Economic evaluation of cash "plus" interventions for risky sexual behaviour among Adolescent Girls & Young Women in low and middle-income countries: A systematic review

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PART 0: PREAMBLE

PLAGIARISM DECLARATION

I, **Vuyolwetu Thembekile Tibini**, hereby declare that the work on this dissertation/thesis is based on my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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DEDICATION

This dissertation is dedicated to the extraordinary individuals who have provided me with unwavering support, love, and guidance throughout this journey. To my mother, Neliswa Faith Tibini, who has continued always to support me and assist me in any way possible. Whose prayers are the reason I am here, today. To my grandmother, Nonceba Thora Tibini, for her wisdom, and constant encouragement to seek knowledge and growth. Her kindness and love, as well as support.

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"INkosi iya kuhlala inathi, ekufuneka sikwenze thina kukumthemba"

- *Nelson Mninawe Tibini*

Abstract

Background

Adolescent girls and young women (AGYW) are especially susceptible to risky sexual behaviours that increase their risk of HIV infection and other negative consequences related to their reproductive health, especially in low- and middle-income countries (LMICs). Globally, AGYW, who are between the ages of 15-24 are at risk of HIV infection at an average of 4900 every week, while in 2021 AGYW accounted for 63% of all new HIV infections. In response, cash transfer interventions have become a tool to lessen financial vulnerability and provide AGYW the confidence to make safer decisions regarding their sexual health. However, cash transfer interventions alone might not adequately address the intricate social, biological, and economic issues that AGYW face. As a result, "cash plus" interventions which combine cash with complementary services such as training, health care, and skill developmenthave piqued interest as potentially more effective fixes. The premise of this systematic review is to examine the economic evaluations of these "cash plus" programs and their effect on reducing risky sexual behaviours among AGYW in LMICs.

Methods

The thesis first implemented a structured literature review. The structured literature delves into the implementation of cash transfers in LMICs and identifies any related shortcomings. Secondly, the structured literature review examines epidemiological evidence of risky sexual behaviours faced by AGYWs in LMICs; these include HIV acquisition, unplanned pregnancy, condomless sex, transactional sex, and multiple sexual partners. Finally, the structured literature review scrutinizes any cash transfer programs that have undergone economic evaluation to address the risky sexual behaviour among AGYWs in LMICs. After the structured literature review was completed, a systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A comprehensive search was performed on several electronic databases, including EbscoHost, PubMed, Cochrane Library, Web of Science, and Scopus, along with relevant grey literature. The review included economic evaluations of cash "plus" interventions aimed at risky sexual behaviour among AGYW in LMICs and studies between 1 January 2000 – 31 December 2023. Studies were screened for eligibility based on pre-defined inclusion criteria, and data were extracted into a synthesis table. Costs were adjusted to 2023 U.S. dollars (USD) to standardize economic evaluations across studies. Full and partial economic evaluations, including cost effectiveness analysis (CEA), cost-utility analysis (CUA), and cost-benefit analysis (CBA), were analysed.

The key gaps show how standard cash transfers for AGYW have a limited impact on complex needs, a lack of complementary support, and minimal long-term benefits. Cash Plus addresses these gaps by integrating additional components tailored to AGYW's needs, such as mentorship and skills training, which enhance resilience and support sustainable behavioural changes. However, the economic evaluation of Cash Plus interventions targeting AGYW's risky sexual behaviours in LMICs requires further work. The importance of this work is that it provides evidence of cost-effectiveness, scalability, and long-term economic impact, allowing for informed, resource-efficient decisions on implementing Cash Plus programs in LMICs.

Results

This thesis' systematic review retrieved a total of 40 articles, six of which met the inclusion criteria. All these studies, conducted between 2018 and 2022, were based in Sub-Saharan Africa, specifically in Kenya, Uganda, and Liberia. The population covered in the six studies totalled 15,517 AGYW, with interventions targeting a wide age range of 12 to 24 years. The interventions included programs like DREAMS, Empowerment and Livelihood for Adolescents (ELA), Girl Empower Plus (GE+), and Bridge PLUS, among others. Economic evaluations revealed mixed results regarding the cost-effectiveness of the interventions. Five studies performed full economic evaluations using CEA and CBA. One study conducted a partial economic evaluation (cost analysis). The total unit cost for the six units was $2 446,90, but after adjusting for the 2023 value, the amount rose to $2 881,60.

Conclusion

The thesis suggests that cash "plus" interventions aimed at reducing risky sexual behaviours among AGYW in Sub-Saharan Africa are cost-effective, particularly over longer time frames. The review highlights the need for further research into the long-term, non-monetary benefits of these interventions, such as improvements in health, education, and social well-being, to fully assess their value. The mixed economic evaluations and inflation-adjusted unit costs highlight the importance of ongoing research and careful resource allocation. The results underscore the importance of targeted, comprehensive strategies in addressing the complex needs of AGYW, while also pointing to the challenges of scaling such interventions in resource constrained environments.

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"I can do all things through Christ who strengthens me."

Philippians 4:13

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Part A: Structured Literature Review

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List of Abbreviations

Abbreviation	Description
AGYW	Adolescent Girl Young Women
SRH	Sexual Reproductive Health
CT	Cash Transfer
CCT	Conditional Cash Transfer
EE	Economic Evaluation
CEA	Cost-effectiveness analysis
CUA	Cost-utility analysis
CMA	Cost-minimisation analysis
CBA	Cost-benefit analysis
WHO	World Health Organisation
LMIC	Low-middle-income country
DALY	Disability-adjusted life year
QALY	Quality-adjusted life year
ICER	Incremental cost-effectiveness ratio
SDG	Sustainable Development Goals
CHEERS	Consolidated Health Economic Evaluation Reporting Standards

PART A: STRUCTURED LITERATURE REVIEW

1. Introduction

Cash transfers have expanded greatly over the last decade in Africa (Ha La 2019); this is due to cash transfers being a mechanism that ensures social protection and economic empowerment for impoverished groups of people. The other forms of aid have experienced challenges with addressing the immediate needs of vulnerable groups (Garcia and Moore 2012). The World Bank notes that while emergency food aid aimed to tackle famine in different regions of Africa, it failed to tackle food insecurity for all people. This is evident in Ethiopia, where emergency food aid, with an average annual cost of $265 million, reached 5 million people annually from a pool of 15.8 million people needing food aid (UN 2024). These types of challenges and others have made African countries to move towards cash transfers. According to (Ha La 2019), the goal of cash transfers is to encourage positive behavioural changes and boost service demand. According to (IFPRI 2018), the goal of cash transfer programs is to shield vulnerable groups from financial shocks and minimize coping strategies that negatively affect the sustainability of livelihoods. The above explanations reveal that the implementation of Cash Transfer interventions aims to safeguard vulnerable groups financially; this can occur either at the national level through government structures or at the district level with households within a district (IFPRI 2018). However, it is imperative to also examine the impact of cash transfers on outcomes. We can measure the impacts of the cash transfer on several outcomes, including poverty alleviation, education, health and nutrition, savings and production, employment, and empowerment. When considering poverty alleviation, (Fullz & Francis 2013) note that South Africa, through the grant system, has reduced the poverty headcount by 4.3%. Although this is a positive impact, (Fullz and Francis 2013) also note that even though households in South Africa moved from extreme poverty to poverty, the households never escape poverty altogether. The impact of cash transfers on education also presents positive results, where cash transfers have improved reading and writing abilities at both primary and secondary level by at least 6.7% and 20.3% respectively (Mostert and Vall Castello 2020). In keeping to the

context of this study, some outcome measurements have shown that cash transfers lower the odds of sexual debut, which has a positive impact on reducing HIV acquisition (The Transfer Project 2021). Cash transfers have also had an impact on HIV service utilization. (Taaffe, Longosz, and Wilson 2017) state that the piloted programs for cash transfers reduce costs associated with HIV service utilization while also incentivizing the use of the services. (Taaffe, Longosz, and Wilson 2017) also note that Malawi implements a voucher system, which is redeemable when HIV tests are done, which creates an increased demand for HIV testing by 12%. Rural Uganda implements a cash transfer system that reduces barriers to accessing HIV treatment by providing between $5 to $8 to reduce transportation costs to HIV clinics (Taaffe, Longosz, and Wilson 2017). The evidence provided of the impact of cash transfers on various outcomes is positive overall. However, there are more variations to cash transfers, which increase their reach to vulnerable households. Cash transfers can be divided into two distinct delivery methods: 1) unconditional cash transfer, which doesn't require any action from the recipient. 2) Conditional cash transfer, in which the recipient must meet a certain criterion to receive cash. (Innovations for Poverty Action 2018).

2. Cash Transfers

2.1 Unconditional Cash Transfer

The (Oxford Policy Management 2018) defines unconditional cash transfers as cash payments provided to impoverished individuals without any expectation of reciprocation. Low- and middle-income countries use unconditional cash transfers as a method to reduce poverty and other health-related issues. (Oxford Policy Management 2018) found that unconditional cash transfers had a positive impact on health outcomes; their study found that unconditional cash transfers reduced the odds of experiencing illness by 27% between the last 3 months. According to (Garcia and Moore 2012), unconditional cash transfers have no conditions besides an

eligibility category that represents a part of a population; this could be poor people or orphans. Unconditional cash transfers are universal basic income interventions that assist in offering a basic income to the identified groups of people (Painter 2016). Unconditional Cash Transfer creates an opportunity for another type of cash transfer, which is Conditional Cash Transfer.

2.2 Conditional Cash Transfer

The term "conditional cash transfer" implies that the cash transfer is subject to certain conditions. According to (Baird et al. 2013), the government almost always implements both conditional and unconditional cash transfer programs, both of which target impoverished households. The difference between the two is that the conditional cash transfer makes use of the means testing method to identify beneficiaries. According to (Simpson 2018), families experiencing poverty can access conditional cash transfers provided they invest in human capital, such as children attending school or regular visits to health clinics. (Simpson 2018) equally adds that there is great effort in the effectiveness or ineffectiveness of conditional cash transfers reducing poverty or the goal of increasing human development. Conditional cash transfers may also deter implementation in poorer countries because they require more administrative capacity than unconditional cash transfers (Simpson 2018). Examining the various types of cash transfers revealed that, as a social protection intervention, cash transfers, whether unconditional or conditional, aim to reduce poverty and enhance outcomes such as education and health.

However, there are some shortcomings with cash transfer programs. One of the major issues with cash transfer programs is the need to scale up the intervention. According to (Fleno and Leclerc-Madlala 2014), a considerable amount of attention must be given to cash transfers when moving towards scale-up, as well as how the program will work in a larger population. The other issue with cash transfers is the potential spillover of cash benefits to non-beneficiaries. (Kandpal 2019) addresses the issue of possible spillovers regarding cash transfers

and states that the impact of spillovers increases the probability of preventing child development in households. These challenges have presented an opportunity for cash plus programs to be included in community social protection discussions.

2.3 Cash “plus” Transfer

Cash plus transfers allow for better access to nutrition, education, or health, as cash plus means complementing cash transfers with programs to improve access and quality of services, because cash transfers alone may not be effective in reaching those outcomes (UNICEF 2023). The ‘plus’ in cash plus interventions offers more than just cash relief. According to (Keetie et al. 2017), we can understand Cash "plus" interventions as social protection interventions that combine ongoing transfers with additional components or linkages to enhance the income effects. (Matin 2022) reports that Ghana's Innovation for Poverty Action conducted an examination of the local cash plus intervention, concluding that it offered agricultural enhancement and training to generate income from agriculture. The assessment also examined the enrolment in the national health insurance program and the weekly coaching provided by program staff, this was all in addition to the cash transferred (Matin 2022). The addition of various complementaries to cash transfers creates a combination of benefits for participants. These combination benefits allow participants to build resilience, learn skills for their day-to-day lives, and offer financial support to mitigate conditions of extreme poverty (Matin 2022).

2.4 Objectives of the Literature review

The objectives of this literature review are to:

1. Develop an understanding of the prevalence and epidemiology of risky sexual behaviour among adolescent girls and young women.

2. scrutinize the economic evaluation methodology for health care and provide strategies for both full and partial economic evaluation.
3. examine the existing research on interventions that tackle risky sexual behaviour in adolescents, adolescent girls, young women, and females, and whether these interventions have undergone full or partial economic evaluation.

We gathered the material for this structured literature review from a variety of sources, including the following:

1. PUBMED
2. Google Scholar,
3. BMJ Global Health.

3 PREVALENCE AND EPIDIEMIOLOGY OF ROISKY BEHAVIOUR

3.1 Epidemiology of Risky Sexual Behaviour and Adolescent Girls and Young Women in Africa

Risky sexual behaviour, defined as the act of having unprotected vaginal, oral, or anal intercourse, increases the likelihood of contracting a sexually transmitted infection (STI) for medical reasons. (Glen-Spyron 2015). Similarly, (Nnebue et al. 2016) note that there is a global increase in the ages of adolescents when engaging in sexual intercourse. This risky sexual practice exposes adolescents to a range of negative health outcomes, which include unwanted pregnancy, STIs, and the Human Immunodeficiency Virus (HIV).

The health consequences of risky sexual behaviour for AGYW consist of HIV acquisition, unplanned pregnancy, transactional sex, condom use, and multiple partners. The estimated figures state that nearly 50% of the 35.3 million people who acquired HIV did so before the age of 25 (Cherie and Berhane 2012). Estimates also reveal that 333 million new cases of curable STIs occur worldwide (Cherie and Berhane 2012). Adolescents engage in risky sexual

behaviours with multiple sexual partners and also do not consistently use condoms (Cherie and Berhane 2012).

When considering unintended pregnancy, Sub-Saharan Africa measures at 91 per 1000 women. Comparatively, Europe and North America recorded 35 unintended pregnancies per 1000 women (Ajayi 2022). Estimates around the sexual debut of adolescent girls and young women state that by the age of 15, 13% had sexual intercourse, while by the age of 17, this figure increased by 30% to 43%, and by the age of 19, the figure increased by 25% to 68% who had participated in sexual intercourse (Martinez and Abma 2015).

Transactional sex estimates report that in Kenya, 52% of adolescents aged 14–17 practiced transactional sex (UNAIDS 2018). Estimates for condom use and multiple partners range from country to country. Recent findings by the South African Demographic and Health Survey stated that 50% of young women had sex before the age of 18, while 4.6% of young women had more than 2 sexual partners in the last 12 months. Only 37.7% of these young women reported that they did not use a condom during sexual intercourse (National Department of Health 2016).

These estimates of risky sexual behaviour outcomes highlighted briefly the present issues for adolescents. The following section will examine in depth these risky sexual behaviour outcomes and their impact on AGYW.

