Parenting for Lifelong Health program for parents and teens in Zimbabwe: Cost estimation and the budget impact analysis

Mini dissertation submitted by

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PART 0: PREAMBLE

PLAGIARISM DECLARATION

I, Yolanda Rutendo Zwidza, hereby declare that the work on this dissertation/thesis is based on my original work (except where acknowledgments 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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December 2024

DEDICATION

This thesis is dedicated to my parents, Nancy Dobani and Gerald Dube, whose unwavering support and unconditional love have been the foundation of my journey. Your endless encouragement has been my constant source of inspiration.

To my older brother, Prince, your courage and determination have taught me to pursue the extraordinary and to dream boldly, thank you for showing me the beauty of reaching beyond limits.

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ABSTRACT

Introduction

Parenting for Lifelong Health (PLH) for adolescents was initiated in 2012 to address the pervasive issue of childhood violence in low-to-middle-income countries. The intervention targets teens aged 10-17 years old and their caregivers. The program outcomes aim to increase positive parenting, reduce harsh discipline, and the reduction of behavioural problems in teenagers. Secondary outcomes include increasing the parents' self-efficacy.

Methods

This thesis evaluates the total and unit costs of the Parenting for Lifelong Health for Teens (PLH-Teens) program in Zimbabwe and estimates the budgetary impact of scaling up the intervention nationally. An economic cost analysis was conducted from the provider's perspective to calculate the total cost of implementing the program over one financial year, using the 2021 USD rate. The total cost of delivering the intervention to 5537 families was determined by summing capital and recurrent costs, with capital costs annuitized at a 5% discount rate. A budget impact analysis was then performed to estimate the financial implications of scaling the program to 250,000 families. Additionally, a one-way sensitivity analysis was carried out to examine potential variations in cost outcomes by making assumptions and changes to the input variables.

Results

The total implementation cost of the PLH-Teens program for 5537 participants in the year 2021 was US $823,704.00 The unit cost per family (completing sixteen sessions) was US $148.76, and the unit cost per session was US $9.30. Scaling the program to 250,000 families, representing an approximate increase of 96.36% of the initial target population, resulted in an estimated budget impact of US $37 190 915.00 . The budget impact analysis indicated that the total cost of implementing the PLH program exceeded the national government budget allocation for programs that address violence in orphaned and vulnerable children and teens of US $27 000 000.00.

Conclusion

Parenting programs indicated high efficacy in the reduction of violence between caregivers and teenagers in Zimbabwe, following extensive modification of the intervention design to accommodate the context of low- to middle-income countries in their various dimensions. The socioeconomic profile of Zimbabwe has limitations in the ability to implement the intervention without donor assistance independently.

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List of Abbreviations

BIA-	Budget impact analysis
CA-	Cost Analysis
DNA-	Deoxyribonucleic acid
GDP-	Growth Domestic Product
HIC-	High-income countries
ICER-	An incremental cost-effectiveness ratio
LMIC-	Low to middle-income countries
NBSLEA-	National Baseline Survey of the Life Experiences of Adolescents
NGO-	Non-Government Organization
NICE-	National Institute for Health and Care Excellence
PEPFAR-	President's Emergency Plan for AIDS Relief
PLH-	Parenting for Lifelong Health
PLH (SUPER)-	Parenting for Lifelong Health (Scale-up of parenting evaluation research)
UNICEF-	United Nations Children's Emergency Fund (UNICEF)
USAID-	United States Agency for International Development
WHO-	World Health Organization

PART A:

PROTOCOL

SECTION 1: INTRODUCTION

1.1 Background

A 2020 report from the World Health Organization revealed that worldwide 1 billion children between the ages of 2 and 17 years have encountered some form of violence (physical, sexual, emotional, or neglect) within the past year (World Health Organization, 2020). These childhood traumas drastically impact lifelong health and well-being (World Health Organization, 2020). The biology of violence has shown that traumatic stress experienced because of violence may disrupt brain development, immune status, metabolic systems, and inflammatory response (Hillis et al.,2016). In children, these episodes of violence may influence genetic alteration of the DNA (Hillis et al.,2016). Target 16.2 of the 2030 Agenda for Sustainable Development is to "end abuse, exploitation, trafficking and all forms of violence against, and torture of, children" (United Nations, 2015).

Violence toward children is a global pandemic, however, the burden of injury and violence is noted more in lower-middle-income countries (Desai et al., 2017). Despite the socio-economic disparities evident in the prevalence of childhood violence, Desai et al.,(2017) recognized that parenting is a crucial key component in the etiology of child maltreatment. Parents who were victims of childhood violence themselves tend to create a cascade chain of violence within their children (Desai et al., 2017). Furthermore, parents with limited knowledge of childhood development, who utilize authoritarian parenting skills are less nurturing and expose their children to various forms of violence (Desai et al., 2017).

1.2 Problem statement

1.2.1 Parenting programs in low-to-middle-income countries

Knerr et al. (2013) stated the lack of systemic reviews and evaluations on parenting programs in the context of low-and middle-income countries. A wide gap exists in the number of available parenting programs between high-income countries and LMICs (Cluver et al., 2018). Disparities noted are attributed to the lack of resources and capacity of the LMICs to fully implement the parenting programs independently without external financial aid (Cluver et al., 2018). Base case estimates in 2015 showed that a minimum of 50% or more children between the ages of 2-17 years experienced various forms of violence in Asia, Africa, and Northern America (Hillis et al., 2016). Robust literature exists on parenting programs in high-income countries, which is further focused on younger children under the age of 10 years (Cluver et al., 2018).

1.2.2 Parenting for Lifelong Health (PLH)

In 2012, the development of the Parenting for Lifelong Health (PLH) for teens commenced with efforts to combat the widely spreading pandemic of childhood violence, in low-to-middle-income countries (Cluver et al., 2018). The intervention was established through collaborative efforts and partnerships

amongst international governmental organizations such as the World Health Organization (WHO), the United Nations Children's Emergency Fund (UNICEF), the President's Emergency Plan for AIDS Relief (PEPFAR), and the US Agency for International Development (USAID) (Cluver et al., 2018). Furthermore, a coalition was formed with various multidisciplinary research teams from the University of Cape Town, Stellenbosch University, Bangor University, University of Reading, and the University of Oxford, with the function of developing an evidence-based best practice parenting program (Cluver et al., 2018).

The premise of the PLH-Teen's initiative was to create an effective, fit-for-purpose parenting program, that is context-specific and tailored for low-to-middle-income countries, which is affordable (not for profit) and accessible to all (Cluver et al., 2018). Following tests and reviews from academic peers the operational manual was finalized in 2015 (Cluver et al.,2018). The first pilot study (a randomized controlled trial) of the PLH-Teen program was conducted in South Africa, Eastern Cape Province (Cluver et al., 2018). The Eastern Cape province is the second largest and poorest province amongst the nine provinces in South Africa with a high prevalence of childhood violence (Ngumbela, 2020). The setting was carefully selected to simulate the global conditions noted in low-to-middle-income countries (Cluver et al.,2018). Study outcomes indicated that 5-9 months post-intervention, the parenting program was associated with lower incidents of abuse (Cluver et al.,2018). A decrease in the incident reports of corporal punishment, less/poor supervision, harsh discipline, and improved positive parenting with more parenting involvement were observed (Cluver et al., 2018).

