 years	Similar to the South African Government's social protection grant (36 months) Conditionality: School attendance (≥80% of school days per month)	$10 (girls) + $20 (parents) (Monthly)	$71.7 (girls) + $143.4 (parents) (Monthly)	HIV incidence	Intervention: 59/1214 Control: 48/1114
Nyqvist et al., 2018[38] Lesotho, Southern Africa	Females and males 18 to 32 years	Lesotho Labor Force Survey (04 months) Conditionality: STI testing	$6 (Monthly)	$43.02 (Monthly)	HIV incidence	Intervention: 68/785 Control: 111/946
McCoy et al., 2017[32] Tanzania, East Africa	PLHIV at least 18 years	Conditional cash transfer program via Tanzania Social Action Fund (TASAF) (12 months) Conditionality: Attending scheduled visits with the HIV care provider	$11 (Monthly)	$9,796.38 (Monthly)	Retention in HIV care ART adherence	*Retention in HIV care* Intervention: 108/112 Control: 286/346 *ART adherence* Intervention: 256/346 Control: 62/112

Reference and location	Population	Cash transfer program, follow-up and conditionalities	Value (and frequency)	PPP value in 2011	Outcomes evaluated	Effect numbers
Kadota et al., 2018[41] Tanzania, East Africa	PLHIV at least 18 years	Conditional cash transfer program via Tanzania Social Action Fund (TASAF) (12 months) Conditionality: Attending scheduled visits with the HIV care provider	$11 (Monthly)	$9,796.38 (Monthly)	Retention in HIV care ART adherence	Secondary analysis of McCoy et al., 2017[32] Tanzania
Mills et al., 2018[33] Uganda, East Africa	PLHIV 18–60 years	Cash grants by Uganda government (24 months) Conditionality: NA = UCT	~$5.8 (Monthly)	$7,595.1 (Monthly)	ART adherence	Intervention: 32/537 Control: 38/547
Thirumurthy et al., 2019[34] Uganda, East Africa	PLHIV ≥ 18 years	Cash grants by Uganda government (06 months) Conditionality: NA = UCT	$ 4 (3 times: 6, 12, 24, and 48 weeks)	$ 5,238.04 (3 times: 6, 12, 24, and 48 weeks)	Viral load	Intervention: 176 Control: 154
Liu et al., 2019[31] Nigeria, West Africa	PLHIV pregnant	Non-governmental organization implemented a CCT intervention in Akwa Ibom (05 months) Conditionality: Attending scheduled visits with the HIV care provider	$ 24 (Monthly)	$ 3,661.68 (Monthly)	Retention in HIV care	Intervention: 146/216 Control: 116/217
Scaefer et al., 2020[42] Zimbabwe, sub-Saharan Africa	Females and males age group 15 to 54 years	Zimbabwean government to roll out a national cash transfer programme (12 months) Conditionality: Children attending scheduled visits with the HIV care provider and School attendance	$ 18 plus $4 for each child in the household (Every 2 months)	$1,438.2 plus $319,6 for each child in the household (Every 2 months)	Had an HIV test	Intervention: 140/575 Control: 139/457
Saleska et al., 2021[30] Democratic Republic of Congo, Central Africa	PLHIV pregnant	Humanitarian assistance (12 months) Conditionality: Attending scheduled visits with the HIV care provider	$5 plus $1 at each visit (Monthly)	$4,767.2 plus $953.44 at each visit (Monthly)	Retention in HIV care	Secondary analysis of Yotebieng et al., 2016[29]
Chamie et al., 2021[39] Uganda, East Africa	HIV–negative adults with self-reported risk	Cash grants by Uganda government (06 months) Conditionality: Attending scheduled visits with the HIV care provider	$7 (2 times on point:3 and 6 months)	$9,166.55 (2 times on point:3 and 6 months)	HIV incidence Had an HIV test	*HIV Incidence* Intervention: 1/180 Control: 2/172 *Had an HIV test testing* Intervention: 33/180 Control: 89/172

Note: ART: antiretroviral therapy; PLHIV: people living with HIV; PMTCT: Prevention of Mother to Child Transmission; PPP: Purchasing power parities.

Table 2 -

Summary of findings table for the main outcomes.

Outcome	References	Relative effect (95% CI)	Certainty of the evidence (GRADE)
HIV incidence	04 studies (5050 patients) *Kohler & Thornton*, 2012[36] *Pettifor et al.*, 2016[18] *Nyqvist et al.*, 2016[38] *Chamie et al.*, 2021[39]	RR=0.88 (95% CI: 0.67-1.15)	⊕⊕⊕O MODERATE
HIV incidence *Subgroup: Health Care conditionality*	03 studies (2722 patients) *Kohler & Thornton*, 2012[36] Nyqvist *et al.*, 2016[38] *Chamie et al.*, 2021[39]	RR=0.74 (95% CI: 0.56-0.98)	⊕⊕⊕⊕ HIGH
Had an HIV test	03 studies (2711 patients) *Baird et al.*, 2012[17] *Schaefer et al.*, 2020[42] *Chamie et al.*, 2021[39]	RR=0.69 (95% CI: 0.41-1.17)	⊕⊕⊕O MODERATE
Retention in HIV care	03 studies (1340 patients) *Liu et al.*, 2019[31] *Yotebieng et al.*, 2016[29] *McCoy et al.*, 2017[32]	RR=1.29 (95% CI: 1.06-1.56)	⊕⊕⊕O MODERATE
Retention in HIV care *Subgroup: pregnant women with aim prevention of mother-to-child transmission*	02 studies (882 patients) *Liu et al.*, 2019[31] *Yotebieng et al.*, 2016[29]	RR=1.36 (95% CI: 1.13-1.64)	⊕⊕⊕O MODERATE
ART adherence	02 studies (1542 patients) *McCoy et al.*, 2017[32] *Mills et al.*, 2018[33]	RR=1.12 (95% CI: 0.79-1.75)	⊕⊕OO LOW

Note: ART: antiretroviral therapy; CI: confidence interval. GRADE Working Group grades of evidence

High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.

Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.