3.1.1 Risky Sexual Behaviour: AGYW & HIV Prevention

UNAIDS (2016) recorded 450,000 new HIV infections for AGYW in sub-Saharan Africa in 2015, equivalent to 8600 new infections per week. According to a South African study, new infections tend to occur in girls under the age of 15, but there is an exponential increase in HIV incidence among adolescent girls and young women between the ages of 15 and 24 (UNAIDS 2016). The data also suggests that new HIV infections are much larger in proportion among

AGYW in urban areas (UNAIDS 2016). (George et al. 2022) looked at the risk of getting HIV for AGYW in relationships with "Blessers" (transactional sex) and partners of different ages. They found that people in relationships with a blesser and an age-disparate partner were three times more likely to be HIV positive than people who were not in a relationship with a blesser or an age-disparate partner. AGYW who solely had a relationship with an age-disparate partner had a higher likelihood of HIV positivity compared to those without such a relationship. When assessing AGYW vulnerability to HIV acquisition, there are a host of issues to consider, including biological factors, behavioural factors, and structural factors. (Mathur et al. 2020) conducted a study that investigated the HIV vulnerability among AGYW from three different countries: Kenya, Malawi, and Zambia. Their study found that structural factors of food insecurity contributed to HIV vulnerability for AGYW from Kenya; equally, the study observed that lack of parental supervision was a contributing factor to HIV vulnerability among AGYW from Kenya and Zambia. (Mathur et al. 2020) also found that across the three countries, gender inequitable attitudes and a lack of HIV knowledge were associated with a higher vulnerability to HIV infection among AGYW. (Murewanhema et al. 2022) assess biological factors associated with HIV infection and find that women are more vulnerable to HIV infections than men due to a greater mucosal area exposed during penile penetration. AGYW are at a greater risk of HIV acquisition because of an underdeveloped cervix and low vaginal mucus production (Murewanhema et al., 2022). Further to this, (Murewanhema et al. 2022) states that the development of candidiasis or bacterial vaginosis increases the risk of acquiring HIV through sexual contact among AGYW. According to (UNAIDS 2016), women have a higher per-act transmission risk during sexual intercourse than men do. This is due to the larger surface area of the vaginal lining cells compared to the penis, as stated by (UNAIDS 2016). AGYW, on the other hand, may be at increased risk due to high levels of genital inflammation, and a vaginal microbiome perturbed by bacterial vaginosis could also enhance HIV acquisition

(UNAIDS 2016). The available data from across different contextual settings emphasize the same thing: AGYW are at a higher risk of HIV acquisition, which makes the AGYW population vulnerable and in need of interventions that address their vulnerability by empowering the population and reducing the likelihood of AGYW being involved in risky sexual behaviour that could result in HIV acquisition. Apart from HIV acquisition, AGYW are also at risk of unplanned pregnancy. The next section examines the scope of risky sexual behaviour among AGYW and unplanned pregnancy.

3.1.2 Risky Sexual Behaviour: AGYW & Unplanned Pregnancy

Unplanned pregnancy remains a public health concern, with as many as 44% of women globally having unintended pregnancy between 2010 and 2014 (Bearak et al., 2018). Apart from HIV acquisition, AGYW's unplanned pregnancy rate remains high. Estimates assess that globally over 16 million women aged 15-19 give birth each year, with over 50% of those women found in Sub-Saharan Africa (Yah et al., 2020). In 2013, (Yah et al. 2020) calculated that in Sub-Saharan Africa, the birth rate of adolescent girls between the ages of 15 and 19 was 101 births per 1000 women. The following can be established regarding unplanned pregnancy among AGYW, focusing particularly on Sub-Saharan Africa: Tanzania ranks 17th in the UN Population Fact Sheet for adolescent fertility, with 132 births per 1000 AGYW (United Nations Population Fund 2018). In Tanzania, 28.4% of women give birth before the age of 18, whereas over 56.4% of all first births occur when women reach the age of 20. Similarly, (McCleary-Sills et al. 2013) found that 26.6% of Tanzanian women under the age of 20 had at least one recent pregnancy that they wanted later in their life. According to (Mchunu et al. 2012), in their study of unplanned pregnancy in Soweto, South Africa, 23% of AGYW aged 13–16 were pregnant, and 14.9% were pregnant between the age range of 17–19. Another study, analysing the prevalence of unintended pregnancy among women in South Africa, found from 34946 participants that more than half, 51.6%, were unintended, with girls aged 15-19 reporting

76.3% and young women aged 20-24 reporting 56.5%, compared to older women aged 35-49 (Woldesenbet et al., 2021). The evidence clearly indicates that unintended pregnancy is a risk for AGYW and is a result of participation in risky sexual behaviour. AGYW, as a vulnerable group in Sub-Saharan Africa, requires strategies to reduce exposure to unplanned pregnancy. AGYW are equally at risk of another facet of risky sexual behaviour, which is transactional sex.

3.1.3 Risky Sexual Behaviour: AGYW & Transactional Sex

Defining transactional sex has not been an effortless task, as there have been vast interpretations for the term “transactional sex." For the purposes of this paper, we define transactional sex as a non-marital, non-commercial sexual relationship that implicitly assumes the exchange of sex for material support or other benefits (Stoebenau et al., 2016). It is certainly plausible to confuse transactional sex with sex work. However, UNAIDS, using the same definition, affirms the need to see transactional sex apart from sex work (UNAIDS 2018). The prevalence of transactional sex among AGYW in Sub-Saharan Africa has been well documented. A study (Gichane et al., 2020) found that the marital status of AGYW in Malawi was a strong predictor of transactional sex. Divorced or widowed AGYW had 2.63 times the odds of engaging in transactional sex compared to single women. The study also found that education was a strong predictor, with AGYWs with less than primary education having higher odds of transactional sex compared to those with more education. Similarly, AGYW members who experienced food insecurity in the past month had higher odds of engaging in transactional sex than those who did not. A study evaluating South African AGYW motivations in transactional sex or relationships revealed the following findings: From a sample of 4399 AGYW, those who had ever had sex reported that they had engaged in transactional sex, with 12.9% being between the ages of 20-24 and 11.2% being 11-19 years of age. The study also revealed that 16.3% of HIV-positive sexually active AGYW reported participating in

transactional sex, compared to 11.4% of HIV-negative sexually active AGYW (Duby et al., 2021). Evidence suggests that transactional sex not only increases the risk of HIV infection among AGYW but also poses a concern for them as they strive to minimize risky sexual behaviours. The evidence also demonstrates the structural associations between transactional sex and factors such as food insecurity and education. Similarly to transactional sex, condom use is an imperative component of sexual risk behaviour. The next portion assesses the prevalence of condom use and AGYW.

3.1.4 Risky Sexual Behaviour: AGYW & No Condom Use

Condom use as sexual behaviour determines the risk that AGYW attach to themselves, especially when there is inconsistent condom use. Given that AGYW are a vulnerable group, it is crucial to evaluate the prevalence of condom use among this demographic. (Mabaso et al., 2018) assessed the determinants of HIV infections among AGYW aged 15–24 in South Africa. The study found that at least 63% of AGYW who started sexual activity at the age of 15 are engaged in inconsistent condom use. Equally, the study determined that there was an increased association of HIV infection among young women aged 20-24, where odds of condom use were 1.91, as compared to adolescent girls aged 15-19. (Exavery et al. 2012) conducted a study on the role of condoms in promoting condom use among women from Tanzania. The study assessed 2614 women and found that 6.9% of women were not able to negotiate condom use with their sexual partners. The study also found that women from impoverished households were the least likely to use condoms compared to women from middle- and upper-class backgrounds. The study found that education was a significant determinant of condom use, with women with no education reporting a low 14.4% condom use rate, significantly lower than those with primary, secondary, or higher education levels. The observation from the previous study aligns with those of (Cherutich et al. 2008), who examined condom use among sexually active adolescent females from Kenya who were at risk of HIV infection. The study

found that out of 734 participants, only 2.3% were consistent condom users during the recall period, and more than 50% of the participants justified the use of condoms for preventing pregnancy as opposed to HIV. The study also established that marital status was negatively associated with condom use, as only 3.5% of women living with partners made use of condoms. The study found that adolescent girls with higher education levels were more likely to use condoms than those with only primary school or no education. Several factors may contribute to condom non-use. In their study, (Exavery et al. 2012) found that women's trust in their partners served as a dominant justification for not using condoms. Other justifications include the discomfort of condoms, partners' dislike for condoms, and limited access to condoms. A range of external factors impact AGYW and are associated with inconsistent condom use. Based on the evidence, these factors could be wealth-related, education-related, or power dynamics within the relationships. The lack of condom use poses a health risk to AGYW, one that furthers the vulnerability of this already fragile group. The final risky sexual behaviour that will be assessed is multiple sexual partners.

3.1.5 Risky Sexual Behaviour: AGYW & Multiple Sexual Partners

According to (George et al. 2022), they reported that AGYW who were involved in age-disparate relationships were twice as likely to have had more than 2 sexual partners in the last 12 months. The study also reports that AGYW who were in relationships with both “Blessers” and age-disparate individuals were three times more likely to have more than two sexual partners, while in comparison, those who were not in a relationship with blessers and age-disparate partners were less likely to have multiple sexual partners. (Onoya et al. 2015) conducted a study to assess the determinants of multiple sexual partners in South Africa. The study found that women aged 15–24 had the highest reported age of having multiple sexual partners. Similarly, the study discovered a strong correlation between multiple sexual partners and early sexual debut among AGYW, as well as a strong association between urban location

and having multiple sexual partners among AGYW. In Tanzania, (Kazaura & Masatu 2009) study of the sexual practices of unmarried Tanzanian adolescents found the following results: 6.3% of AGYW reported having multiple sex partners, while 20.4% of in-school adolescents reported having multiple sexual partners, as opposed to 8.9% of out-of-school adolescents having multiple sexual partners. According to (Exavery et al. 2012), 42% of the sexually active adolescents reported having more than one sexual partner in the last 12 months. Evidence presented shows that there is legitimate concern and prevalence of multiple sex partners being a risk indicator for sexual behaviour.

The evidence presented above emphasis how vulnerable AGYW have become, the group face many issues that could have negative impacts on their health. These include biological challenges and structural challenges. These challenges affect AGYW in terms of how they practice their sexual behaviour. This section has presented evidence that demonstrates the risk AGYW face in engaging or encountering sexual behaviours. This would further cripple their futures, as risky sexual behaviour is a barrier to a safe transition to adulthood. AGYW are at risk of HIV infection, unplanned pregnancy, transactional sex, inconsistent condom use, and multiple sexual partners. All these behaviours could negatively impact AGYW health outcomes. Therefore, the next section of this literature review will assess effective methods to assess the social protection interventions. The section will scrutinize the economic evaluation method to determine the efficacy of Cash "Plus" interventions in safeguarding adolescent girls and young women.

4. Methodological Review Economic Evaluation

Economic evaluation as a study can be defined as “the systematic appraisal of costs and benefits of projects, normally undertaken to determine the relative economic efficiency of programs. (U.S. National Library of Medicine 2014).” Economic evaluation compares costs and benefits

against each other, with the goal being to find efficiency between the two components. Economic evaluation is a tool that assists decision-makers in making decisions based on efficiency (Drummond et al. 2015), "the comparative analysis of alternative courses of action in terms of both their costs and consequences." When conducting an economic evaluation, there must be identification, measurement, value of associated costs, and the consequences in relation to the comparator (Shafie et al., 2017). To put it another way, decision makers use economic evaluation as a tool to weigh the benefits and costs of various options, enabling them to make efficient decisions (Robinson, 1993). There exist various methods for conducting economic evaluations. This section will discuss the various types of economic evaluations and provide an overview of cost analysis, including identification, measurement, and valuation. This section will examine the process of estimating effectiveness, and the elements involved in discounting and annuitizing. Lastly, this section will discuss how the ICER can effectively display efficiency.

4.1 Types of Economic Evaluation

Economic evaluation can be divided into full -economic evaluation and partial economic evaluation. Full economic evaluation includes Cost Benefit Analysis (CBA), Cost-Minimization Analysis (CMA), Cost-Effectiveness Analysis (CEA), and Cost-Utility Analysis (CUA) (Ngorsuraches, 2008) while partial evaluation is cost analysis only. This section will review all four of these economic evaluations.

4.1.1 Full -economic evaluation

4.1.1.1 Cost Benefit Analysis (CBA)

The technique of cost-benefit analysis compares the costs and benefits of interventions, expressing both in monetary units. CBA achieves this by assigning a monetary value to health outcomes, thereby expressing both benefits and costs in monetary units (Centers for Disease

Control and Prevention 2021). The comparison of benefits and costs in monetary units necessitates the translation of outcome effects such as disability days avoided, life-years gained, medical complications avoided, or QALY's gained into a monetary value, which can then be compared with program costs (Drummond et al. 2015). CBA as a decision-making technique assists policymakers to make decisions that are efficient. This is because the purpose of a CBA is to help social decision-making and efficiently allocate resources (Jiang & Marggraf, 2021).

4.1.1.2 Cost-Minimization Analysis (CMA)

Cost minimization analysis refers to the comparison of two similar interventions with the intention of knowing which of the two is less expensive (Brown & Brown, 2010). When considering CMA from a health care perspective, it means comparing the costs of an intervention that has the same medical effects (York Health Economics Consortium 2016). Considering the objective, CMA in health aims to offer the most affordable intervention with comparable medical benefits (York Health Economics Consortium 2016). However, the shortcoming of CMA is that it should not be viewed as a form of full economic evaluation (Drummond et al. 2015). (Briggs & O'Brien 2001) argue that the uncertainty of estimated costs and effects prevents a legitimate evaluation.

4.1.1.3 Cost Effectiveness Analysis (CEA)

One of the most used economic evaluation techniques is cost-effectiveness analysis (CEA). CEA compares the cost per unit of the benefit, whether this is per DALY averted or QALY gained in the intervention, which aids in finding the lowest cost intervention (Edoka & Stacey, 2020). CEA considers costs to be associated with a single, common effect that differs in outcome between the programs (Drummond et al. 2015). CEA uses a threshold value to determine efficiency or non-efficiency. This means that when the cost per unit is lower than the threshold, it will be considered efficient (Edoka & Stacey, 2020). The threshold allows for

CEA to identify the best possible value of monies (Bertram et al., 2016). CEA makes use of unit cost to obtain the lowest cost intervention based on the cost meeting the demands of the set threshold value. WHO encourages low- to middle-income countries to use the one-to- three times per capita GDP per DALY averted as the CEA threshold to determine good value for money (Edoka & Stacey, 2020).

4.1.1.4 Cost Utility Analysis (CUA)

According to (Drummond et al. 2015), CUA is a variation of cost effectiveness that utilizes a generic measure for health gain. According to (Clarke & Panopalis 2007; Wordsworth et al. 2016), CUA values the health outcomes by adjusting them based on health state preference scores or utility weights. This emphasizes a difference in approach when it comes to the treatment outcomes.

4.1.2 Partial Economic evaluation

4.1.2.1 Cost Analysis

When considering cost analysis, it is useful to know that cost analysis assists in decision-making on programs or running programs. Cost analysis provides cost information, whether individually or in combination; this requires identification of all applicable resources (Johns et al., 2003). The costs associated with overhead costs, the costs associated with differential timing of costs, and the costs associated with productivity costs play a key role in the development of a cost analysis (Drummond et al. 2015). The are two key identifiers when it comes to cost analysis, these are direct costs and indirect costs. Direct costs refer to costs which a related directly to treatment care, which may include medical costs such as hospital stays, surgeries and non-medical costs which include any costs incurred by patient and family to access treatment such as transportation (Lau 2017). Indirect costs on the other hand refer to costs that are not directly related to the core activities of the intervention, but still support the

overall operation. These include administrative overheads, and salaries for management and supervision staff (Lau 2017).

4.2 Economic evaluation key considerations

When undertaking economic evaluation there are key considerations: These include perspective, measurements, valuation, effectiveness, time-period, discounting and annuitization, and incremental cost effectiveness (ICER). The below section examines these key considerations.

4.2.1 Perspective

Perspective is key when undertaking an economic evaluation. The study perspective has implications for the study's trial design (Byford & Raftery, 1998). Understanding the study's perspective clearly enables the determination of costs based on their relevance to the perspective (Drummond et al. 2015). There are three main perspectives to consider when conducting an economic evaluation. These include provider perspective, patient perspective, and sociocultural perspective (Drummond et al. 2015).