1.3 Rationale

1.3.1 Violence against Children in Zimbabwe

A Zimbabwean population-based survey done in 2011 on 2,410 respondents aged 13 to 24 years, by the National Baseline Survey of the Life Experiences of Adolescents (NBSLEA), reported that 60.9% of boys report experiencing more physical violence perpetrated by the parent or caregiver and 39.1% emotional violence (Fry, 2016). In girls, the trends displayed 47.8% and 29.0% respectively (Fry, 2016). In 2014, although research has shown the tremendous barriers to health-seeking behaviour, Childline Zimbabwe received a total of 15,446 abuse-related reports, 54% of which were sexual abuse, 25% negligence-related, 22% physical abuse, 12 % emotional abuse, and 2% bullying (Fry, 2016).

1.3.2 The Parenting for Lifelong Health (PLH) - Scale-Up of Parenting Evaluation Research (SUPER) Study

(Cluver et al.,2018) recognized the lack of theoretical frameworks that addressed parenting programs in low-to-middle-income countries. In efforts to bridge the gap, a scale-up of parenting evaluation research to study the implementation of the PLH-Teens programs in other low-to-middle-income countries was initiated (Cluver et al.,2018). Countries involved in the scale-up study are DRC (Lubumbashi), DRC (Kinshasa), Montenegro, South Sudan, Eswatini, Kenya, Cameroon, Coted'Ivoire, Haiti, South Africa, Uganda, Lesotho, Tanzania, Ethiopia, Botswana (Charasika,2020). In Zimbabwe, a

five-year PLH-Teen program was started in 2018 (Charasika, 2020). The intervention is designed to improve well-being by comprehensively meeting the needs of orphaned and vulnerable children in the different spheres of their lives with the main goal to positively contribute towards the control of the HIV epidemic (Charasika, 2020). The population target size is 250,000 families throughout Zimbabwe (Charasika, 2020). Since the commencement of the program, 6361 pairs of teens aged 10-17 years, and their caregivers are currently enrolled in nine of the 16 regions in Zimbabwe (Charasika, 2020). The main service provider is Catholic Relief Services (CRS) with the support of community partnering organizations such as Childline Zimbabwe (Charasika, 2020). The intervention is funded by USAID Zimbabwe through the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) (Charasika, 2020).

This research study is linked to the Parenting for Lifelong Health (PLH) - Scale-Up of Parenting Evaluation Research (SUPER) study and will focus on determining and quantifying the implementation and scale-up costs of the PLH program for teens and parents in Zimbabwe.

1.4 Literature Review

1.4.1 Cost analysis of parenting programs in LMICs

A cost analysis of two small-scale pilot parenting programs aimed to reduce violence and insecurity experienced by children within the home in Liberia and Thailand reported a cost estimateof US $650 and US $900 per family respectively (International Rescue Committee, 2016). Recommendations from this cost analysis indicated that the cost per family could be dramatically reduced if the ‘fixed’ costs of management and curriculum development of the program were spread over a larger pool of clients through a larger-scale up program (International Rescue Committee, 2016).

1.4.2 Cost analysis and budget impact analysis on the PLH-Teen trial in South Africa (Eastern Cape)

Costing on the trial in South Africa was done retrospectively from the provider's perspective using accounting records and data (Redfern et al.,2018). The cost inputs were divided into three components, namely set-up costs (facilitator training, participation recruitment, and community liaison); program development costs were omitted because the manual had already been developed; program delivery costs (staff-time, transport costs, monitoring cost, and all other materials required for workshop implementation); and overheads costs,office running costs and management support incurred by the NGO over the implementation period(Redfern et al.,2018). The study reported the total program cost of US $135,954.00 for the implementation of the trial on 270 families over 14 weeks, with the unit cost per family at US $504 (Redfern et al.,2018).

SECTION 2: AIM AND OBJECTIVES

2.1 Aim

This study aims to determine whether the Parenting for Lifelong Health (PLH) for parents and teens program is affordable at a national level in Zimbabwe.

2.2 Objectives

1. To determine the total and unit costs of the (PLH-Teens) program in Zimbabwe.
2. To estimate the budget impact of scaling up the (PLH-Teens) program on a national level.

SECTION 3: STUDY METHODS

3.1 Study design and population

The quantitative research design will constitute a cost and budget impact analysis to inform the planning and budgeting of the PLH-SUPER study within the Zimbabwean context.

3.2 Cost Analysis

A retrospective costing analysis will be done using the economic costing concept from the provider's perspective. The costs will be estimated in the 2021 USD.

The total cost of the (PLH-Teens) study will be estimated using capital and recurrent cost inputs, described in Tables 1 and 2 below

TABLE 1: RECURRENT COST INPUTS

Recurrent Cost	Cost category	Costing method	Related information for allocation purposes	Source of Data	Valuation methods	Source of Data
	Recurrent costs					
Personnel Cost	Administration staff Facilitators Support staff Management staff (program manager)	Documenting staff time on these activities Total remuneration package costs External support staff from NGOs Each category of personnel costed separately	The number of hours spent per session and other activities (training / Preparation time for workshops/ time spent on the workshops/ time spent coaching) Gross remuneration per annum	Staff Timesheets and Logbooks Staff interviews	Remuneration rates per category per annum	Remuneration package records from implementing partners Catholic Relief Services
Overhead cost	Electricity, water, and other utilities Rent Telephones, faxes & postage Stationery, computer consumables & photocopies	Utility rates Lease agreement where applicable Actual price on Airtime and Data Actual Market costing data on stationery and consumables utilized	The actual amount paid for utilities and rent for the sessions Required consumables and equipment per session	program manuals and equipment used per session Facility utility records Logbook data on airtime and data used	Expenditure records	Expenditure record of financial year of costing
Transport Cost	Transport/Vehicle running costs Fuel Cost Contract vehicles	Type of transportation used by facilitators to access participants Travel cost per kilometer traveled by implementors to the participants	Cost of car rental/ public transport used by the facilitator Number of sessions traveled by each facilitator per day/week/month and year	Logbook of kilometers traveled by facilitators to the participants	Expenditure records on transport	Expenditure records on transport

TABLE 2: CAPITAL COST INPUTS

Capital Cost	**Categories**	**Costing method**	**Related information for allocation purposes**	**Source of Data**	**Valuation Method**	**Source of Data**
Buildings	Office space Venues for intervention sessions with participants	Current replacement cost 30-year lifespan 5% discount rate for annuitization	Space (square meters) used for the number of sessions done per family is used within each center.	Review property records	Replacement and contract prices	City Council in Zimbabwe (property valuation department)
Office furniture and other equipment	Laptops/ computers/ Office stationary/ chairs and desk Office phone and Printer	Actual current replacement cost 5-year lifespan for equipment 5% discount rate for annuitization	Resources used by each cost center (i.e., which cost center uses which furniture and equipment)	Review records of number of computers/ Laptop/ Office phone printers and other office stationery from implementing partners	Replacement cost	Procurement data
Training Cost	Facilitator's training	The actual current cost of training 2-year lifespan 5% discount rate for annuitization	Number of facilitators to be trained Equipment and resources needed for the training. Who will provide training? will the trainers be paid? How long does the training take (Total time used for training)	Training records of facilitators	Course fees	Clowns without borders (Training providers in Zimbabwe)

3.3 Unit costs

Two types of unit costs will be estimated: the cost per family completing the program and the cost per session.

1. The cost per family will be determined from the total cost divided by the number of families enrolled in the program for the 2021 financial year.
2. The cost per session will be estimated by dividing the total cost of the program by the total number of sessions in the year 2021 financial year.

3.4 Budget Impact Analysis

A budget impact analysis will be performed to determine the cost implications of adopting the PLH program nationally in the Zimbabwean public health program. The unit cost estimated in the cost analysis will be used to determine the budget impact of scaling up the program nationally for the population in need (parents and teens aged 10-17). In Zimbabwe, the scale-up estimates will increase the population size from 5537 families to an estimated target population of 25000 families (Charasika, 2020).

3.5 Sensitivity analyses

A one-way sensitivity analysis will be performed on the costing model with the cost variables included, which are focused on the number of eligible participants and their trends in parenting program utilization. The base case values will be increased and decreased within limits supported by a theoretical framework from literature and recommendations on parenting programs stipulated by the World Health Organization.

SECTION 4: DATA ANALYSIS AND MANAGEMENT

Data will be captured and analyzed in Microsoft Excel. Excel models will be used to perform the cost, budget impact, and sensitivity analyses.

SECTION 5: ETHICAL CONSIDERATION

5.1 Ethical approval

Ethical approval for the research study was obtained by the Department of Social Policy and Intervention at the University of Oxford (SPICUREC1a_20_015) and the University of Cape Town (PSY2017-040). Zimbabwe-specific conditional approval was obtained from the Research Council of Zimbabwe (MRCZ/A/2617). Additionally, Ethical approval will be obtained from the UCT Ethics Committee for the MPH mini dissertation.

5.2 Potential benefits and risks

This subsection of the SUPER study has minimum interaction with the research subjects; hence no direct risk is evident to the participants. The benefit of the study is that accurate estimation of cost

should assist with the successful implementation of the PLH program in Zimbabwe and contribute to the body of knowledge in the health economic space on cost for parenting programs in LMICs.

5.3 Autonomy and informed consent

No individuals will be recruited to participate in the costing of the intervention of the PLH intervention. Cost data will be collected from the implementing agencies that are already part of the study. Therefore, no consent is required since costing data does not require an individual's personal information. Access to the PLH implementation agencies has already been granted by the principal investigator of the main study.

5.4 Confidentiality and privacy

Information received through the data collection process from the implementing partners and confidential data made available from the other members of the research teams will remain confidential and not be shared with any third party. No identifiers will be published, and all online data will be kept in password-protected folders.

SECTION 6: PUBLICATION AND DISSEMINATION POLICY

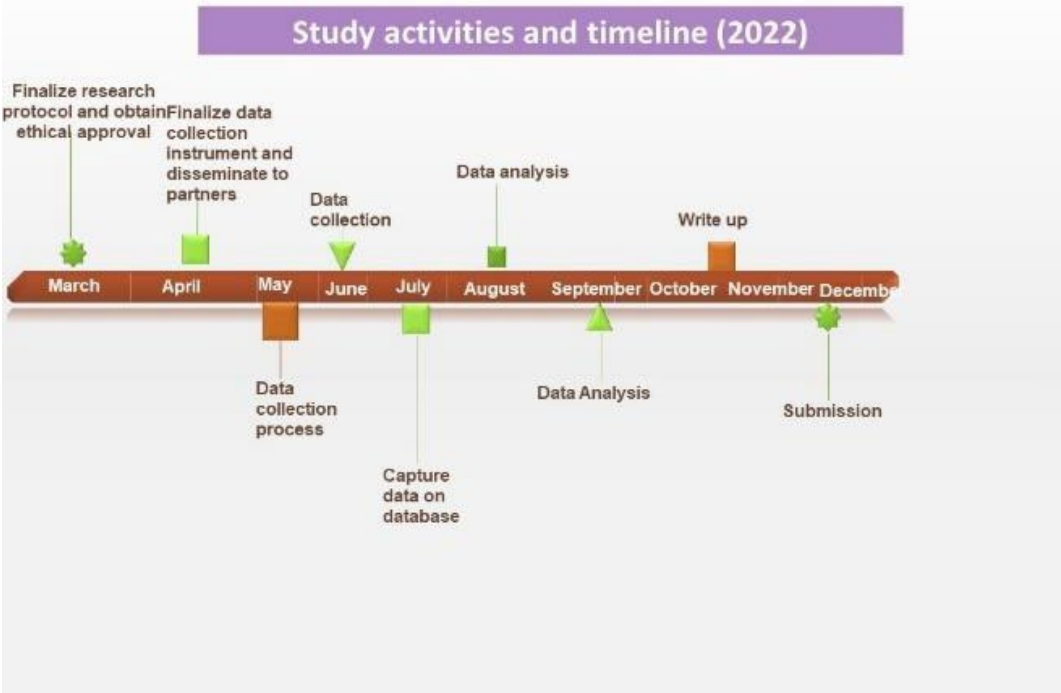
The mini dissertation will be submitted to the University of Cape Town as part of a requirement for the master's in public health, specializing in Health Economics.

The study results will be shared with the PLH SUPER study research team and submitted for publication in a peer-reviewed journal.

SECTION 7: LOGISTICS

The Study will be conducted within 12 months. A framework is provided in Figure 1 outlining the study activities and timelines.

FIGURE 1: STUDY ACTIVITIES AND TIMELINES



SECTION 8: Budget

This study is self-funded.

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PART B:

STRUCTURED LITERATURE REVIEW

2.0 Introduction

Chigiji et al., (2018), analyzed the prevalence of violence against children and the linked associations in Zimbabwe using the 2002 Zimbabwe Population Census Master Sample to develop a stratified two-stage sample, involving 7797 households in Zimbabwe. Parents were reported as the household's biggest perpetrators of physical violence (Chigiji et al.,2018). Descriptively 60 % of girls aged 13-17 years experienced physical violence from their mothers, juxtaposing 46% of the boys of the same age group who experienced violence from their fathers (Chigiji et al.,2018). Additi onally, teenage girls under the age of 18 reported having experienced humiliation by aunts and their mothers (Chigiji et al.,2018). Teachers and uncles were reported as perpetuating similar emotional violence to adolescent boys under the age of 18 years old (Chigiji et al., 2018).

2.1 Lifelong effect of childhood violence

Violence is experienced and expressed in various ways, directly and indirectly by adolescents (Sui et al., 2021). The witnessing of violence by children and adolescents in their formative years may induce a similar psychological response as an individual who is directly experiencing the violence (Sui et al., 2021). Violence can be classified into nine domains, Physical, sexual, emotional cultural, psychological, spiritual, cultural, verbal, financial, and neglect (Oberth et al., 2022). The location and setting of exposure to violence also impact the nature of the long-term negative outcomes affiliated with the act of violence (Oberth et al., 2022). Witnessing or experiencing violence within a certain environment affects how adolescents interact with the environment at a later stage in their lives (Oberth et al., 2022).