4.2.1.1 Patient Perspective

This pertains to the patient's health-related quality of life, their personal preferences, and the portion of health expenses they bear. Patients bear these costs for health care services that their health insurance does not cover. One could identify these as direct costs for accessing health care services, such as transportation to a health facility (Tai et al., 2016).

4.2.1.2 Societal Perspective

This perspective not only considers the provider's context but also encompasses all costs and benefits that have an impact on public society (Luce and Elixhauser 2012). There are some advantages to the societal perspective, such as optimal resource allocation when applied. This would aid decision-making and an informed public discussion. The societal perspective's

disadvantage is the lack of inclusion in economic evaluations due to funding and/or setting constraints (Mohamed et al. 2017).

4.2.1.3 Providers Perspective

According to this perspective, the organization itself funds the intervention and specifically designs the evaluation for a particular customer. The provider seeks to comprehend the associated costs, potential savings from the intervention, and the enhancements in health for the targeted population (Mohamed et al. 2017). The health provider's information encompasses the costs they incurred during the delivery of the health service. These expenses include salaries, medication costs, equipment costs, and fixed assets (Dunet 2012).

4.2.2 Measurements

The cost approach is important when considering measurement in economic evaluation. The bottom-up approach, or micro-costing, and the top-down approach, or gross-costing, are the two possible approaches. The top-down or micro-costing approach measures the relevant items for resource use; this approach shows extreme accuracy. According to (Simoens 2009), top-down or gross costing calculates the average costs of resources without considering each resource individually (Simoens 2009). Applying the categorization of costs is another crucial measurement. You can categorize costs as either capital costs or recurrent (operating) costs. Capital costs refer to costs that are major assets to a firm or program, be it equipment, vehicles, buildings, or land. Recurrent costs, on the other hand, refer to costs that require ongoing expenditure; these may include water and electricity, salary and wages, and so on (Drummond et al. 2015).

4.2.3 Valuation

Assessing value for the available resource for costing is an important part of conducting an economic evaluation. Value is determined by opportunity cost, which is defined as the "cost of using resources for some purpose, measured as their value in their next best alternative use"

(Simoens, 2009). When considering opportunity cost, it refers to the value of benefits that could have been achieved in a different program but were foregone due to the commitment of resources to the first program (Drummond et al. 2015). Therefore, in economic evaluation, market prices, which are free and perfectly competitive, determine the value of resources depleted by disease and treatments (Simoens, 2009).

4.2.4 Effectiveness

There are various ways to categorize outcome measures. It could be conditioning-specific outcome, a morbidity outcome for clinical measures, a quality of life or generic health outcome, a mortality outcome for measuring the expected life years gained, or a monetary-based outcome (Lorgelly et al., 2010). The answer to the question is determined by the effectiveness of an economic evaluation. The premise involves measuring comparisons across a range of interventions, specifically using Quality Adjusted Life Years (QALYs). By combining both mortality and morbidity measures of health and weighting a year of life, QALYs enable both quality and quantity of life (Lorgelly et al., 2010). The advantage of QALY is its ability to simultaneously capture the benefits of reduced morbidity and reduced mortality, combining both into a single measure (Drummond et al. 2015). DALY is another important outcome measure in economic evaluation. DALYs, as developed by WHO, are similar to QALY; however, they differ in that disability weights in the DALY are not based on preference but were person trade-off scores. Secondly, DALYs are limited to seven health states, unlike QALYs, which can include any health state, and they also take age weights into account (Drummond et al. 2015).

4.2.5 Time Period

It is crucial to complete the economic evaluation within a specific timeframe. Hence, in economic evaluation, the time horizon is important. The time horizon refers to the duration over which health outcomes and costs are calculated (York Health Economics Consortium

2016). When selecting a time horizon, it is crucial to consider the specific intervention under consideration. The longer the horizon, the more applicable it is to ongoing medical management, whereas the shorter the time horizon, the more applicable it is for diseases with limited long-term health impacts (York Health Economics Consortium 2016).

4.2.6 Discounting & Annuitization

Discounting, a mathematical procedure, adjusts the future costs and intervention outcome to a present value (Severens & Milne, 2004). According to (Drummond et al. 2015), discounting guarantees that an effective intervention for the current population will yield present health benefits. However, it is also important to note that health benefits will occur in future periods, which means that costs incurred in the near future are of greater value than those incurred in the far future (Drummond et al. 2015). We apply a discount rate to gauge the savings. The most common global health discount rate is 3%; however, this discount rate does not consider the economic context of LMICs, where a discount rate of 5-6% is much more applicable (Haacker et al., 2020).

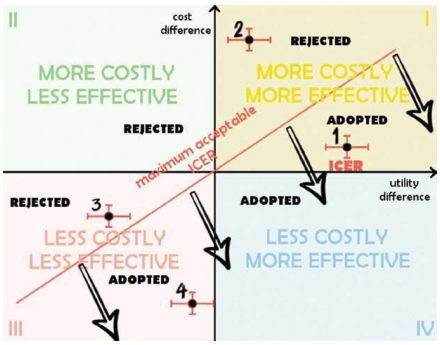
Costs that last more than a year should be annuitized. The annuitization method presents costs for a period of more than one year. Ensure to calculate the equivalent annual cost when presenting costs on an annual basis. Similarly, capital costs should be annuitized based on their useful lifetime, considering that they represent purchases made at a specific point in time but utilized over time (Drummond et al. 2015).

4.2.7 Incremental Cost-Effectiveness Ratio (ICER)

The ICER is an ideal ratio for presenting cost-effectiveness. The ICER represents the difference in costs of two interventions to the difference in outcome between the two interventions. This means that ICER assesses the cost per unit of health benefit gained when changing from one intervention to another (Bambha & Kim, 2004). The cost-effectiveness plane (Figure 1)

presents the ICER, enabling decision-makers to determine the threshold at which patients or intervention users would be willing to pay.

Figure 1: ICER Diagram



Adapted from Pirc et al. (2018)

In the above cost-effectiveness plane adapted from (Pirc et al. 2018), the quadrants all represent a certain outcome, while the red line represents the ICER threshold or willingness to pay (WTP). Effectiveness is adaptable when the cost moves further right of the x-axis, and the more the y-axis rises, so does the cost outcome increase (Pirc et al., 2018).

4.3 Challenges Associated with Systematic Reviews and Economic Evaluations

There is a growing body of literature that assess the methodological challenges associated with conducting a systematic review of economic evaluations. (Anderson 2010) notes the difficulty of synthesizing findings across studies due to substantial heterogeneity in design, cost perspective, time horizon and outcome measures. Similarly (Jefferson et al., 2002) also found that many economic reviews suffer from poor reporting standard and Inadequate use of quality appraisal tools, which affects the transparency. These studies highlight the need for rigorous methodological frameworks and critical appraisals, this allows the systematic review of economic evaluations to produce policy relevant, and valid insights.

5. Empirical Review

There has been a shift in terms of the distribution of HIV incidence, and prevalence among people; this shift has moved towards younger age-grouped females. This implies that there is a significant risk of HIV incidences for adolescent girls and young women (AGYWs) in regions such as Sub-Saharan Africa (Harling et al., 2014). Adolescent girls and young women from poor households have a higher chance of being involved in multiple sexual relationships, which exposes them to higher HIV incidences (Schaefer et al. 2017). However, health economic evaluations have provided insights into the effectiveness of cash interventions for adolescent girls and young women (AGYW) to mitigate risky sexual behaviour. Therefore, this section of the structured literature review will examine the results of various studies that have conducted economic evaluations on cash interventions to address risky sexual behaviour among adolescent girls and young women.

5.1 Economic Evaluation Studies on Cash Interventions for Reducing Risky Sexual Behaviour among Adolescent Girls and Young Women

(Terris-Prestholt et al. 2006) conducted the first study in which they examined the Mema kwa Vijana trial, a multifaceted adolescent program that addresses sexual health. The aim of the study was to examine the annual costs associated with implementing the sexual intervention. Tanzania's Mwanza village hosts the study. The study assessed the cost of the intervention through its various components, including in-school activities, community activities, youth-friendly health services, and condom distribution. The study divided each component into various phases: development, startup, trial implementation, and scale-up. The study analyzed financial and economic costs from the perspective of the providers. Over a 3-year period, the study incurred economic costs for the intervention, totalling $879,032. (Terris-Prestholt et al. 2006) note that initial development and startup costs accounted for 21% ($184596.72) of the total cost. (Terris-Prestholt et al. 2006) measured the unit costs of the intervention at $16 per adolescent in the first year and $10 per adolescent by the third year. Finally, the scale-up costs

amounted to $175,806.40. (Terris-Prestholt et al., 2006) present evidence of costs reducing as the intervention matures, and that scale of adolescents is very much with only a $1,54 increase on the initial unit cost. This study has some limitations. Two notable limitations of this study are its temporal scope, spanning from 1999 to 2001. This period spans 23 years, meaning that the current plight of adolescents, particularly adolescent girls and young women, differs significantly from that of the past. Additionally, inflation has led to significant changes in costs. Assessing the costs in the study requires caution. However, the study provides valuable insights into economic evaluation, particularly in relation to interventions aimed at addressing risky sexual behaviour in adolescents.

(Bango et al. 2022) conducted a study to evaluate the economic impact of a sports-based sexual education intervention for adolescent girls in South Africa. The SKILLZ health for girls' intervention, which collects adolescent girls through a cluster randomized cluster trial, is examined by (Bango et al., 2022). The study conducted the cost analysis from the provider perspective, using a mixed-methods approach to costing. After analyzing the costs for 2019, the ITT revealed that the average cost per adolescent girl learner per session was $9.92, and the intervention's estimated cost for the adolescent girls reached was $69.43.

According to (Bango et al. 2022), the sensitivity analysis revealed a significant correlation between costs and the participation rates of learners who did not complete the intervention. The study contributes significantly to the understanding of economic evaluation for addressing risky sexual behaviour in adolescents, as it enables decision-makers to understand not only the costs, but also the impact on individual adolescent girls, particularly when implementing these interventions in similar contexts.

The next study involves the intervention of Médecins Sans Frontières-Holland, a sexually transmitted infection service. The province of Banteay Meanchey, Camboida, implemented the intervention. The intervention was available to the general public but targeted female sex

workers. (Carrara et al. 2005) conducted an operational performance and cost analysis of the project. (Carrara et al. 2005) obtained effectiveness outcomes by retrospectively analyzing patients' records. The provider provided the costs. Unit costs for the cost-effectiveness analysis included the cost per visit, per partner treated, and per syndrome treated and cured. (Carrara et al. 2005) found that the total economic cost of the project amounted to $766,046.00. The average cost per visit was US$ 25.12, and the cost per partner receiving treatment for a STI was US$ 50.79. For female sex workers with genital discharge, the cost per syndrome cured or improved ranged from US$ 57.85–251.98. The entire process took place over a span of 30 months. Finally, (Carrara et al. 2005) note that the intervention only partially succeeded in reaching its intended target population of sex workers and their male partners. Despite decreasing unit costs, declining cure rates among sex workers led to relatively poor overall cost-effectiveness outcomes.

(Stover et al. 2014) evaluates the impact and costs of UNAIDS' HIV/AIDS investment framework for adolescents. One of the paper's key objectives is to establish the program's cost by type. According to (Stover et al. 2014), the Investment Framework will require a 45% increase in annual expenditure to nearly $5.5 billion by 2014. (Stover et al., 2014) observes that after this period, the needs will decline due to reductions in new infections. One-third of these resources are for basic programs, one-fourth for critical enablers, and 40 percent for development synergies.

7. **Conclusion**

This section of the structured literature review has analyzed studies that have conducted economic evaluations of cash interventions, focusing on their effectiveness, costs, and impacts on outcomes. These studies collectively offer valuable lessons on the economic evaluation of interventions aimed at reducing risky sexual behaviour among AGYW. The studies provided insights into initial development costs, economies of scale, participation rates, the need to have

targeted population reach, and long-term financial commitments. The studies have demonstrated their ability to assist policymakers and/or stakeholders in making evidence-based decisions. However, the studies that have been presented have only focused on cash interventions; it is necessary to establish the economic evaluation impact of cash plus interventions.

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PART B: JOURNAL MANUSCRIPT

Abstract

Background

Adolescent girls and young women (AGYW) are especially susceptible to risky sexual behaviours that increase their risk of HIV infection and other negative consequences related to their reproductive health especially in low- and middle-income countries (LMICs). Globally AGYW, who are between the ages of 15-24 are at risk of HIV infection at an average of 4900 every week, while in 2021 AGYW accounted for 63% of all new HIV infections. In response, cash interventions have become a tool to lessen financial vulnerability and provide AGYW the confidence to make safer decisions regarding their sexual health. Cash interventions such as unconditional or conditional cash transfers, there has been a reduction in certain risk behaviours among AGYW. However, these cash interventions alone are not sufficient to address the complex and full spectrum challenges faced by AGYW's. As a result, "cash plus" interventions, which combine cash with complementary services such as training, health care, and skill development have piqued interest as potentially more effective fixes. The premise of this systematic review is to examine the economic evaluations of these "cash plus" programs and their effect on reducing risky sexual behaviours among AGYW in LMICs.

Methods

A systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A comprehensive search was performed on several electronic databases, including EbscoHost, PubMed, Cochrane Library, Web of Science, and Scopus, along with relevant grey literature. The review included economic evaluations of cash "plus" interventions aimed at reducing risky sexual behaviour among AGYW in LMICs, and studies between 1 January 2000 – 31 December 2023. Studies were screened for eligibility based on pre-defined inclusion criteria, and data were extracted into a synthesis table. Costs were adjusted to 2023 U.S. Dollars (USD) to standardize economic evaluations across studies. Full and partial economic evaluations, including cost-effectiveness analysis (CEA), cost-utility analysis (CUA), and cost-benefit analysis (CBA), were analysed.

Results

A total of 40 articles were retrieved, of which six studies met the inclusion criteria. These studies were conducted between 2018 and 2022 and were all based in Sub-Saharan Africa, specifically in Kenya, Uganda, and Liberia. The population covered in the six studies totalled 15,517 AGYW, with interventions targeting a wide age range of 12 to 24 years. The

interventions included programs like DREAMS, Empowerment and Livelihood for Adolescents (ELA), Girl Empower Plus (GE+), and Bridge PLUS, among others.

Economic evaluations revealed mixed results regarding the cost-effectiveness of the interventions. Five studies performed full economic evaluations using CEA and CBA. One study conducted partial economic evaluation (cost analysis). The total unit cost among the six amounted to $2 446,90, but when the total unit cost was adjusted for 2023 value, the amount increased to $2 881,60.

Conclusion

The systematic review suggests that cash "plus" interventions aimed at reducing risky sexual behaviours among AGYW in Sub-Saharan Africa are cost-effective, particularly over longer time frames. The review highlights the need for further research into the long-term, non-monetary benefits of these interventions, such as improvements in health, education, and social well-being, to fully assess their value. The mixed economic evaluations and inflation-adjusted unit costs highlight the importance of ongoing research and careful resource allocation. The results underscore the importance of targeted, comprehensive strategies in addressing the complex needs of AGYW, while also pointing to the challenges of scaling such interventions in resource-constrained environments.

Economic evaluation of cash "plus" interventions for risky sexual behaviour among Adolescent Girls & Young Women in low and middle-income countries: A systematic review

Introduction

As a vulnerable group in society, adolescent girls and young women (AGYW) are at risk of participating in risky sexual behaviours. In 2021 AGYW accounted for 63% of new HIV infections (1). In 2022, new HIV infections totalled 1.3 million, with women and girls comprising 598,000 of these cases (2). The exposure of AGYW to risky sexual behaviour is more evident in low- and middle-income regions. In the Asia & Pacific region, one in 10 females aged 15–24 reported having sex with a partner who was at least 10 years older in the last 12 months (3). UNAIDS reports that every week, at least 4,900 AGYW aged 15-24 globally contract HIV (2).

Cash transfer interventions have emerged as a promising strategy for AGYW. These interventions offer financial support, reducing economic vulnerability and empowering AGYW to make safer sexual and reproductive health choices. (4) The Zomba Cash Transfer Program, a conditional cash transfer intervention for AGYW in Malawi, the intervention provided school fees or cash transfers to current school-going girls and recent dropouts to stay or return to school. The intervention showed a decline in early marriage, teen pregnancy, and self-reported sexual activity. The intervention encouraged AGYW who dropped out of school at baseline to return, resulting in a 40% decrease in the probability of getting married and a 30% decrease in the probability of becoming pregnant (4).

Similarly, a combined microfinance and training intervention (5) on HIV risk behaviour among AGYW in rural South Africa, where the study evaluated baseline data and data from two years post-intervention, assessing HIV risk behaviour among female participants aged 14–35. The

responses were compared to a control group of women from the same age and poverty groups in control villages. Intervention effects were calculated using adjusted risk ratios. After two years, compared to the control group, participants had higher levels of HIV-related communication, were more likely to have accessed voluntary counselling and testing, and were less likely to have had unprotected sex at last intercourse with a non-spousal partner (5).

While there is significant evidence supporting the effectiveness of cash transfer programs in reducing risky sexual behaviour among AGYW, UNICEF found that cash transfers play an important role in transitioning adolescent girls to secondary school. Cash transfers had more than a 50% return-to-school outcome for out-of-school girls and improved the economic livelihoods of AGYW (6).

However, cash transfer programs have some shortcomings. One issue is that studies have indicated that AGYW return to risky sexual behaviours once the intervention program is terminated (7). This highlights the lack of sustained impact, which exists for this vulnerable group. Equally while cash provides immediate financial relief, the intervention is not able to strengthen deeper aspects such as self-efficacy, decision making power and long-term resilience (8). This points directly to how cash on its own is not sufficient to address the complex, interlinked social and economic drivers of HIV risk among AGYW. Another issue to consider is that cash transfers may encounter difficulties when scaled up. There is a need for significant focus on scaling cash transfers and evaluating the program's effectiveness in larger populations (9). Another issue is the possible spillover of cash benefits to non-beneficiaries. The issue of spillovers can have a negative impact on children and AGYW development in households, as the benefits of the intervention won't totally reach them (10). These challenges have created an opportunity for "cash plus" programs to become part of social protection interventions for vulnerable groups, particularly AGYW.

AGYW require interventions that address a mix of social, biological, physical, and cultural

experiences that affect their well-being (11). Cash-only interventions may not meet the needs of AGYW due to the level of risk they face. In order to address the AGYW complex needs, "cash plus" interventions are introduced. Cash "plus," as formally defined, refers to a combination of cash transfers and one or more types of complementary support. These could consist of in-kind transfers, information, behaviour-changing communication, or psychosocial support. Cash "plus" complementaries could also include external components such as direct provision of access to services or facility linkages to services (12).

"Cash plus" interventions also have a broader impact on the social determinants of health, such as education, health services, and skills development, alongside cash transfers (13). The Kenya Red Cross implemented a "Cash Plus" intervention to reduce HIV prevalence among AGYW in Kenya, the project greatly contributed to AGYW's economic empowerment and demonstrated shared benefits with the community (14).

Although "cash plus" transfers have emerged as a promising intervention, offering economic support alongside holistic strategies to empower vulnerable populations, policymakers face challenges with resource constraints when trying to scale up efforts to reduce the risk that AGYW face in LMICs. Economic evaluation has emerged as a tool to aid decision makers and/or policymakers in health care, especially in terms of resource allocations for interventions. The ability of economic evaluation to help policymakers or decision-makers assess which intervention offers the best value for money has become important.

Thus, this study sought to synthesize and critically review evidence on economic evaluations of cash 'plus' interventions for adolescent girls and young women (AGYW) in relation to risky sexual behaviour and HIV risk in low- and middle-income countries. The systematic review is expected to answer the following questions:

1. In what countries or regions were the economic evaluation focused?
2. What economic evaluation methods or techniques have been used to evaluate these

interventions?

3. What kind of data has been used in conducting economic evaluations for these interventions?

4. What is the estimated unit costs of different models of cash "plus" interventions? What are the underlying assumptions of the Economic Evaluations?

Methods

Search Strategy

The search was conducted on the following electronic platforms: EbscoHost, PubMed, Cochrane Library, Web of Science, Scopus. We also made use of relevant grey literature. The key terms used for the search terms were influenced by the PICO guideline of Population, intervention, comparator, and outcome. Below. The key terms were as follows:

Population

["adolescent" OR "adolescents" OR "girl" OR "girls" OR "females" OR "young females" "young women" OR "women" OR "teenagers" OR "10-15" OR "15-18" OR "18-24 OR "low-income countries" OR "middle-income countries"]

Intervention

[cash "plus" transfer OR "unit costs' OR "economic evaluation" OR "economic" OR "costs" OR "cost analysis" OR "cost benefit analysis" OR "cost utility analysis" OR "cost effective analysis" OR "CBA" OR "CUA" OR "CEA"]

Comparator

["No Cash" OR "Cash Transfer" OR "Unconditional Cash Transfer" OR "Conditional Cash Transfer" OR "economic evaluation" OR "economic" OR "costs" OR "cost analysis" OR "cost benefit analysis" OR "cost utility analysis" OR "cost effective analysis" OR "CBA" OR "CUA" OR "CEA"]

Outcomes

["Risky Sexual Behaviour" OR "Risky Behaviour" OR "Transactional Sex" OR "Unplanned Pregnancy" OR "No Condom Use" OR "Multiple Partners" OR Multiple Sexual Partners" OR "HIV" OR "QALYs" OR "DALYs" OR "STD"].

Reporting Standards

The review for this was systematically guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), which ensured a comprehensive and transparent approach to identifying, selecting, and synthesizing relevant studies.

Inclusion Criteria

Type of studies

Publications between the period of 1 January 2000 to 31 December 2023 were the parameter of consideration of the systematic review. Randomized controlled trials (RCTs) and interventional studies of economic evaluation of cash plus interventions which address risky sexual behaviours such as transactional Sex, unplanned Pregnancy, no condom use, multiple partners, HIV included. We included studies if they covered at any LMIC countries Peer-reviewed published articles; grey literature including conference abstracts, and project reports; published in English language; randomized controlled trials (RCTs) and interventional studies of economic evaluation of cash "plus" interventions. PICOS was used to guide the eligibility criteria of studies on economic evaluation included. Searches were restricted to English This includes partial or full economic evaluation. Partial economic costing being studies focusing on cost analysis or cost minimisation analysis. The full economic evaluation studies included: cost-Effectiveness Analysis (CEA), cost-utility analyses (CUA) and cost benefit analysis (CBA).

Exclusion criteria

The following studies were excluded from the Systematic Review. Studies not specific to AGYW (i.e., no disaggregated data by age and sex); letters, editorials, guidelines, case reports; studies from high income countries; qualitative studies; any form of reviews (systematic, scoping); impact evaluation studies and studies conducted outside of LMIC countries.

Data Management & Selection Process

We used Mendeley as the reference manager to export and store the identified references. Three reviewers oversaw the selection process. The first and second reviewers conducted the screening, where the first step included screening for any duplicates and removing them. The next step involved screening by title, followed by screening by abstract. We then proceeded to review the remaining full text of the articles. To resolve the disagreement between the first and second reviewers and reach a final resolution, the third reviewer was only consulted.

Data synthesis

We used an Excel data synthesis table to extract data from the various selected articles. The synthesis table includes each study's essential information. Authors, the economic evaluation type, study design, data source, country/setting, location (national/subnational), population size, intervention comparator, intervention description, platform, intervention type, outcome measure, types of costs, and perspective are all taken into consideration. "Coverage scenarios modelled," assumptions, estimated unit costs, discount rate used, time horizon, uncertainty, Key, Results/Points, Quality considerations, Reference. We have adjusted for inflation in cost studies conducted before 2023 to present all costs in 2023 U.S. Dollars (USD). This process involved using the World Bank Consumer Price Index to inflate costs from their original costing year to 2023. We converted all costs not reported in USD for research studies conducted

over multiple years to USD using the applicable exchange rates for the specific study year. After conversion, we inflated the costs to 2023 USD using the Consumer Price Indices.

Study Approval

This study is a secondary analysis, which does not involve human subjects. However, study approval was obtained from the Departmental Research Committee, which is the School of Public Health at the University of Cape Town (UCT).

Results

Descriptive Findings

We retrieved a total number of 40 articles from the various search platforms. A process to remove duplicates followed, and 2 duplicates were removed, and 38 articles remained. We then screened by title and by abstract, a total of 22 articles were excluded. The remaining 16 articles were subject to full text screening. Based on the full-text screening only 6 (15, 16, 17, 18, 19, 20) studies met the inclusion criteria, as seen in the diagram on (Figure 1). These 6 studies included four (15, 16, 18, & 19) journal studies and two (17 & 20) grey literature sources. The study characteristics of the 6 studies are presented in table 1. The studies span over a six-year period, with two studies dated in 2018 and 2020, one study dated in 2019. The final study is dated in the year 2022. All the studies were from the African continent, with five studies being from East Africa (Kenya and Uganda), and one from West Africa (Liberia). In terms of the population of the AGYW in the studies, the following can be presented. From the included papers, the total population of adolescent girls and young women was 15517, which was made up of 6383 for the DREAMS (15) intervention in Kenya, 4099 for the AGI-Kenya (20) intervention, 789 for the Bridge PLUS from Uganda (18 &19), 3474 for the Empower Livelihood Adolescent (ELA) in Uganda (16), and 772 from the Girl Empower Plus in Libera

(17). The age range for the adolescent girls and young women was from 12 years to 24 years of age, this meets our inclusion criteria and WHO guidelines (21).

Intervention Findings

The interventions in the six studies included Bridge PLUS, DREAMS intervention, Girl Empower Plus (GE+), Empowerment Livelihood Adolescent (ELA), and Adolescent Girl Initiative (AGI). The comparator for Bridge PLUS was Usual Care and Bridges (18 &19), and the comparator for GE+ was the usual care intervention Girl Empower (GE) (17). The comparator for ELA was the control group, which received no club (16). The AGI intervention compared itself with adolescents who received no care, and a cash only intervention (20), while in contrast the DREAMS intervention had no comparator (15). The Bridge PLUS as an intervention included standard care along with a matched saving of 2:1, and two components which include the following 1) workshops aimed at asset building, financial literacy, and future planning, and 2) peer mentors to reinforce learning. The AGI intervention had four different package components, which were 1) Violence Prevention (V-only) 2) Violence Prevention + Education (VE) 3) Violence Prevention + Education + Health (VEH) 4) Violence Prevention + Education + Health + Wealth Creation (VEHW/full program package). The DREAMS intervention aims to Reduce HIV risk through youth-friendly reproductive health care and social asset building, and 2) Offering education subsidies, and combination economic strengthening measures programs. The GE+ intervention included the following package components 1) comprehensive life skills curriculum implemented by mentors made up of young women from the local communities, 2) A parent/caregiver learning group that complemented the learning and asset building of the girls, 3) Capacity building and training of local health and psychosocial service providers to provide quality services to survivors of gender-based violence, 4) The creation of individual savings accounts for the girls with an initial deposit made through the program. Finally, ELA programme components included

vocational skills training through a series of courses on income generating activities with focus on establishing small scale enterprises. Supplemented with financial literacy courses. Courses on SRH, menstruation, pregnancy, STIs, HIV awareness, family planning, and rape; also include conflict management and negotiation skills along with practical legal knowledge (e.g., bride price, child marriage, and VAW). Intervention costs and ICERs were extracted from the five studies included in the systematic review. The costs and ICERs are presented on table 2, which makes a summary of the included studies. The summary presents the costing data, outcome measures, sensitivity analysis, intervention costs and ICERs all presented in the United States Dollar.

Outcomes of Interventions

The six interventions address risky sexual behaviour outcomes in different ways. All the interventions evaluated the efficacy of AGYW in implementing HIV preventative measures. Our systematic review also shows that unplanned pregnancy is nearly consistent as an outcome among the interventions, bar GE+. Transactional sex and multiple sexual partners are the two outcomes that showed the most inconsistency. Only 33% (2/6) of the interventions tackled transactional sex as an outcome, while 17% (1/6) concentrated on multiple sexual partners. HIV knowledge and preventative tools, along with unplanned or early pregnancy, appear to be the primary focus of interventions aimed at reducing risky sexual behaviour among AGYW.

Methodological Findings

A total of four studies mentioned the economic perspective they used (15, 18, 19 & 20). Three of the 6 (3/6) studies adopted the provider perspective to conduct the evaluation analysis (15, 18 & 19), while only one (1/6) mentioned the societal perspective (20). The were only two studies which did not stipulate from which the perspective the economic evaluation (16 & 17). The costing data for only three studies was mentioned that the cost data was collected

retrospectively, as opposed to prospectively (15, 18 & 19). The studies from AGI-Kenya, ELA, and GE+ did not state how the cost data was collected. Regarding the sensitivity analysis, 50% (3/6) of the studies reported having performed a sensitivity analysis (15, 18 & 19), while 50% (3/6) did not report doing a sensitivity analysis (16, 17 & 20). The one-way sensitivity analysis was done by 33% (2/6), which was the most common analysis. In terms of economic evaluation techniques, our findings show that from the six studies, one study conducted a partial economic evaluation (15), and the other five studies conducted a full economic evaluation (16, 17, 18, 19 & 20). The one partial economic evaluation was a cost analysis. The five full economic evaluations were three cost effectiveness analysis and two cost benefit analysis. The systematic review also revealed that out of the six studies, only one study was done within a 12-month study period (15). The other five were done over a period of longer than 12 months (16, 17, 18, 19 & 20). Our findings also show that of these six studies included in the review. There was a total of three studies that did not report discounting (16, 17 & 20). The studies that accounted for discounting reported a discount percentage of 3% were three (15, 18 & 19). The outcome measure varied across the six studies. One study evaluated the outcome measure in terms of unit cost per Adolescent Girl and Young Woman (AGYW), while three studies assessed the outcome using the Incremental Cost-Effectiveness Ratio (ICER). Additionally, two studies examined the outcome in terms of monetary benefits per AGYW.

Adjusted Estimated Unit Cost

Table 4 summarizes the adjusted unit costs of the cash plus the AGYW interventions across the different countries. The interventions include DREAMS (Kenya), Empowerment Livelihood Adolescents (Uganda), Girl Empower Plus (Liberia), Bridges Plus (Uganda), and the Adolescent Girl Initiative (Kenya). Each study adjusts the unit costs from its cost year to 2023 values. The DREAMS intervention was the only one that did not undergo a cost adjustment, as the CPI maintained its consistency (22). The CPI increased the cost of

interventions such as the ELA, Bridges Plus, and Adolescent Girl Initiative (22). However, the Girl Empower Plus programme experienced a decrease in its adjusted cost (22). Overall, the total unit cost across all interventions increased from $2,446.90 in the study years to $2,881.60 in 2023. When adjusted for the AGYW population included in the systematic review (15,517 individuals), the total unit cost per AGYW increased from $0.16 to $0.19.