2.1.1 The long-term physiological impacts of violence exposure in adolescents

Exposure to early life adverse events such as psychosocial stress, induced by violence creates a disequilibrium in the body's natural ability to maintain stability through internal and external changes (allostasis) (Danese & McEwen, 2012). During a traumatic experience, the sympathetic nervous system is activated, thus triggering stress hormones that promote alertness and attention to the environment (Danese & McEwen, 2012). The consistent activation of the allostatic system that works to restore stability and overcome stressful experiences leads to allostatic overload (Danese & McEwen, 2012). Early exposure to violence or prolonged stimulation in the brain's stress response mechanisms, such as the sympathetic nervous system; results in structural and functional anomalies in the stress-sensitive regions (Danese & McEwen, 2012). These anomalies manifest as lifelong attention deficiency, reduction in fear response, and reduction in the ability to regulate emotions (Danese & McEwen, 2012).

The endocrine system comprises various glands and organs that regulate metabolism, growth and development, mood, reproduction, energy level, and response during trauma, and stress (Campbell & Jialal, 2022). In children, psychological stress stimulates the endocrine system by inhibiting the secretion of the Growth Hormone, which delays developmental milestones (Ranabir & Reetu, 2011).

The human body aims to maintain and protect itself from danger, during acute stress or traumatic experiences, the body through the endocrine system decreases insulin secretion to have enough "energy" to overcome stress, however, this leads to stress-induced hyperglycaemia (Ranabir & Reetu, 2011). Notwithstanding that the auto-response is considered protective, stress-induced hyperglycaemia has been associated with adverse clinical outcomes and complications such as the onset of type 1 diabetes mellitus (a lifelong chronic condition) in children and adolescents (Argyropoulos et al., 2021)

Psychosocial adverse events in childhood have a higher propensity to trigger higher responses to environmental threats, in the various bodily systems (Danese & McEwen, 2012). In contrast to psychosocial adverse effects experienced in adulthood, the impact in children and adolescents endure long after the initial threat has been removed thus increasing incidents of psychiatric disorders such as depression and post-traumatic stress disorder (Danese & McEwen, 2012).

2.1.2 Diverse effects of exposure to violence

Adopting from the science of criminology, the General strain theory (GST) developed by Robert Agnew, is a theoretical framework that suggests that exposure to violence at certain crucial points of development functions as a strain to a developing teenager, and the adaptation to these strains develop maladaptive traits and behaviours i.e. delinquency and violent criminal activities in adulthood (Haynie *et al.*, 2009).

Blakemore and Mills (2013) suggested that teenagers are hypersensitive to the social and environmental cues around them. Their brain's mentalization and organization reflected the complex environmental and social stressors around them (Blakemore and Mills, 2013). Exposure to violence in adolescence prompts the internalization and externalization of problems, which is an unhealthy coping mechanism (Oberth et al., 2022). Internalization in adolescents is demonstrated in them believing that the world is an unsafe place, and they are not worthy of protection, whilst externalization is associated with adolescents who were exposed to violence feeling that violence is an acceptable form of conduct thus inducing delinquent behaviors as they model the observed violence (Oberth et al., 2022).

Exposure to violence in adolescents has also been associated with learning difficulty and substance abuse as a coping mechanism later in life (Oberth et al., 2022). Early childhood exposure to violence creates and perpetuates a cycle of intimate partner violence (Oberth et al., 2022).

Care-giver physical violence in teenagers has shown subsequent tendencies of teenagers to attempt suicide, run away from home, contact with law enforcement, and drop out of school (Haynie*et al.*, 2009). These risky behaviours expose the teenager to adverse social outcomes such as substance abuse, further violence, and risky sexual encounters (Haynie *et al.*, 2009).

2.2 Interventions to Childhood Violence

The basis of parenting interventions stems from an array of social learning theories, which state that individuals learn behaviours and attitudes from other individuals in their social environment (Patterson, 2018). Amongst other domains, parental socialization in the development of the "self" in Children and adolescents acts as a conduit by which they view themselves and interact with the world around them (McCoy et al, 2020). Positive and harmonious parent-child/ caregiver-child relationships empirically act as mediators even in adverse social settings (McCoy et al, 2020). Therefore, parenting programs are used as a theory of change model to promote parenting behaviors and styles to reduce violence against children in the household (Gould et al., 2022). Interventions aimed at parenting skills in child development are effective in the improvement of multi-dimensional health outcomes (Jeong et al., 2021). Parenting programs with a structured curriculum that encompasses key parenting skills such as transparency in communication, positive parenting, and non-violent disciplinary techniques reduce exposure to violence in adolescence (Stark et al., 2018). The interpersonal relationship between adolescents and their caregivers mitigates their susceptibility to other forms of violence through various pathways beyond the household (Stark et al., 2018).

2.2.1 Effectiveness of Parenting Programs as Interventions against Violence in Children.

The searches were conducted in electronic databases; PubMed, PMC PubMed Central, BMC Public Health Journal, UCT electronic database. Search and MeSH terms used were; Violence OR Harsh parenting OR physical abuse AND reduction OR Prevention AND Parenting programs AND low-income-countries with the search filter to only include papers in the last 10 years, papers published in English, with human subjects, and adolescent: 13-18 years. Following the identification and screening process, three papers were included. "Before I was like a Tarzan. But now, I take a pause": mixed methods feasibility study of the Naungan Kasih parenting program to prevent violence against children in Malaysia. Reducing child abuse amongst adolescents in low- and middle-income countries: A pre-post-trial in South Africa. Effectiveness of a parenting program to reduce violence in a cash transfer system in the Philippines: RCT with follow-up.

The three studies evaluated parenting programs aimed at violence reduction through the engagement of parents or caregivers in low-income countries. The contextual commonality of the three countries where the interventions were implemented was the impact of poverty and social stress on families, which contributes to violence and maltreatment of children in the household. Parenting programs in High-income countries have yielded evidence of high efficacy (Berrone et al.,2012). In low- to middle-income countries, existing parenting programs require systemic modification to contextualize them for

the target population (Jeong et al., 2021). These modifications include language, instructional technology, culture, values, and historical, political, and economic contextualization (Jeong et al., 2021). Each of the studies evaluated in this paper underwent cultural adaptations to incorporate the cultural norms and societal values of the target countries. (Lachman et al. 2021) Further adapted the parenting program by introducing a cash transfer system, as a form of social support, a practice that is not routinely practiced in high-income countries.

The program content of the three interventions was developed through context-specific shared goals and values to achieve love and protection within the communities. These interventions mainly focused on the objective of reducing adolescent violence in low-income countries using a structured parenting program intervention.