Figure 1: PRISMA DIAGRAM

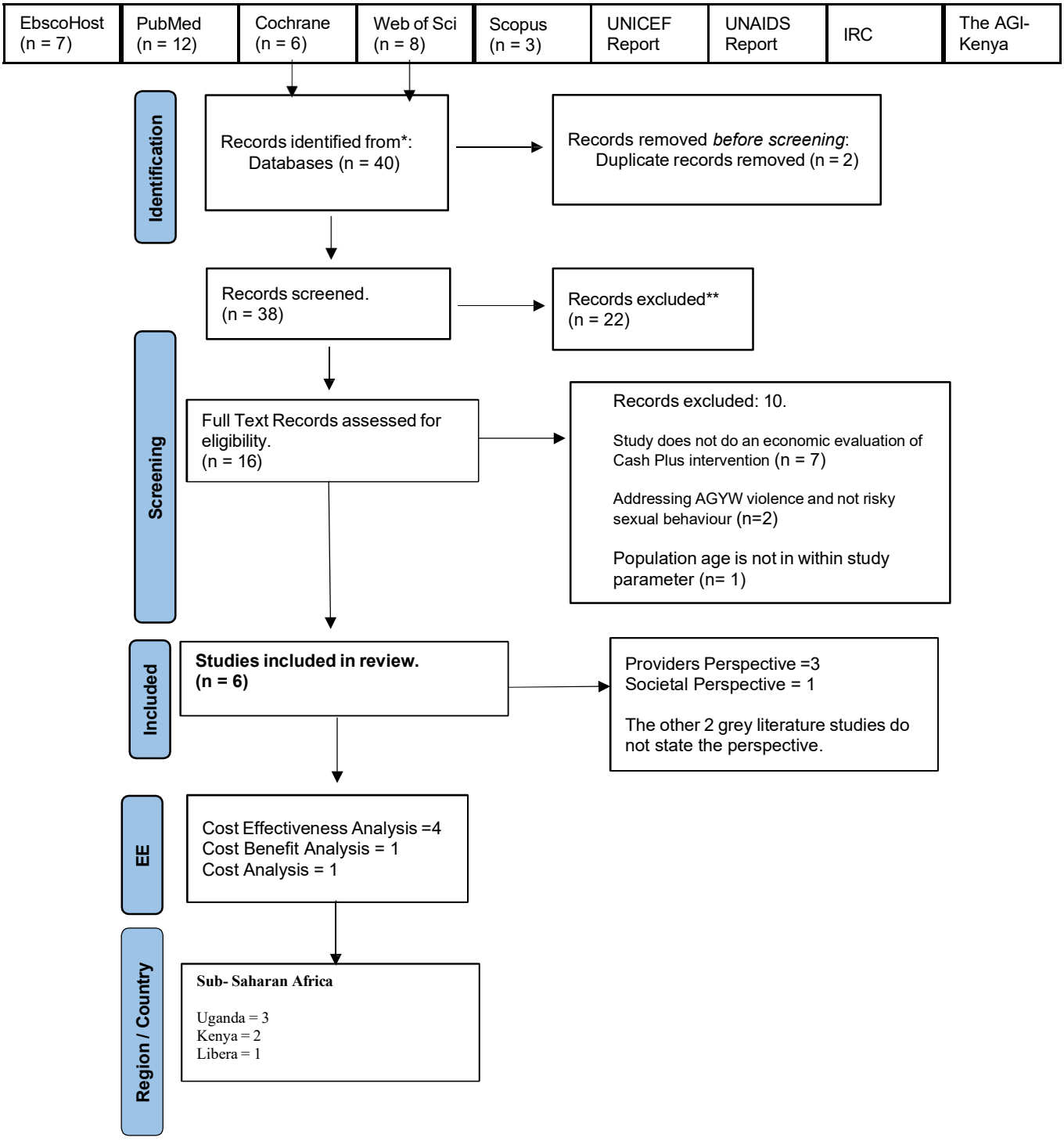

Table 1: Study Characteristics

Intervention	Author	Year	Country	Perspective	Exposure	Comparator
DREAMS Intervention						
DREAMS	Okal et el.,	2022	Kenya	Providers Perspective	Risky Sexual Behaviour	CA of DREAMS in Peri-urban compared to Urban area
Girl Empower Plus (GE+)						
Girl Empower Plus (GE+)	Özler, Hallman, Guimond, et al.,	2020	Libera	Not Reported	Risky Sexual Behaviour	Usual Cash Transfer (GE)
Empowerment and Livelihood for Adolescents (ELA)						
Empowerment and Livelihood for Adolescents (ELA)	Bandiera, Buehren, Burgess, et al.,	2020	Uganda	Not Reported	SRH, Poverty, Violence	Usual Care Cash transfer
Bridges PLUS Intervention						
Bridges Plus	Tozan et el.,	2019	Uganda	Providers Perspective	HIV Exposure	Usual Care & Bridges
Bridges Plus	Ssewamala et el.,	2018	Uganda	Providers Perspective	HIV Exposure	Usual Care & Bridges
AGI-Kenya Intervention						
Adolescent Girl Initiative _ Kenya (AGI-Kenya)	Austrian et el.,	2018	Kenya	Societal Perspective	Violence, SRH, Poverty, and Education	Usual Conditional Cash Transfer

Table 2: Methodological Characteristics of Articles

Author Reference	Year	Country	Population (n=)	Intervention	Type of Economic Evaluation	Costing Data	Sensitivity Analysis	Outcome measure	Study Duration	Discount Rate	Cost per AGYW (USD)	ICER (USD)	Estimated Adjusted Cost (2023)
Okal et el.,	2022	Kenya	Adolescent Girls (n=6383)	DREAMS	Cost Analysis	Retrospective	Two-Way	HIV Prevention, Condom Use and Multiple Sexual Partners	12 Months	3%	$129 in Peri-Urban Setting $67 in Urban setting	No	Remains $196
Bandiera, Buehren, Burgess, et al.,	2020	Uganda	Adolescent Girls and Young Women (n=3474)	Empowerment Livelihood Adolescents (ELA)	Cost Benefit Analysis	Not Reported	Not Reported	Courses on SRH, STIs, HIV awareness, family planning.	24 Months	Not Reported	$17.9	No	Adjusted to $7.98
Özler, Hallman, Guimond, et al.,	2020	Liberia	Adolescent Girls and Young Women (n=772)	Girl Empower Plus (GE+)	Cost Effectiveness Analysis	Not Reported	Not Reported	Reproductive Health; Leadership and Empowerment; and Setting life goals.	12 Months	Not Reported	$1230	$1302	Adjusted to $4524.26
Ssewamala et el.,	2018	Uganda	Adolescents Girls (789)	Bridges Plus	Cost effectiveness analysis	Retrospective	One-Way	Sexual risk-taking intentions, HIV prevention intention, and HIV knowledge	24 Months	3%	$426.00	$172.55	$884.76

Tozan et el.,	2019	Uganda	Adolescent Girls (n=789)	Bridges Plus	Cost effectiveness analysis	Retrospective	Two-Way	Sexual risk-taking intentions, HIV prevention intention, and HIV knowledge	48 Months	3%	$428.00	$298.00	$796.96
Austrian et el.,	2018	Kenya	Adolescent Girls & Younge Women (n=4099)	Adolescent Girl Initiative _ Kenya (AGI-Kenya)	Cost Benefit Analysis	Not Reported	Not Reported	Health: health and life-skills training led by a trained female mentor	24 Months	Not Reported	$149	No	$212.47

Table 3: Quality Assessment of Articles based on CHEERS Checklist

Section/topic	Item	Article					
		Okal et el.,2022	**Bandiera et al.,2020**	**Özler et al.,2020**	**Ssewamala et el.,2018**	**Tozan et el.,2019**	**Austrian et el 2018**
Title	1	Yes	Yes	Yes	Yes	Yes	Yes
Abstract	2	Yes	Yes	No	Yes	Yes	Yes
Introduction							
Background and objectives	3	Yes	Yes	Yes	Yes	Yes	Yes
Methods							
Health economic analysis plan	4	Yes	No	Yes	Yes	Yes	No
Study population	5	Yes	Yes	Yes	Yes	Yes	Yes
Setting and location	6	Yes	Yes	Yes	Yes	Yes	Yes
Comparators	7	Yes	Yes	Yes	Yes	Yes	Yes
Perspective	8	Yes	No	No	Yes	Yes	Yes
Time Horizon	9	Yes	Yes	Yes	Yes	Yes	Yes
Discount Rate	10	Yes	No	No	Yes	Yes	No
Selection Outcomes	11	Yes	Yes	Yes	No	No	No
Measurement of Outcomes	12	No	No	No	No	No	No
Valuation of Outcomes	13		Yes	No	No	No	No
Measurement and valuation of resources and costs	14	Yes	Yes	Yes	Yes	Yes	No
Currency, price date, and conversion	15	Yes	Yes	Yes	Yes	Yes	No
Rationale and description of model	16	Yes	No	Yes	Yes	Yes	No
Analytics and assumptions	17	Yes	No	No	Yes	Yes	No
Characterising heterogeneity	18	No	Yes	No	No	No	Yes
Characterising distributional effects	19	Yes	Yes	No	Yes	Yes	Yes
Characterising uncertainty	20	Yes	No	No	Yes	Yes	No
Approach to engagement with patients and others affected by the study	21	No	Yes	No	No	No	No

Results							
Study parameters	22	Yes	Yes	No	Yes	Yes	No
Summary of main results	23	Yes	Yes	No	Yes	Yes	Yes
Effect of uncertainty	24	Yes	No	No	Yes	Yes	No
Effect of engagement with patients and others affected by the study	25	Yes	Yes	No	Yes	Yes	No
Discussion							
Study findings, limitations, generalisability, and current knowledge	26	Yes	Yes	No	Yes	Yes	Yes
Other relevant Information							
Source of funding	27	No	Yes	No	Yes	Yes	No
Conflicts of interest	28	No	No	No	Yes	Yes	No

Table 4: Adjusted Estimated Unit Costs

Adjusted Unit Costs of Cash Plus Interventions						
Intervention	**Country**	**Cost Year**	**CPI at year of study**	**CPI at 2023**	**Unit Cost as per Study year**	**Adjusted Unit Cost as 2023**
DREAMS Intervention	Kenya	2022	7,7%	7,7%	$196,00	$196,00
Empowerment Livelihood Adolescents	Uganda	2020	3,3%	5,4%	$17,90	$29,29
Girl Empower Plus	Liberia	2020	17,0%	10,09%	$1 230,00	$730,04
Bridges Plus	Uganda	2019	2,9%	5,4%	$426,00	$793,24
Bridges Plus	Uganda	2018	2,6%	5,4%	$428,00	$888,92
Adolescent Girl Initiative- Kenya	Kenya	2018	4,7%	7,7%	$149,00	$244,11
Total Unit Cost					**$2 446,G0**	**$2 881,60**
Total Unit Cost as per AGYW in the Systematic Review Population TUC/15517					**$0,16**	**$0,1G**

Discussion

In the systematic review we conducted, we established that from the six studies identified (15, 16, 17, 18, 19, 20), there were more studies that conducted a full economic evaluation, while it was only one study (15) that conducted a cost analysis (partial economic evaluation). In terms of the studies that conducted a full economic evaluation, five studies conducted a cost effectiveness analysis (16, 17, 18, 19, 20). There was no cost utility analysis, or cost minimization analysis. The systematic review indicates that Cash "plus" interventions which have done a full economic evaluation were cost effective and were able to reduce various health outcomes specifically reducing risky sexual behaviours among AGYW. The Bridge PLUS intervention indicated that at 24 months there was no cost effectiveness for HIV knowledge and Sexual Health, however at 48 months there was cost effectiveness for HIV knowledge and Sexual health with $252 and $298 per unit of change respectively (18 & 19). The GE+ intervention establishes cost effectiveness 24 months post implementation at $1302 per 50% reduction in risky sexual behaviours of multiple sexual partners, and condom use among

AGYW (17). Equally, AGI-Kenya, although underwent a cost effectiveness evaluation 24 months post intervention, the study established that out of the four components of the intervention, the sexual health intervention was not cost-effective, compared to the education intervention (20). Finally, despite the cost-effectiveness of interventions such as GE+ in reducing sexual behaviour, these programs come with significant costs. For instance, the GE+ program, which includes cash transfers and health services for AGYW, incurs a substantial financial investment of approximately $1230.00 per AGYW participant. Similarly, other interventions, like Bridge PLUS, have shown mixed outcomes depending on the time frame of the evaluation. These variations in outcomes highlight the significance of timing in evaluations, as the conduct of the assessment can alter the perceived effectiveness of an intervention. (17, 18, 19). In the context of economic evaluations, both the duration of the intervention and the follow-up period critically influence cost estimates and the projected impact on the target population. Longer interventions or delayed assessments may reveal additional costs or benefits that short-term evaluations might overlook (23).

Due to differences in time frames used, there is a higher possibility of variations in cost effectiveness of the interventions, where the longer the time horizon, the more an intervention may yield comprehensive results, but also increase the likelihood of uncertainty due to possible contextual changes of overtime (24). The cost effectiveness analysis overall also provides insights into the necessity of targeted interventions to drive positive long terms outcomes.

Our systematic review has also established that all the studies were in Sub-Saharan Africa. This is also consistent with various studies over the plight of adolescent girls and young women in Sub Saharan Africa (2, 3, 25, 26). Kenya and Uganda are the leading countries where economic evaluations have been done on cash “plus” interventions. This supports various literature regarding the risk of AGYW in both these countries (27, 28, 29). However, our systematic review only being able to source six studies of economic evaluated cash “plus” intervention for

AGYW and their risky sexual behaviours speaks to the issue of financial constraints in the Sub-Saharan African region. Funding majority is allocated to economic evaluation studies that address communicable diseases in Sub-Saharan Africa (30). In the context of AGYW, there is also a small amount of studies which also examine cash "plus" interventions, which target various adolescent risks (27). Focus should be given in allocating more funding towards studies that examine economic evaluation of AGYW interventions. This forms part of the overall target to improve the quality of economic evaluation in low-middle income countries (31).

The systematic review also gave evidence of the usage of different perspectives by the studies. Half of the studies adopted the providers perspective, and only one reported the societal perspective. The providers perspective allows for better cost control and resource allocation, as providers focus on costs incurred, and allow health providers to determine better ways to manage both costs and resources. The providers' perspective also allows the for better funding opportunity as the provider can leverage the economic evaluation for better funding by demonstrating how cost effective the programme (32). Promoting a societal perspective means considering an intervention's broader social effects in addition to its immediate health costs and benefits (33). This covers things like lost productivity, unpaid care expenses, and more general economic impacts like adjustments to career or educational outcomes (33). Another approach would be combined perspectives, where it would offer full impact of intervention, and reduce the narrow focus on outcomes only. It would also mean improved resource allocation, and a better promotion of equity and fairness. Combining perspectives has several benefits and a more comprehensive cost effectiveness outcome. It guarantees that choices are made with the best interests of society as a whole and health outcomes in mind (31, 32).

Economic evaluations have uncertainties owing to a lack of available evidence and unexplained variations (34). Therefore, uncertainty or assumptions must be reviewed. The underlying assumptions across the six studies focus on the idea that incentivized savings, mentorship, education, and cash transfers can lead to long-term positive sexual health outcomes for AGYW. The interventions assume that standardized health and behavioural outcomes, such as self-efficacy, HIV knowledge, education, and sexual health, are reliable indicators of future well-being among AGYW. The interventions also rely on the assumption that providing financial support, either through cash transfers or savings accounts, leads to sustainable improvements in participants' sexual health behaviours. A critical assumption is that the positive effects observed in the short-to-medium term (24 to 48 months) will continue even after the interventions conclude.

From a cost perspective, the studies assume that the reported costs accurately reflect the true expense of delivering the interventions and will remain stable over time. The assumption of scalability, particularly in the Girl Empower program, suggests that the per-participant cost will decrease as the program reaches larger populations. Finally, the studies assume that the socioeconomic environment remains stable, allowing the interventions to proceed without major external disruptions and that they are equally effective across different regions or populations facing similar challenges.

Using the CHEERS checklist as the benchmark, considerable inconsistencies were observed. Notably, several studies did not report discount rates (16, 17 & 20), and perspectives (16 & 17) which are critical elements of economic evaluation. Equally, the consistent omission of valuation and measurement across all studies. The lack of reporting on uncertainty analysis, and stakeholder engagement have an impact on transparency and comparability with other studies. This leads to a reduction of confidence in generalizability of the findings. Therefore, while promising trends are identified, the conclusions drawn must be interpreted cautiously, with the understanding of methodological gaps in the primary studies may have influenced the direction

and strength of evidence.

As per our systematic review and standardized unit cost, we can establish that after adjusting the costs and focusing on the population of 7,944 adolescent girls and young women (AGYW), the unit cost per AGYW for the interventions evaluated through cost analysis is very low, at just $0.67. This suggests that the interventions, even after adjustment, were implemented at a relatively low per-person cost. Secondly, the estimated monetary benefits per AGYW from studies that conducted a cost-benefit analysis were notably low, at just $0.01 per AGYW. This indicates that while the costs of delivering the interventions were minimal, the tangible financial benefits for participants, as measured by these studies, are extremely small. This might raise concerns about the financial return on investment for these interventions, especially in terms of measurable monetary benefits for the AGYW population. There is a large discrepancy between the low costs per AGYW and the almost negligible monetary benefits, suggesting that while the interventions are low-cost, their immediate financial returns (as measured by cost-benefit analysis) are limited. Further research should be done for long-term health or non-monetary benefits of these interventions to fully assess their value.

Study Limitations

The systematic review included only six studies, which may not be fully representative of all interventions aimed at reducing risky sexual behaviours among AGYW. One of the limitations relates to methodological limitations which are inherent to systematic reviews of economic evaluations. Substantial heterogeneity in cost-effectiveness, such as different analytic approaches, time horizons, perspectives, and outcome measures, all can impact the comparability and synthesis of findings (35). Further to this is the poor reporting quality and inconsistent use of standardized guidelines, which compromise the transparency of economic evaluations (36)

Equally the small sample size limits the generalizability of the findings and may not capture a

broader range of economic evaluations across different regions or interventions. All the studies included were from Sub-Saharan Africa, with most from East Africa. While this reflects the high-risk context in these areas, it may not provide insights into how cash "plus" interventions perform in other regions of the world, limiting the ability to compare interventions across diverse contexts. Only half of the studies reported using a provider's perspective, with just one adopting a societal perspective.

Additionally, some studies did not report how cost data was collected (prospectively or retrospectively), which limits the transparency and robustness of the economic evaluations. Inconsistent reporting of perspectives and cost data collection methods could affect the accuracy and comparability of results. Out of the six studies, only two conducted a cost-benefit analysis, and the financial benefits reported were very low. This narrow focus on cost-effectiveness analysis (CEA) without other forms of economic evaluation, such as cost-utility analysis (CUA), limits the comprehensive understanding of the broader economic value of these interventions. Only one study was conducted over a 12-month period, with the others spanning longer. However, not all studies applied discounting, which is necessary for long-term evaluations. Inadequate discounting could lead to inaccurate assessments of future costs and benefits, especially for interventions whose outcomes manifest over extended periods. Some interventions, such as DREAMS, lacked comparators, making it difficult to evaluate their relative effectiveness. This lack of comparability can hinder the assessment of whether the intervention performs better than standard care or alternative strategies. While costs were standardized to 2023 USD, there was not much significant adjustment between Total Unit Costs. The 2023 USD showed a total unit cost of $2881.60, which represented a 15% increase in costs due to inflation adjustment. This, however, could suggest inflationary pressures or cost variances that might affect the interpretation of economic efficiency across different contexts. This introduces potential challenges in comparing the economic value across different interventions and time periods.

Conclusion

The systematic review reveals that while cash "plus" interventions aimed at reducing risky sexual behaviour among adolescent girls and young women (AGYW) in Sub-Saharan Africa are cost-effective, particularly in the longer term, their immediate financial benefits appear limited. Most of the studies focused on cost-effectiveness analysis, with only a few conducting cost-benefit analyses, which showed very low monetary returns for the participants. Despite low unit costs, the tangible financial benefits per AGYW were minimal, raising concerns about the short-term economic value of these interventions. This highlights the need for further research into the long-term, non-monetary benefits to better understand the full impact of such programs.

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Conflict of Interest

No Conflict of interested noted by authors.

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PART C: POLICY BRIEF

Economic evaluation of cash "plus" interventions for risky sexual behaviour among Adolescent Girls & Young Women in low and middle-income countries: A systematic review

Introduction

Globally, an estimated 39 million people were living with HIV in 2022. 53% of this figure were women and girls. This accounts for over 20 million women and girls living with HIV [1]. Equally, women and girls account for 46% of new HIV infections; whereas there were 1.3 million new infections in 2022, women and girls account for 598,000 of the 1.3 million [1]. In Sub-Saharan Africa, women and girls of all ages account for 63% of all new HIV infections, considering the regions of the world. In sub-Saharan Africa, women and girls (all ages) accounted for 63% of all new HIV infections; this is however different in other geographical locations, where men and boys account for 70% of new HIV infections [1]. Among these women who are at risk are adolescent girls and young women (AGYW) are among those at risk. UNAIDS 2022 reports that at least 4000 AGYW, aged 15-24, globally contract HIV every week. 3100 of these infections occur in sub-Saharan Africa.

KEY MESSAGE

- AGYW in LMIC are at significant risk of engaging in risky sexual behaviors, contributing to new HIV infections.
- We conducted a systematic review focused on EE's on cash "plus" interventions aimed at reducing risky sexual behavior and HIV risk among AGYW in LMICs, using data published between 2000 and 2023.
- Six studies were found that conducted EE's on cash "plus" interventions. All studies were based in sub-Saharan Africa, and they highlighted a lack of research in other regions. The studies included two CEAs, two ICER, one CA and one CBA.
- Unit costs varied by country context, with lower costs in urban settings compared to peri-urban areas.
- More research is needed on the EE's impact on Cash "plus" on other risky sexual behaviours such as transactional sex, no condom use, etc.

Intervention

Cash "Plus" transfers have emerged as a promising intervention, offering not only economic support but also holistic strategies to empower vulnerable populations [2]. However, policymakers and decision makers encounter challenges due to resource constraints when attempting to reduce the risk that young adults face in low- and middle-income countries (LMICs). Economic evaluation has emerged as a tool to aid decision makers and/or policymakers in health care, especially in terms of resource allocations for interventions. The ability for economic evaluation to assist in assessing which intervention offers the best value for money has become important to policymakers or decision-makers [3].

ABOUT THE STUDY

We conducted a systematic review across different electronic databases and platforms. We retrieved a total of 40 articles. We manually and electronically removed duplicates, then screened the remaining articles based on their titles and abstracts. We then proceeded with a full-text screening, applying specific selection criteria. The studies were mostly about either partial or full economic analyses. Partial analyses included cost analysis, while full economic analyses included cost-effectiveness analysis (CEA), cost-utility analysis (CUA), cost minimization analysis (CMA), and cost benefit analysis (CBA). The review targeted adolescent girls aged 10-19 and young women aged 20-24 and considered articles published between January 1, 2000, and December 31, 2023. It included randomized controlled trials (RCTs) and interventional studies evaluating the economic impact of cash-plus interventions aimed at reducing risky sexual behaviours, such as HIV awareness, transactional sex, unplanned pregnancy, no condom use, and multiple partners. One reviewer selected the articles, with a second reviewer assisting in all steps and a third reviewer resolving any disagreements. We conducted data extraction using an Excel spreadsheet and performed quality checks on the collected information. We made estimated cost adjustments to align all costs with 2023 values. We based this adjustment on the Consumer Price Index (CPI) of each country to accurately convert and reflect the costs in 2023 US dollars.

FINDINGS

What models of cash plus interventions have been subject to economic evaluation?

The systematic review included six articles. The six articles included various types of Cash Plus interventions. The interventions included 3 studies from Uganda: Bridges PLUS, a matched savings-led intervention for orphaned adolescents, and Empower Livelihood Adolescents, which is a cash intervention complemented with health services for adolescent girls and young women. Two interventions, the DREAMS intervention and the Adolescent Girl Initiative, originated in Kenya. Both of these interventions combined health services with financial support to promote sexual health, education, and economic empowerment among adolescent girls and women. The final intervention was from Libera; it was the Girl Empower Plus intervention. The bundled intervention combined health services for AGYW and added

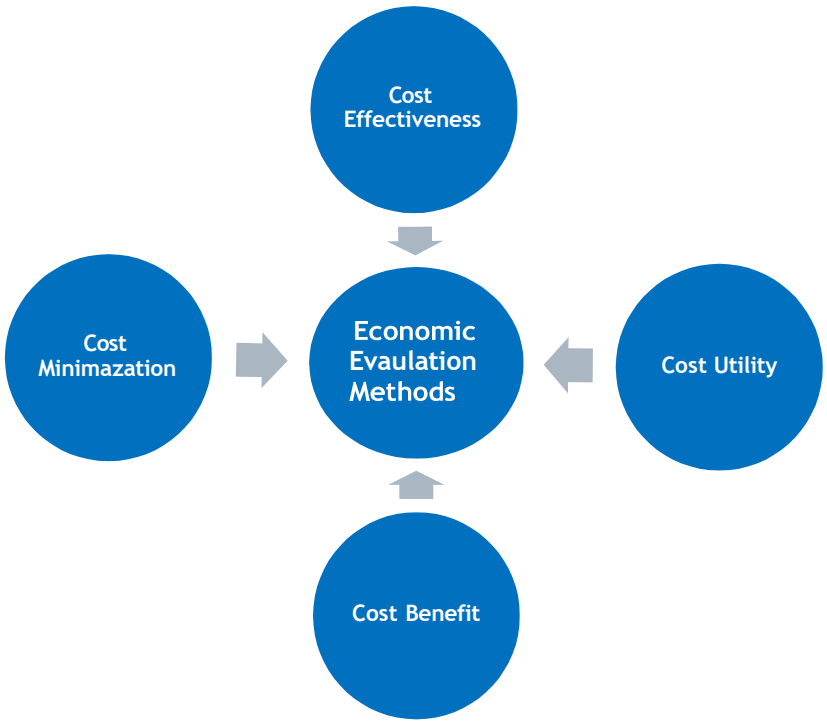
cash transfers to parents (GE+) to reduce sexual violence and sexual risk and improve reproductive outcomes among AGYW.

What types of setting (e.g. low-and-middle income countries) have these economic evaluations been focused?

The six articles were all published from the Sub-Saharan African Region. Two were from Kenya and three from Uganda, and the last one was from Libera.

What economic evaluation methods or techniques were used to evaluate these interventions?

The types of economic evaluations ranged between partial and full economic evaluations. One study conducted a partial economic evaluation, which was a cost analysis. The remaining five studies, consisting of three cost-effective analysis studies and two cost-benefit analysis studies, all conducted full economic evaluations. The systematic review did not find data for studies that conducted techniques like cost minimization and cost utility analysis.



What is the estimated unit costs of different models of cash plus interventions?

Adjusted Unit Costs of Cash Plus Interventions						
Intervention	Country	Cost Year	CPI at year of study	CPI at 2023	Unit Cost as per Study year	Adjusted Unit Cost as 2023
DREAMS Intervention	Kenya	2022	7,7%	7,7%	$196,00	$196,00
Empowerment Livelihood Adolescents	Uganda	2020	3,3%	5,4%	$17,90	$29,29
Girl Empower Plus	Liberia	2020	17,0%	10,09%	$1 230,00	$730,04
Bridges Plus	Uganda	2019	2,9%	5,4%	$426,00	$793,24
Bridges Plus	Uganda	2018	2,6%	5,4%	$428,00	$888,92
Adolescent Girl Inititative- Kenya	Kenya	2018	4,7%	7,7%	$149,00	$244,11
Total Unit Cost					$2 446,G0	$2 881,60
Total Unit Cost as per AGYW in the Systematic Review Population TUC/15517					$0,16	$0,1G

Which model of cash plus have been estimated to be cost-effective?

From the evidence in the systematic review, although, Adolescent Girl Initiative in Kenya is robust and showed great significance in outcomes, it is resource intensive. Interventions like GW+ and Bridges PLUS offer better cost-effective solutions. As these three studies have demonstrated cost-effectiveness. In Uganda, the Bridges and Bridges Plus savings-led economic empowerment showed an improvement of HIV knowledge and sexual health among AIDS-orphaned adolescent girls, with the ICER ranging from $224 to $298 per 0.2 standard deviation change. In Liberia, the Girl Empower program, which aimed to reduce sexual violence and improve life skills, proved more cost-effective when paired with parental cash transfers, increasing sexual and reproductive health outcomes by over 50% with just a 6% increase in cost. These findings collectively highlight the cost-effectiveness of integrating financial incentives and support into programs for adolescents.

CONCLUSION

This systematic review has shown that the health and wellness of AGYW is a global priority; however, the resources to assist AGYW's are limited. Cash Plus interventions present a promising and contextual approach that addresses the complex needs of this vulnerable group. Cash Plus interventions have also proven to be cost-effective, especially after two years of implementation. However, all current economic evaluations of these interventions are from the Sub-Saharan African region. Similar evaluations are crucial for other regions that may or may not have implemented these interventions yet. By extending these economic evaluations, means that comparative studies can be conducted, and findings can provide policymakers with guidance on resource allocation for effective interventions in diverse settings.

POLICY RECOMMENDATIONS

- Expand and increase research funding on the economic evaluation of cash increase funding and support for research on economic evaluations of cash "plus" intervention in diverse settings, especially in low to middle income countries focusing both on urban and peri-urban areas. The need for research in other settings will add value to the economic evaluation findings, and create a better understanding of the impact of risky sexual behaviour in other settings.

- In order to close the economic evaluation geographic gap more research needs to be done on cash plus interventions outside of the sub-Saharan Africa region. The ability to evaluate AGYW risky sexual behaviours in other high-risk areas allows for better cross-regional learning

- A wider range of economic evaluation methods to form a better comprehensive understanding of the cost-effectiveness of cash "plus" interventions on various sexual behaviours by AGYW is needed. Methods could include cost minimization, cost-benefit and cost-utility analysis.

- Recommendation to policymakers to support more holistic, multifaceted interventions that will empower and enhance efforts to reduce risky sexual behaviours among AGYW.