Results of the three interventions indicated that overall post-intervention, there was a mean difference of 63,5% reduction of physical violence, fewer incidences of emotional abuse, and caregivers reported having an increased sense of self-parenting efficacy. The Philippine RCT showed the largest impact of 30-50% improvement in positive parenting and violence reduction. Their structural adaptation of Cash transfer and education contributed to the overall outcomes. The overall community responsiveness in the three locations was high (80-90%). This indicates the acceptability of these social interventions in low-income countries with different child-rearing practices. Limitations of social behavioral studies are that the studies are vulnerable to self-reporting bias. Self-reported data for social desirability, especially on topics of child abuse, are affected due to fear of social judgment and rejection.

TABLE 3: SUMMARIES OF PARENTING PROGRAMS AND THEIR EFFECT IN REDUCING VIOLENCE AGAINST CHILDREN AND ADOLESCENTS IN LMICS

Title	Year	Author	Country	Intervention	Population	Methodology	Output measure	Results
"Before I was like a Tarzan. But now, I take a pause": mixed methods feasibility study of the Naungan Kasih parenting program to prevent violence against children in Malaysia	2023	Lachman et al. BMC Public Health	Malaysia	Naungan Kasih Positive Parenting Program ("Protecting through Love" in Bahasa Melayu).	female caregivers (N = 74) and children ages 10–17 (N = 26)	mixed-methods study. Multilevel Poisson regression and multilevel linear regression were conducted to compare baseline and post-test outcomes. Qualitative interviews and focus groups examined how participants experienced the program utilizing a thematic analysis approach.	primary outcome was child maltreatment with secondary outcomes including neglect, positive parenting, acceptability of corporal punishment, harsh parenting, positive discipline, and child behavior problems	Parents reported 32% decreased overall abuse at post-test (IRR = 0.68 [0.57, 0.81]), 71% reduced physical abuse (IRR = 0.29 [0.18, 0.47]), and 19% reduced emotional abuse (IRR = 0.81 [0.66, 0.99]). Adults reported a 74% reduction in endorsement of corporal punishment (IRR = 0.26 [0.09, 0.75]). In addition, adults reported reduced overall child behavior problems (β = -2.19; p = 0.23) and reduced sense of parenting inefficacy (β = -0.43; p = 0.004) for their children ages 6 to 17 years.
Reducing child abuse amongst adolescents in low- and middle-income countries: A pre-post-trial in South Africa	2016	Cluver et al. BMC Public Health	South Africa	parenting program, named 'the Sinovuyo ('we have joy') Teen Program'	N=115 adolescent-caregiver dyads (adolescents aged 10–17)	quantitative study	Primary outcome measures: Abuse of adolescents within the home (physical abuse/violent discipline, emotional abuse and neglect)	Abuse of adolescents within the home (physical, emotional, neglect) significantly decreased following the intervention (p < 0.001 adolescent and caregiver reports)

Effectiveness of a parenting program to reduce violence in a cash transfersystem in the Philippines: RCT with follow-up	2021	J.M. Lachman, L.P. Alampay, R.M. Jocson etal.	Philippines	Parenting interventionsand conditional cash transfer (CCT)	N=120 Adolescent-caregiver pairs (adolescents aged 13-24)	Qualitative study	Primary outcomes: Overall maltreatment,Emotional Abuse, Physical Abuse Neglect, positive parenting, use of corporal punishment	Adults receiving the MaPa program reported less overall maltreatment in comparison to the TAU arm at post- intervention (d = -0.50, 95%CI [-0.86, -0.13]) and at 1-year follow-up (d = -0.39, 95%CI [- 0.75,-0.03]. Frequency of emotional abuse was also less for families who received the MaPa program at post-intervention (d = -0.59, 95%CI [-0.95, -0.22]) and 1-year follow-up (d = -0.37, 95%CI [-0.73, -0.01]). MaPa participants reported a 49% reduced risk of physical abuse in comparison toTAU families at post-intervention (IRR = 0.51, 95%CI[0.26,0.75]). MaPa program reported a 63% reduced risk of intimate partner violence victimhood at one-month post-intervention (IRR=0.37, 95%CI [0.06,0.68]) with 49% reducedrisk at one-year follow-up (IRR=0.51, 95%CI [0.01,1.00]).They also reported increased parentingself-efficacy (d=0.39, 95%CI [0.03,0.75]) and fewer daily child behaviour problems (d=-0.45,95%CI[-0.82, -0.09]) at post-intervention compared to those receiving treatment as usual, although these were not maintained at 1-year follow-up

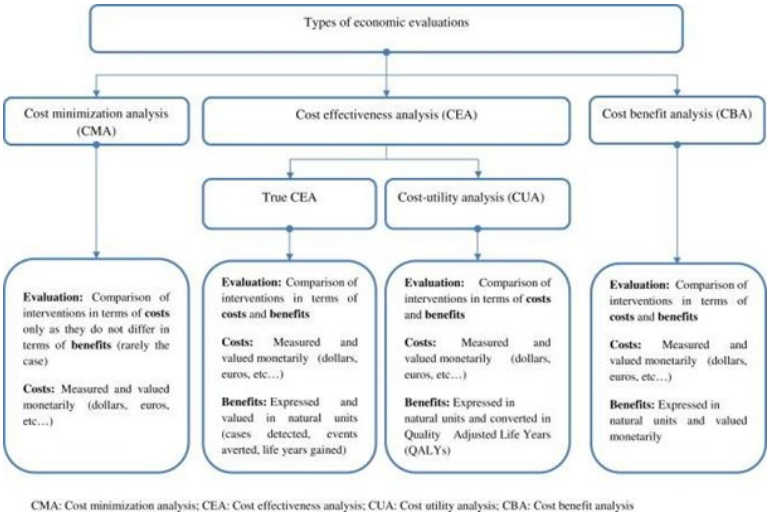
3.0 Clinical-Effectiveness Versus Cost

A Health care system is a system that is not excluded from the broader economic system and context in which it exists (Goeree and Diaby, 2013). The delivery and funding of health care is not in isolation from the other markets within society (Goeree and Diaby, 2013). Beyond the ethical consideration of health needs, the financing of health care interventions is also premised on empirical, theoretical economic principles such as price, ability to pay, willingness to pay, and the foreseen benefit (now and in the long term) (Goeree and Diaby, 2013).

Decision-making in health services on the multiple levels of system work transcends the clinical effectiveness of the intervention and further explores the opportunity cost of the intervention, meaning that for every intervention funded, there is an alternative opportunity with benefits that has been foregone, by virtue-making the real cost of the intervention the foregone benefit of the alternative intervention (Goeree and Diaby, 2013).

The field of health economics uses various economic evaluation methods to determine the cost-effectiveness of health interventions (Drummond *et al.*, 2015). A detailed cost analysis forms the premise of collecting costing data that will be inputted into the various cost evaluation models. Firstly, A cost-effectiveness analysis CEA makes a comparison between cost and alternative intervention (Drummond *et al.*, 2015). A cost-utility analysis (CUA) computes the cost and outcomes of a particular health intervention (Goeree and Diaby, 2013). The product of a CUA is measured in the quality-adjusted life years (QALYs) presented on a range from zero to one (where perfect health equates to one and death equates to zero) (Goeree and Diaby, 2013). A Cost Benefit Analysis (CBA) expresses the product of health interventions, and the health outcomes are presented in monetary value (Goeree and Diaby, 2013). This permits the comparison of two health care interventions on their monetary value (Goeree and Diaby, 2013), the Cost minimization analysis approaches all possible interventions as having similar health outcomes, therefore the centralized aim is to determine the difference in the cost inputs (Goeree and Diaby, 2013).

FIGURE 2: TYPES OF ECONOMIC EVALUATIONS



CMA: Cost minimization analysis; CEA: Cost effectiveness analysis; CUA: Cost utility analysis; CBA: Cost benefit analysis

4.0 Economic Evaluations in Health Interventions

4.1 Types of Cost

In economic evaluations, cost refers to the inputs/ resources needed to provide the health intervention (Drummond *et al.*, 2015). Costs are classified as either financial or economic cost (Drummond *et al.*, 2015). Financial costs allude to valuing inputs of an intervention based on their monetary value only, whilst economic cost includes the valuing of inputs beyond money but further encapsulates the value of time and opportunity costs (Drummond *et al.*, 2015). Cost can further be discriminated as real-world costing, incremental, or full costing (Drummond *et al.*, 2015)

4.2 Costing perspective

The aim and intent of the cost analysis or evaluation determines which perspective will be used (Drummond *et al.*, 2015). The costing perspective can be from the users' perspective (this relates to the costs that they encounter to access the health intervention). Alternatively, the costing can be done from the provider's perspective (the total cost required to implement the intervention to the population in need) (Špacírová *et al.*, 2020). Providers' perspectives include all role players that contribute to the start-up and implementation of the intervention, such as funders, donors, and other sectorial members (Špacírová *et al.*, 2020). The use of the providers' perspective or the payers' perspective in economic evaluations has been argued to introduce biases (Špacírová et al., 2020). In the data, collection process cost inputs from the providers' data may be recorded and kept satisfying the organizational operational needs such as year-end financial reporting, standards setting, tariffs, and preparing for audits (Špacírová et al., 2020). However, the users' perspective is more detailed as it involves costs from different periods in accessing health (Špacírová et al., 2020). The healthcare users' perspective is much broader in context and includes costs outside the health domain such as accommodation, and transportation to access health and extends to include loss of monetary productivity such as unpaid absence from work (Sittimart et al., 2024).

4.3 A Focused Economic Evaluation

The intended purpose of cost estimation should be clearly defined (Clement (Nee Shrive) *et al.*, 2009). A clearly defined purpose as a point of departure assists in mapping the correct methodological approach in cost estimation (Clement (Nee Shrive) *et al.*, 2009). The conceptualization of the purpose assists in a focused approach to determining the type of cost and outcomes to be measured (Bilinski *et al.*, 2017). The purpose can be categorized into the following compartments: Economic evaluation or priority setting, financial planning or cost estimation, budgeting & price setting, and technical efficiency analysis (Drummond *et al.*, 2015). Economic evaluations help in decision-making within health system delivery therefore the cost components included must be contextualized to assist the policymakers and decision-makers when the analysis has been concluded (Bilinski *et al.*, 2017).

5.0 Costing methods

Determining the cost measured in an economical evaluation requires the analyst to conceptualize a costing methodology (Jacobs & Barnett, 2017). The method of reporting costs in economic evaluation plays a vital role in maintaining research principles (Clement (Nee Shrive) et al., 2009). The components of cost inputs utilized to obtain the cost analysis are directly linked to the results obtained (Jacobs and Barnett, 2017). Costing methods will inform the data collection process, the type of data collected, and the measurements that will be used. These methods increase the validity and reliability of the cost evaluation (Clement (Nee Shrive) *et al.*, 2009). Furthermore, the methods will also communicate the generality of the results obtained and their use in policy recommendations (Bilinski *et al.*, 2017). Overall, the major classifications are Gross or Microcosting. Thereafter these methods will be further fragmented into bottom-up or top-bottom, step-down, and activity-based costing.

5.1 Micro-costing

Micro-costing measures the direct cost involved in producing the health intervention (Jacobs & Barnett, 2017). Obtaining these costs requires direct observation of all resources in the production pathway including the time of the health care provider with the health care users, equipment, supplies, and the space used in providing the health intervention (Jacobs & Barnett, 2017). Personnel costs in terms of salaries and other labour costs i.e. salaries and employee benefits and other support services offered to the health care users (Jacobs & Barnett, 2017). Due to the comprehensive nature of micro-costing, it is regarded as favorable as it improves specificity, precision, and validity (Jacobs & Barnett, 2017). The limitation of micro-costing is that to obtain cost inputs, the data collection is time-intensive and requires more resources in the research field (Jacobs& Barnett, 2017). Additionally, results from micro-costing studies have reduced use in a different context from those in which the study was performed i.e. reduced generalization (Jacobs & Barnett,2017).

5.2 Bottom-Up Costing Method

The micro-costing method is often classified as a type of bottom-up costing method (Chapko *et al.*, 2009).The characteristic of the bottom-up method is that data collection is done on each individual or healthcare user rather than on an organizational level (Špacírová et al., 2020). This type of costing allows us to allocate cost as a product of how the user interacts with the intervention, time and utilization are taken into consideration (Chapko *et al.*, 2009). Key elements of this methodology involve three phases namely identification, measure, and valuation of resources (Špacírová et al., 2020).

5.3 Top-Down Cost Method

Top-down is a method of reporting costs that takes a macro analysis of the full scope of the intervention produced or the products produced by the organization (Špacírová et al., 2020). This method takes a retrospective technique in the data collection phase (Špacírová et al., 2020). Top-down takes into consideration fixed costs such as building and overhead costs (training costs or administrative costs) needed for the implementation process (Špacírová et al., 2020). This costing approach applies the

same weight to all users and overhead costs irrespective of their interaction with the intervention (Chapko *et al.*, 2009).

5.4 Step-down and activity-based costing

To mitigate the gap in the need for research accuracy in the costing methods step-down and activity-based costing methods were established. (Drummond *et al.*, 2015). Activity-based costing method is used by organizations to identify cost drivers (Blaschke *et al.*, 2020). This method examines all direct and indirect costs used in the provision of the health care intervention and then allocates these costs to a specific activity (Blaschke *et al.*, 2020). Activity-based costing is a more detailed method of valuing the overhead cost within the organization (Blaschke *et al.*, 2020). In informing decision-making within organizations Activity-based costing allows for resource distribution based on utilization (Blaschke *et al.*, 2020)

6.0 Present cost and future value

6.1 Discounting

The valuation of capital cost and fixed cost for the period in which they occur (Shiell et al., 2002). Capital costs or fixed costs are costs that an organization spends money on now and the benefits are extended from the time of purchase (Shiell et al., 2002). The life span of the capital goods or services is assigned to an interest rate (Shiell et al., 2002).

(Drummond et al.,2015) explained that when performing a cost analysis/ evaluation, to adequately assess the cost impact of an intervention the cost needs to be evaluated over a certain time horizon. Due to factors such as inflation and opportunity cost, the present and future value of money does not remain stagnant over time (Drummond *et al.*, 2015). When performing cost evaluation studies adjustments need to be applied to the future cost and benefits to reflect the present value of money (Drummond *et al.*, 2015).