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PART E: APPENDICES

Appendix 1: Protocol

Introduction

Background

Globally an estimated 39 million people were living with HIV in 2022. 53% of this figure were women and girls. This accounts for over 20 million women and girls living with HIV (UNAIDS 2022). Equally women and girls account for 46% of new HIV infections, where new infections of 2022 were 1.3 million, women and girls account for 598000 of the 1.3 million (UNAIDS 2022). Considering the regions of the world, women and girls of all ages in Sub-saharan Africa account for 63% of all new HIV infections. In sub-Saharan Africa, women and girls (all ages) accounted for 63% of all new HIV infections, this is however different in another geographical locations, where men and boys account for 70% of new HIV infections (UNAIDS 2022). Among these women who are at risk are adolescent girls and young women (AGYW). According to UNAIDS 2022 every week at least 4000 AGYW who are aged 15-24 get infected with HIV on a global level. 3100 of these infections occur in sub-Saharan Africa.

There are a range of factors that influence AGYW to be at risk of acquiring HIV. According to Choudhry, et al. 2015 economic marginalization is a driver for AGYW in subs-Saharan Africa forcing them to be involved in risky sexual behaviours which include transactional sex, age-disparate partner and multiple sexual partners. (Choudhry, et al. 2015) states that there is a positive correlation between transactional sex and HIV infections among AGYW in Uganda. (Wamoyi, et al. 2016) states that in South Africa young women who participate in transactional sex and are aged below 26 were 3 times likely to be infected by HIV by their partners, as opposed to those who did not engage in transactional sex. According to Gavin, et al. 2022 AGYW from South Africa who had age-disparate partners were 3 times more likely to be HIV positive. In their study found that for adolescent girls aged 15-19 the risk of HIV acquisition was 2.04 where the male partner was 10 or more years older compared to those with 0 to 4 years older. Similarly, among young women aged 20-24 the risk of HIV acquisition was 1.24

where the male partner was 10 or more years older. Prevalent HIV-1 infection in female participants increased with older male sexual partners. This places young women at risk of HIV, due to the male partner being significantly older.

In a report that assess the sexual and reproductive health of young people in Asia and the pacific the following was established of AGYW risky sexual behaviours. (UNFPA 2015) notes that a high number of AGYW aged 15-24 reported premarital sex in the pacific. (UNFPA 2015) notes 53% of schoolgirls from Thailand's urban settings aged 17-20 were engaged in sexual activity. Equally (UNFPA 2015) state that in South Asia, one in 10 females who are aged 15-24 years old, reported having sex with a partner who was at least 10 years or older in the last 12 months. These challenges that AGYW face attest to the magnitude of vulnerability faced by AGYW, vulnerabilities that are not limited to one region.

Interventions to address AGYW Vulnerabilities

There have been various interventions to mitigate or reduce the risk that AGYW's face in low middle income countries. The interventions can be divided into three categories, 1 Behavioural intervention, 2 Structural Interventions and 3 Combination.

When considering behavioural interventions, (Harrison, et al. 2016) conducted the Mpondombili Pilot Intervention, which is a gender focused HIV and Pregnancy prevention school programme for AGYW in KwZulu-Natal, South Africa. Where (Harrison, et al. 2016) found that the gender-focused pilot intervention increased self-efficacy and partner communication among adolescents' and the intervention showed evidence of improving preventive behaviours among adolescents. (Smith, et al. 2008) assess the evaluation of the Healthwise Program, which is a sexual risk related to substance use prevention intervention in Cape Town, South Africa. Where the intervention has shown great promise in reducing multiple health risk behaviours among school going adolescents. (Agha and Van Rossem 2004)

assess the impact of a school-based peer sexual health intervention on normative beliefs, risk perceptions and sexual behaviour of Zambian adolescents. (Agha and Van Rossem 2004) notes that one session of school-based peer sexual health intervention resulted in normative beliefs on abstinence, which were sustained over 6-month period. Normative beliefs over condoms took much longer to develop, and the intervention reduced the regularity of multiple partners among the adolescents.

When considering the structural interventions (Handa, et al. 2014) examines the government of Kenya's cash transfer program in reducing the risk of sexual debut among young people aged 15-25. (Handa, et al. 2014) notes that the cash transfer intervention, implemented by the Kenyan government reduced sexual debut by 31%. The cash transfer intervention showed minimal significance on secondary outcomes which included condom use, multiple partners, and transactional sex. Our results, adjusted for these covariates, show that the program reduced the odds of sexual debut by 31 percent. There were no statistically significant effects on secondary outcomes of behavioural risk such as condom use, number of partners and transactional sex. (Handa, et al. 2014) further notes that the Kenyan cash transfer intervention which is intended to alleviate poverty in households has positive spillover benefits in reducing HIV risk among AGYW. (Hallfors, et al. 2014) notes the impact of a school subsidies on HIV-related outcomes among adolescent female orphans in Zimbabwe. Where the intervention showed that paying school fees reduced the likelihood of early marriage, improved school retention, improved food security and marginal gains on quality of life.

When considering combined interventions (Naledi, et al. 2022) examines the impact of a cash plus intervention to enhance the attendance and reduce sexual health risks for young women in Cape Town, South Africa. Where the intervention showed that participants who were involved in the program receiving the Cash Transfer layered with economic empowerment in the form of employment reduced sexual health risks among the young women in the study. (Stoner, et

al. 2021) models a cash plus intervention to prevent HIV among AGYW. (Stoner, et al. 2021) states that providing Child Support Grant combined with increasing caregiver care and reducing adolescent depression had the biggest impact on HIV incidence reduction compared to providing cash alone.

These interventions play an integral role in addressing the sexual risk behaviours of AGYW. Structural interventions such as cash transfers and cash "plus" transfers, especially cash "plus" interventions, because the "plus" component of the intervention combines multilevel interventions and cash to form one package. However, there is a need to find the effectiveness of cash "plus" interventions when addressing structural issues faced by AGYW. Economic Evaluation offers the ability to assess the effectiveness of the intervention.

Economic Evaluation & Cash 'Plus' Intervention

There is limited evidence concerning the economic evaluation of cash-plus interventions aimed at mitigating HIV risk among AGYWs within Low- Middle-Income Countries. This research gap underscores the need for further studies that to investigate the cost-effectiveness and economic viability of cash 'plus' interventions for low-middle-income countries.

When attempting to conduct an economic evaluation of Cash 'Plus' intervention, the research process should begin with obtaining primary data of the Cash 'Plus' intervention. Where the process is micro-costing, and this can provide the most precise method of deriving intervention costs, because it involves direct enumeration and costing of each intervention input (Chapel and Guijing 2019). The primary data would facilitate the cost analysis process and the calculation of the unit cost per participant within the intervention. However, should obtaining primary data prove to be challenging, the next step would be to develop an estimated cost analysis model. This model would make use assumptions and insights from similar interventions (Miani, Martin and Exley 2017). This estimated cost model would offer valuable

insights and approximations regarding the potential costs which are associated when implementing intervention. It is imperative to note that although the model makes use of secondary data, the reliability of the model relies heavily on the comparability and relevance of the secondary data (Miani, Martin and Exley 2017). Where primary and secondary data cannot be obtained, the next possible option would be conducting a systematic review of all available studies to offer a structured, comprehensive, and reliable outcome on cash 'plus' interventions for reducing HIV risk for AGYW. The evidence obtained from the systematic review will enable further understanding on the topic of economic evaluations for cash plus interventions aimed at reducing HIV risk among AGYWs.

This study will therefore be conducting a systematic review economic evaluations of cash "plus" interventions for AGYW in relation to reducing HIV risk. This study will consider all full economic evaluations, which is cost effectiveness analysis (CEA), cost-benefit analysis (CBA) and cost-utility analysis (CUA) and partial economic evaluations, which are (cost analysis, which have been conducted).

Brief Literature Review

Drivers of HIV Risk among AGYW in Low-Middle-Income Countries

(Ziraba, et al. 2018) assess key drivers for sexual risk for AGYW enrolled in the DREAM Program in Nairobi, Kenya. (Ziraba, et al. 2018) notes that there is a multifaceted approach needed to address the educational and social vulnerabilities of AGYW. Where drivers such as negotiating condom use, multiple sexual partners, and age-disparate sex. (Ziraba, et al. 2018) also notes that there is a need to reach the youngest adolescent girls in poor urban settings, among whom condom use and awareness of HIV status is rare. (Mabaso, et al. 2018) also addresses the determinants of HIV infection among adolescent girls and young women, who are aged 15–24 years in South Africa. (Mabaso, et al. 2018) states that HIV prevalence was

higher among young women compared to adolescent girls. (Mabaso, et al. 2018) further states that increased risk to HIV was associated to condom use at last sex, and being a young women aged 20-24. (Mabaso, et al. 2018) states that the need for a combination prevention intervention which simultaneously address socio-economic drivers of the HIV epidemic, promote education, equity and access to schooling, and target age-disparate partnerships, and inconsistent condom use.

Cash Transfer and HIV Risk among AGYWs in Low middle income countries.

According to Matin 2022 during the COVID pandemic in 2020, there was a doubling of cash transfer benefits in 214 countries, and 400 cash transfer programs being implement as a response to the pandemic. (Matin 2022) notes the push for these initiatives was because cash transfers are fast, cost effective and they increase people's consumption, assets, and food security. However (Matin 2022) also notes that there are challenge which exists within Cash Transfer Programs, which is the attempt to combine the short-term effectiveness to meet the immediate needs of people in extreme situations, while enabling them to build sustainability in sources of income. These challenges have presented the opportunity for cash "plus" programmes to be a part of social protection interventions for minority communities. According to Austrian, et al. 2016 who assess the impact of Cash 'Plus' interventions on AGYWs, the implementing of the cash plus intervention, impacts more than one outcome among young girls, a multisectoral intervention which is not based on cash alone, but cash packaged with other interventions (Austrian, et al. 2016). Cash plus interventions have gained valuable exposure in Africa, and in particular addressing structural issues of adolescents and AGYW (UNICEF, 2021).

There is a research gap of studies which assess the economic evaluation of cash 'plus' interventions on AGYW for reducing HIV risk. There is much work done on examining the impact of cash plus interventions on various risks factors facing AGYW, however there is limited research on economic evaluations on cash plus interventions. The gap lies with availability of studies assessing the cost-effectiveness, cost-benefit, and economic feasibility of implementing Cash Plus interventions targeted at AGYW in low-middle-income countries as a means to mitigate HIV risk.

Problem Statement

AGYW being a vulnerable group that faces challenges of HIV risk, interventions are necessary to address this risk. Cash Transfer interventions offer potential tools to address these issues by providing financial support to AGYW. Cash Plus interventions can reach AGYW further as opposed to Cash Transfers and are able to address the multi-faceted nature of risky sexual behaviour among AGYW. However, it remains uncertain which of these approaches is more effective from an economic perspective, considering their potential impacts on health outcomes, healthcare costs, and broader societal benefits. The research problem of this study is to evaluate and the economic evaluation evidence available on Cash Plus interventions targeting AGYW risk to HIV, through a systematic review. This includes conducting a comprehensive synthesis of economic evaluations, where the findings of the study will inform policymakers, donors and program implementers about the effectiveness and efficiency of these interventions to improve AGYW's health outcomes.

Aims & Objectives

Study Aim

The overall aim is to summarise the evidence from economic evaluations regarding the value-for-money of cash-plus interventions impacting AGYW sexual risk behaviours.

Objectives

(1) What models of cash plus interventions have been subject to economic evaluation?
(2) In what types of setting (e.g low-and-middle income countries) have these economic evaluations been focused?
(3) What economic evaluation methods or techniques have been used to evaluate these interventions?
    a. What kind of data has been used in conducting economic evaluations for these interventions? What is the quality of this data?
(4) What is the estimated unit costs of different models of cash plus interventions?
(5) Which model of cash plus have been estimated to be cost-effective?
(6) What models have been successfully replicated in other settings/contexts, and what are the underlying assumptions?

Methodology

This systematic review will be guided by the Population, Intervention, Comparator, and Outcome framework (PICO). The following criteria will be considered:

(a)Peer-reviewed published articles ; (b) grey literature including conference abstracts, and project reports (c) published in English language; (e) randomized controlled trials (RCTs) and interventional studies of economic evaluation of cash plus interventions; (f) studies focusing on either partial economic evaluation only reporting on costs including a cost analysis and

incremental cost or full economic evaluation which valued both costs and health benefits including cost-Effectiveness Analysis (CEA), cost-utility analyses (CUA) and cost benefit analysis (CBA); (g) evaluated at least a single intervention to prevent risky sexual behaviour, compared to an existing practice comparator. These risky sexual behaviours include transactional Sex, unplanned Pregnancy, no condom use, multiple partners, HIV, STD's; (h) publication date between 2000-2023.Studies excluded from the review:

The following criteria will not be considered when conducting the review:

Studies not specific to AGYW (i.e., no disaggregated data by age and sex); (b) letters, editorials, guidelines, case reports; (c)studies from high income countries; (d) qualitative studies; (e) any form of reviews (systematic, scoping); (f) impact evaluation studies.

Search Strategy

The same key terms will be used and applied in different electronic databases. The search terms will be influenced by the stated PICO guideline above of Population, intervention, comparator, and outcome. The following will be considered for search strategies. Population: ["adolescent" OR "adolescents" OR "girl" OR "girls" OR "females" OR "young females" "young women" OR "women" OR "teenagers" OR "10-15" OR "15-18" OR "18-24 OR "low-income countries" OR "middle-income countries"] Intervention: [cash "plus" transfer OR "unit costs' OR "economic evaluation" OR "economic" OR "costs" OR "cost analysis" OR "cost benefit analysis" OR "cost utility analysis" OR "cost effective analysis" OR "CBA" OR "CUA" OR "CEA"] Comparator: ["No Cash" OR "Cash Transfer" OR "Unconditional Cash Transfer" OR "Conditional Cash Transfer" OR "economic evaluation" OR "economic" OR "costs" OR "cost analysis" OR "cost benefit analysis" OR "cost utility analysis" OR "cost effective analysis" OR "CBA" OR "CUA" OR "CEA"] Outcomes: ["Risky Sexual Behaviour" OR "Risky

Behaviour" OR "Transactional Sex" OR "Unplanned Pregnancy" OR "No Condom Use" OR "Multiple Partners" OR Multiple Sexual Partners" OR "HIV" OR "QALYs" OR "DALYs" OR "STD"].

Information Source Platforms

There will be different information platform search engines used. The premise of these platforms is to identify the articles according to the inclusion criteria which has been set. The searches will be conducted on the following database platforms: EbscoHost, PubMed, Cochrane Library, Web of Science, Scopus, relevant grey literature websites.

Data Management & Selection Process

Once the studies have been identified they will be exported and stored in a reference manger. This will be done on Mendeley. The screening and selection process will begin will be done on Rayyn, where the first step would be screening for any duplicates and removing them. Next will be screening by title, and then screening by abstract. Once this is done, then there will be a full assessment of the full text of the articles remaining, this will be the final step within the selection process. The articles which meet the selection process will be stored in Mendeley.

Data synthesis

An Excel data synthesis table will be used to extract data from the different selected articles. from different selected articles. The data synthesis table will offer important data on economic evaluation of Cash 'Plus' interventions in reducing HIV risk. The synthesis table will include the following headings:

Authors, Economic evaluation type, Study design, Data source, Country/Setting, Location (national/subnational), Population, Intervention comparator, Intervention description,

Platform, Intervention type, Outcome measure, Types of costs, Perspective, "Coverage scenarios modelled", Assumptions, Estimated Unit costs, Discount rate used, Time horizon, Uncertainty, Key, Results/Points, Quality considerations, Reference.

Once the data has been extracted on the synthesis table, the results/findings will be reported in narrative form, where the themes of the studies will be identified and reported on.

Risk of bias

In the attempt to minimise the risk of selection bias, the study will be guided by the Cochrane guidelines for Systematic Review, and the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist.

Ethical Consideration

The following sections will detail the ethical consideration for the proposed study. At present there aren't explicit clear guidelines on a standardized method of ethical consideration. This section will address the ethical considerations by offering the study approval, examining the selected studies, good practices of a systematic review and conflict of interests.

Study approval

The proposed review is conducted as a secondary analysis. There is no involvement of human subjects since it is a secondary analysis. The approval for the study will be established from the Departmental Research Committee, which is the School of Public Health and Family Medicine (SPHFM) at the University of Cape Town.

Selected studies

This study summarises all data from economic evaluations regarding the value-for-money of cash or cash-plus interventions impacting AGYW sexual risk behaviours. The authors of the

which have been included in the study are to be acknowledged both in the text and in the references. The various databases that will be used will also be acknowledged.

Conflicts of interest

If there should be any conflict arising, this will be highlighted by the author. The source of funding will also be stated as this provides transparency.

Work Plan

(Table 1)

Activity	June	July	August	September	October	November	December
Proposal Submission	X						
Data Analysis Completion	X						
Structured Literature Review Completion		X	X				
Write Up Draft 1				X			
Write up Draft 2				X			
Final Draft					X		
Submission						X	

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Appendix 2: Human Research Ethics Committee

17 October 2023

STUDENT NUMBER: TBNVUY001

Dear Vuyolwetu Tibini

Please be advised that this protocol has been reviewed by the School of Public Health Departmental Research Committee (DRC), agreeing that the study does not require Human Research Ethics Committee (HREC) approval.

Title: Economic evaluation of cash "plus" interventions for risky sexual behaviour among Adolescent Girls & Young Women in low and middle-income countries: A systematic review

Please upload this to Peoplesoft in the 'Copy of Ethics Approval Letter' section when you do your Intent to Submit.

Kind regards

Signed by candidate

Dr Tammy Phillips
Chair: Departmental Research Committee
School of Public Health

Appendix 3: BMJ Author/Manuscript Guidelines

Style Matters

Guidelines for writing papers

On the following three pages we publish instructions, guidelines, and checklists that we use, at various stages of the editorial process, to assess papers submitted to the journal. We hope that authors will note the points we look for so that the number of changes that they are required to make before we finally accept their paper may be kept to a minimum. The BMJ has agreed to accept manuscripts prepared in accordance with the Vancouver style[1] and will consider any paper that conforms to that style.

Instructions to authors

All material submitted for publication is assumed to be submitted exclusively to the BMJ unless the contrary is stated. All authors must give signed consent to publication. The editor retains the customary right to style and if necessary shorten material accepted for publication.

Manuscripts will be acknowledged; letters and obituaries will not be unless a stamped addressed envelope is enclosed. Authors of letters and obituaries are not sent proofs.

All material should be typed in double spacing. Authors should give one degree and one appointment.

Original articles are usually up to 2000 words long, with no more than six tables or illustrations; they should normally report original research of relevance to clinical medicine and may appear either as Papers or as Short Reports. Short Reports are up to 600 words long, with one table or illustration and no more than five references. Clinical case histories and brief or negative research findings may appear in this section. Papers for the Practice Observed section should cover research or any other matters relevant to primary care. Middle articles are mostly written by invitation, but we welcome reports of up to 2000 words on the organisation or assessment of medical work and on sociological aspects of medicine or the organisation, financing, and manpower of health services. Contributions for the Personal View and Materia Non Medica columns are always welcome and should contain up to 1150 and 400 words respectively. Letters should normally be of not more than 400 words, have no more than 10 references, and be signed by all authors; preference is given to those that take up points made in contributions published in the journal. Contributions to Medicine and the Media should be discussed with one of the editors before being submitted. Obituaries should not normally exceed 300 words.

Any article may be submitted to outside peer review and evaluation by the editorial committee as well as statistical assessment incorporating the use of published checklists.[2] This should take four weeks but may take up to six. Manuscripts are usually published within three months of the date of final acceptance of the article.

MANUSCRIPTS, TABLES, AND ILLUSTRATIONS

Authors should keep one copy of their manuscripts for reference. *All manuscripts including letters and obituaries should be typed double spaced* on one side of the paper *with a 5 cm margin* at the top and left hand side of the sheet. *The pages should be numbered. Three copies should be submitted*; if the paper is rejected these will not be returned. After being kept for three months to answer any queries they will be shredded. *The authors should include their names and initials, their posts at the time they did the work, and no more than one degree each. Scientific articles should conform to the conventional structure of abstract, introduction, methods, results, discussion, and references. Papers reporting clinical trials should include a structured abstract,*[3] which should be no longer than 350 words. *Other papers should have an abstract up to 150 words long*, setting out what was done and why and the main findings and their implications. *In addition, all authors should submit a paragraph up to 150 words long for the This Week in BMJ page.*

Drugs should be referred to by their approved, not proprietary, names, and the source of any new or experimental preparations should be given. *Abbreviations should not be used. Scientific measurements should be given in SI units*, but blood pressure should continue to be expressed in mm Hg.

Statistical methods should be defined in the methods section of the paper and any not in common use should be either described in detail or supported by references. General guidelines on the use of statistical methods and on the interpretation and presentation of statistical material as well as specific recommendations on statistical estimation and significance have been published.[2] *Whenever possible numbers of patients or subjects studied should be given.* Tables and illustrations should be submitted separately from the text of the paper and legends to illustrations should also be typed on a separate sheet. *Tables should be simple and should not duplicate information in the text of the article.* Illustrations should be used only when data cannot be expressed clearly in any other way. *When graphs, scattergrams, or histograms are submitted the numerical data on which they are based should be supplied; in general, data given in histograms are converted into tabular form.* Line drawings should be in Indian ink on heavy white paper or card, with any labelling on a separate sheet; they may also be presented as photographic prints or good quality photocopies. *Other black and white illustrations should usually be prints*—not negatives, transparencies, or *x* ray films; they should be no larger than 30×21 cm (A4) and be trimmed to remove all redundant areas; *the top should be marked on the back. Staining techniques of photomicrographs should be stated. An internal scale marker should be included on the photomicrograph.* Again, any labelling should be on copies, not on the prints. Patients shown in photographs should have their identity concealed or should give their written consent to publication. *If any tables or illustrations submitted have been published elsewhere written consent to republication should be obtained by the author from the copyright holder (usually the publishers) and the authors.*

REFERENCES, PROOFS, AND REPRINTS

References should be numbered in the order in which they appear in the text. At the end of the article the full list of references should give the names and initials of all authors (unless there are more than six, when only the first three should be given followed by *et al*). *The authors' names are followed by the title of the article; the title of the journal abbreviated according to the style of Index Medicus* (see "List of Journals Indexed," printed yearly in the January issue of *Index Medicus*); *the year of publication; the volume number; and the first and last page numbers. References to books should give the names of any editors, place of publication, publisher, and year.*

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Information from manuscripts not yet in press, papers reported at meetings, or personal communications may be cited only in the text, not as formal references. Authors must verify references against the original documents before submitting the article.

Manuscripts should bear the name and address of the author to whom the proofs and correspondence should be sent. Proofs are not normally sent for letters. Proof corrections should be kept to a minimum and should conform to the conventions shown in *Whitaker's Almanack*. If corrections need justification please include the justification in a letter, not on the proof. Reprints are available; a scale of charges is included when a proof is sent.

1 International Committee of Medical Journal Editors. Uniform requirements for manuscripts submitted to biomedical journals. *Br Med J* 1988;**296**:401-5.
2 Gardner MJ, Altman DG, eds. *Statistics with confidence*. London: British Medical Journal, 1989.
3 Lock S. Structured abstracts. *Br Med J* 1988;**297**:156.

Guidelines for referees

Papers received by the journal are read first by one or more of our medical editors, who decide whether to send them to a referee; about half of all papers are sent to a referee. The referees are asked for their opinion on the originality, scientific reliability, clinical importance, and overall suitability of the paper for publication in the journal, and their reports may be sent to the authors to indicate any changes required. To help them, referees are sent a copy of our "guidelines for referees."

The BMJ normally sends papers to only one referee; after that any potentially acceptable papers may also be sent to our statistical adviser.

- The manuscript is a confidential document. Please do not discuss it even with the author.
- If you want to consult a colleague or junior please discuss this with us first.
- The referee is providing advice to the editors, who (aided by an editorial—"hanging"—committee) make the final decision. We will let you know our decision and will normally pass on your comments (anonymously, of course) to the author.
- Even if we do not accept a paper we would like to pass on constructive comments that might help the author to improve it.
- For this reason please give detailed comments (with references, if appropriate) that will help both the editors to make a decision on the paper and the authors to improve it. Please type your detailed comments on a separate sheet and make your recommendations and any confidential comments to the editor in a covering letter.

The broad aspects that we should like comments on include:

- Originality (truly original or known to you through foreign or specialist publications or through the grapevine); originality is our main criterion for case reports.
- Scientific reliability
  - —Overall design of study
  - —Patients studied
    - Adequately described and their condition defined?
  - —Methods
    - Adequately described?
    - Appropriate?
  - —Results
    - Relevant to problem posed?
    - Credible?
    - Well presented (including the use of tables and figures)?
  - —Interpretation and conclusions
    - Warranted by the data?
    - Reasonable speculation?
    - Is the message clear?
  - —References
    - Up to date and relevant?
    - Any glaring omissions?
- Importance (clinical or otherwise) of the work
- Suitability for the *BMJ* and overall recommendation
  - —Appropriate for general readership or more appropriate for special journal?
  - —If not acceptable now can the paper be made so?
- Other points
  - —Ethical aspects
  - —Need for statistical assessment
  - —Presentation (including writing style)

Checklists for statisticians

The comments made by referees are considered by the "hanging" committee, which decides whether each paper should be published, perhaps after revision, or rejected. If the paper seems promising the committee may decide to send it for statistical assessment. In this case a statistician looks at it, completes a checklist, and probably also writes a report, which, as with the scientific referee's report, may be sent to the author. The statisticians complete one of two checklists: one is for general papers and the other, which is more detailed, is for papers on clinical trials. For each question under the headings "Design features" and "Conduct of study/trial" the statistician is asked to circle the reply Yes, Unclear, or No; for each question under the headings "Analysis" and "Recommendations" he or she is asked to circle the reply Yes or No.

CHECKLIST FOR STATISTICAL REVIEW OF GENERAL PAPERS

Design features

1 Was the objective of the study sufficiently described?
2 Was an appropriate study design used to achieve the objective?
3 Was there a satisfactory statement given of source of subjects?
4 Was a pre-study calculation of required sample size reported?

Conduct of study

5 Was a satisfactory response rate achieved?

Analysis and presentation

6 Was there a statement adequately describing or referencing all statistical procedures used?
7 Were the statistical analyses used appropriate?
8 Was the presentation of statistical material satisfactory?
9 Were the confidence intervals given for the main results?
10 Was the conclusion drawn from the statistical analysis justified?

Recommendation on paper

11 Is the paper of acceptable statistical standard for publication?
12 If "No" to question 10, could it become acceptable with suitable revision?

CHECKLIST FOR STATISTICAL REVIEW OF PAPERS ON CLINICAL TRIALS

Design features

1 Was the objective of the trial sufficiently described?
2 Was a satisfactory statement given of diagnostic criteria for entry to the trial?

3 Was there a satisfactory statement given of source of subjects?
4 Were concurrent controls used (as opposed to historical controls)?
5 Were the treatments well defined?
6 Was random allocation to treatment used?
7 Was the method of randomisation described?
8 Was there an acceptably short delay from allocation to start of treatment?
9 Was the potential degree of blindness used?
10 Was there a satisfactory statement of criteria for outcome measures?
11 Were the outcome measures appropriate?
12 Was a pre-study calculation of required sample size reported?
13 Was the duration of post-treatment follow up stated?

Conduct of trial

14 Were the treatment and control groups comparable in relevant measures?
15 Were a high proportion of the subjects followed up?
16 Did a high proportion of subjects complete treatment?
17 Were the drop outs described by treatment/control groups?
18 Were side effects of treatment reported?

Analysis and presentation

19 Was there a statement adequately describing or referencing all statistical procedures used?
20 Were the statistical analyses used appropriate?
21 Were prognostic factors adequately considered?
22 Was the presentation of statistical material satisfactory?
23 Were confidence intervals given for the main results?
24 Was the conclusion drawn from the statistical analysis justified?

Recommendation on paper

25 Is the paper of acceptable statistical standard for publication?
26 If "No" to question 25, could it become acceptable with suitable revision?

Adverse drug reactions checklist

When we receive a report of an adverse drug reaction we usually send the author a checklist of points that should be mentioned in such reports.

It is our policy to ask authors who are reporting side effects of drugs to contact the Committee on the Safety of Medicines and the manufacturer of the drug to inquire if they have had similar reports and to let us have sight of their replies.

Case reports of adverse drug reactions should include the following information*:

1 Birth date or age and sex
2 Suspected drug and all drugs currently being taken:
   Start, stop, and restart dates
   Dose
   Indication for drug treatment
3 Timing of suspected adverse drug reaction in relation to drugs taken and outcome.
4 Other diseases, environmental factors, and timing.
5 Prior experience with drug or adverse reactions to related drug
6 Ancillary information from pharmaceutical company and regulatory agency
7 Any published reports?
8 Other factors relevant to verify specific types of adverse drug reactions (for example, blood concentration in overdose, baseline laboratory data, ethnic group)

Any report that describes a series of cases should provide the following information*:

1 Age and sex
2 Number of patients treated
3 Number with adverse drug reactions
4 Number of events

Generally something more than simple coincidence in time is required: rechallenge (with the patient's informed consent) or immunological investigations may tip the balance of probabilities.

*Based on guidelines drawn up at a workshop of representatives of the pharmaceutical industry, departments of clinical pharmacology, drug regulating agencies, medical and scientific editors, and science correspondents of the general press in 1984 (Ciba-Geigy workshop; *BMJ* 1984;**289**:898).

Subeditor's checklist

Finally, one of our subeditors looks at the accepted papers, either before they go back to the authors for revision according to the reviewers' remarks or before the letter of acceptance is sent out if the paper does not need revision. The subeditor indicates various small points to be corrected or supplied.

When returning your revised paper please supply the information requested below.

1 Summary of 200 words for "This Week in the BMJ."
2 Structured abstract (details attached).
3 Abstract of up to 150 words, which should adequately summarise the contents of the paper.
4 One degree for each author and one position held at the time of the study.
5 Author for correspondence.
6 All values in SI units (except blood pressure in mm Hg).
7 Actual numbers of patients/subjects, as well as percentages, within the text and tables.
8 The actual figures from which histograms were drawn. If these are percentages, please also provide the actual numbers. (We generally convert histograms into tables, but even if we leave them as histograms the data from which they were drawn are helpful.)
9 This article is too long as a short report. It must be reduced to within 600 words with one table or figure and at most five references.
10 Abbreviations should not be used and should be spelt out in full each time.
11 Please type text and references in double spacing.
12 References must be set out in Vancouver style (*BMJ* v 296, p 403, 6 Feb 88). Please provide:

(*a*) the surnames and initials of all authors (or of only the first three if there are more than six); (ref)
(*b*) the title of the article or chapters; (ref)
(*c*) the final page numbers of each article; (ref)
(*d*) the editors of books; (ref)
(*e*) the publisher of each book; (ref)
(*f*) the place of publication of books; (ref)
(*g*) the year of publication of books; (ref)
(*h*) the title of the journal in full; (ref)
(*i*) has the reference been published? If not please cite in text and renumber other references; (ref)