EQUATION 1: PRESENT VALUE

The Present value can be calculated using the formula:

$$PV = \frac{FV}{(1+r)^n}$$

Where: FV = Future Value

PV=Present Value

r= discount rate

n=number of years unit benefit/cost occurs (Drummond *et al.*, 2015)

Capital costs can either depreciate if a financial costing approach is being used, or the opportunity cost can be obtained if an economical cost method is used (Jackson *et al.*, 2011). The adjustment of the costs to obtain the opportunity cost is done using a discount rate or the principles of annuitization (Jackson *et al.*, 2011). The National Institute of Cost Evaluations has created guidelines and amortization tables to further standardize this process. Cognizant needs to be taken of the context in which the cost applies and the economic climate of the context or setting in the cost analysis. The source of the price needs to be described, and transparency needs to be applied.

When we value the capital cost, there needs to be a specification as to whether the capital cost is land or capital equipment (Drummond, 2015). Economic principles dictate that land does not depreciate in contrast to capital equipment which has a linear depreciation with the use of the equipment. (Drummond, 2015).

In low-to-middle-income countries (LMICs), the opportunity costs of capital costs and the discount rate are strongly associated (Bishai and Hyder, 2006). When money is invested in a healthcare intervention, such as buying new medical equipment, it loses its potential returns that could have been obtained by funding infrastructure projects or community health initiatives within the population. In health economic evaluations, a discount rate of 3% to 5% is applied (Drummond et al., 2015). Choosing the appropriate discount rate is essential for making decisions in low- and middle-income countries (LMICs) (Bishai and Hyder, 2006). Higher rates indicate that expenditures in healthcare should be weighed against other possible opportunities (Bishai and Hyder, 2006). In LMICs due to the scarcity of capital resources, their discount rate is valued higher than in high-income countries (Bishai and Hyder, 2006). Consideration should be taken when applying the discount rate, Key elements of consideration include the social context in which the intervention exists, the theoretical fundamentals that support the discount rate, and the costing perspective (Drummond *et al.*, 2015)

FIGURE 6: DISCOUNT-TABLE (DRUMMOND ET AL.,2015)

N	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7335	1.7125	1.6901	1.6681	1.6467	1.6257
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	2.4437	2.4018	2.3612	2.3216	2.2832
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699	3.1024	3.0373	2.9745	2.9137	2.8550
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908	3.6959	3.6048	3.5172	3.4331	3.3522
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.4859	4.3553	4.2305	4.1114	3.9975	3.8887	3.7845
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330	4.8684	4.7122	4.5638	4.4226	4.2883	4.1604
8	7.6517	7.3255	7.0197	6.7327	6.4632	6.2098	5.9713	5.7466	5.5348	5.3349	5.1461	4.9676	4.7988	4.6389	4.4873
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952	5.7590	5.5370	5.3282	5.1317	4.9464	4.7716
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177	6.1446	5.8892	5.6502	5.4262	5.2161	5.0188
11	10.3676	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.8052	6.4951	6.2065	5.9377	5.6869	5.4527	5.2337
12	11.2551	10.5753	9.9540	9.3851	8.8633	8.3838	7.9427	7.5361	7.1607	6.8137	6.4924	6.1944	5.9176	5.6603	5.4206
13	12.1337	11.3484	10.6350	9.9856	9.3936	8.8527	8.3577	7.9038	7.4869	7.1034	6.7499	6.4235	6.1218	5.8424	5.5831
14	13.0037	12.1062	11.2961	10.5631	9.8986	9.2950	8.7455	8.2442	7.7862	7.3667	6.9819	6.6282	6.3025	6.0021	5.7245
15	13.8651	12.8493	11.9379	11.1184	10.3797	9.7122	9.1079	8.5595	8.0607	7.6061	7.1909	6.8109	6.4624	6.1422	5.8474
16	14.7179	13.5777	12.5611	11.6523	10.8378	10.1059	9.4466	8.8514	8.3126	7.8237	7.3792	6.9740	6.6039	6.2651	5.9542
17	15.5623	14.2919	13.1661	12.1657	11.2741	10.4773	9.7632	9.1216	8.5436	8.0216	7.5488	7.1196	6.7291	6.3729	6.0472
18	16.3983	14.9920	13.7535	12.6593	11.6896	10.8276	10.0591	9.3719	8.7556	8.2014	7.7016	7.2497	6.8399	6.4674	6.1280
19	17.2260	15.6785	14.3238	13.1339	12.0853	11.1581	10.3356	9.6036	8.9501	8.3649	7.8393	7.3658	6.9380	6.5504	6.1982

7.0 Defining Uncertainty in Economical Evaluations

Uncertainty in economic evaluations refers to the unknown effects of the cost and the adoption of a health intervention within population groups (Drummond, 2015).

7.1 Methodological uncertainty

Uncertainty is defined around the methodological design of the cost analysis conceptual framework (Silva et al., 2017). Aspects such as costing perspectives, time horizon, discount rate, health outcome measurements, and method of valuing the cost affect the results of the costing study and ultimately the decision-making in health interventions (Silva et al., 2017). Methodological uncertainty can be handled through research rigor (Silva et al., 2017). The use of authoritative sources and subject-specific guidelines to inform decisions when planning a costing study (Silva et al., 2017)

7.2 Structural uncertainty

In decision-making models, the assumption is that the model should include all relevant domains/ parameters of the clinical state and the economic pathways that may influence the cost estimate and cost-effectiveness of the study intervention and the comparator (Jackson et al., 2011). However, due to research gaps, there may be insufficient literature on the clinical or economic data of the intervention that will be used as the comparator (Jackson et al., 2011). These types of uncertainty may produce biased results that favour the base case intervention due to insufficient data (Jacksonet al., 2011). Because structural uncertainty results from missing data, models that create simulated distribution patterns and model averaging have been used to reduce the effects of these uncertainties (Jackson et al., 2011).

7.3 Parameter uncertainty

Parameter uncertainty addresses the lack of true numeral inputs computed in the analytical costing model (Silva et al., 2017). These numeral values may be informed by the lack of accurate cost price of the resources or products at the time of the costing study, the use of a sample group in performing the cost analysis does not necessarily reflect the population group and the reliability of data used (Silva et al., 2017).

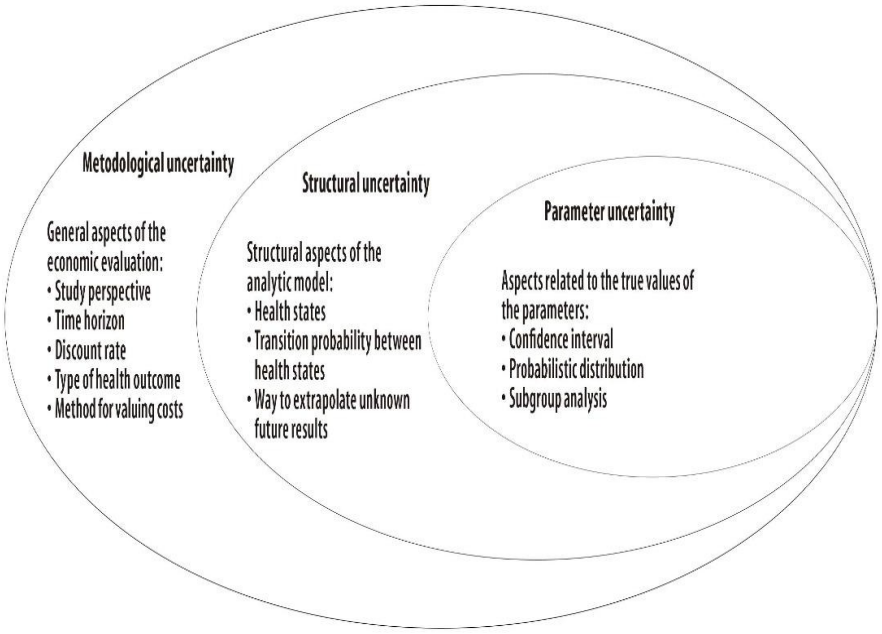
Parameter uncertainty can be addressed using sensitivity analysis such as a one-way sensitivity analysis or a probabilistic sensitivity analysis which changes the parameters used to determine a central tendency of distribution (Silva et al., 2017).

7.4 Uncertainty in Economic Evaluation: Sensitivity Analysis

The domain where research outcomes and results are applied or applicable to other settings and contexts is generalizability (Burchett et al., 2020). In determining the effectiveness of health intervention and support, therefore, informing policy cannot use surface familiarity (Burchett et al., 2020). In economic evaluations, computing results from one setting to another introduces uncertainty

due to economic and healthcare contextual differences (Limwattananon, 2008). A sensitivity analysis is a systemic model that handles different parameter uncertainty (Limwattananon, 2008).

FIGURE 13: MODELLING UNCERTAINITY (JACKSON ET AL.,2011)



Three methodological approaches to perform a sensitivity analysis namely.

- One-way sensitivity analysis
- Extreme scenario analysis
- Probabilistic sensitivity analysis (Briggs & Gray, 1999)

7.5 One-way sensitivity analysis (Deterministic sensitivity analysis)

A one-way sensitivity analysis estimates expected cost, effectiveness, and net benefit through the variation in input parameters (Drummond, 2015). This method analyzes the impact of the changes in the input parameter values on the model outcome (Drummond, 2015).This method of analysis depicts the quantitative association between changes in cost inputs and the outputs thereof (Drummond, 2015). In decision-making, this is important as it allows for the exploration of the various parameter changes and their impact on the model (Drummond, 2015). A one-way sensitivity analysis is performed by varying input parameters (one input at a period, whilst other inputs are kept constant) (Drummond, 2015). This variation may be determined through the addition or subtraction of a certain percentage of the mean value of each cost input (Drummond, 2015).

8.0 Budget impact analysis

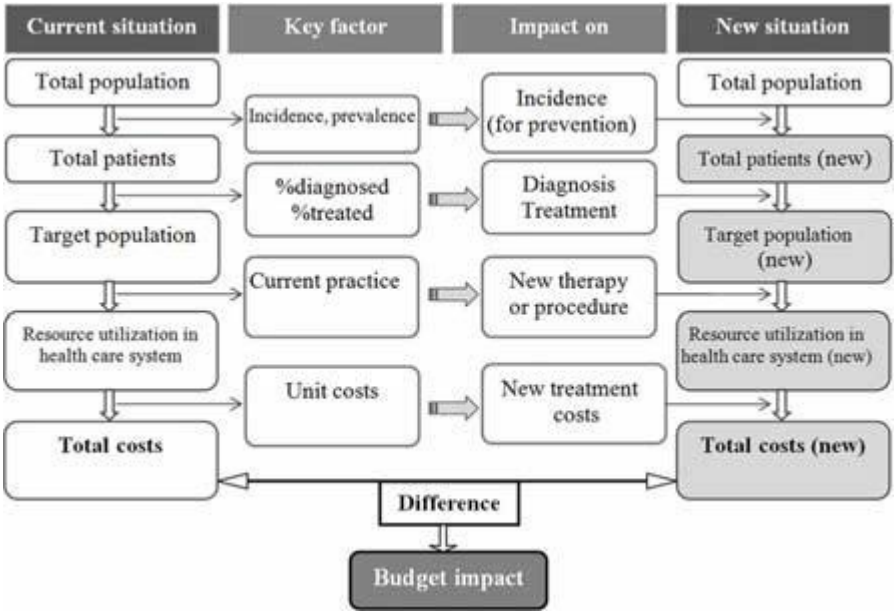
A budget impact analysis explores the financial repercussions of the implication of the health intervention in a specific context with specification (Garattini & van de Vooren, 2011a). Economic evaluations are usually made using a small sample and supported with sensitivity analysis to determine

the uncertainty. The budget impact analysis will inform decision-makers on the affordability and sustainability of the intervention (Trueman et al., 2001).

Budget impact analysis has three objectives namely, estimate the financial repercussions of the implementation of a health intervention to a particular population in a particular context, determine the affordability of the health intervention to a specific population before reimbursement, and inform budget planning for resource allocation once reimbursement has been confirmed (Leelahavarong, 2014)

Countries such as Australia, Canada, Belgium, Croatia, Hungary, and Poland require that during the procurement of health technology a Budget impact analysis with a cost-effectiveness analysis when a reimbursement application is done (Garattini & van de Vooren, 2011b). This is to ensure that provision is made for changes in time horizon with the purchasing power parity, foreseen the development of health care technology, and the changes in the portfolio of the reception and disease profile (Garattini & van de Vooren, 2011b). A BIA further allows for sustainability and priority setting in the healthcare systems (Garattini & van de Vooren, 2011b).

FIGURE 20: BUDGET IMPACT MODEL



It is imperative to know that, not all cost-effective health interventions are affordable. In the context of low-income countries, the economic context of developing countries, with healthcare systems that are poorly resourced results in the lack of the implementation of cost-effective health interventions (Bilinski et al, 2017). Additionally, these governments cannot be self-reliant in maintaining and sustaining health interventions without international donors (Bilinski et al, 2017). In low-income countries, the reliance on foreign aid predisposes them to failure as they cannot meet the future demands of donor-funded and initiated health interventions (Grépin, 2012). As a result of elements like donor fatigue, it is therefore pivotal that a budget impact analysis is presented to the decision-makers of the healthcare system of interest to ensure affordability, priority setting, and budgeting in the absence of donors (Grépin, 2012).

BIA is not a replacement for other economic evaluations such as the cost-effective analysis, which quantifies the value of the new health technology, however, BIA informs us on the impact of the new health technology on the health system budget, hence they are done from the payers' perspective (Drummond *et al.*, 2015)

In the Zimbabwean health care system, the Ministry of Health and Child Welfare has centralized decision-making power, health policymaking, and resource allocation (Hansen, 2008). Due to the declining GDP, the Zimbabwean health ministry is poorly funded and the increase in the emigrationof healthcare professionals further puts pressure on the healthcare system (Hanseen,2008). It is then instrumental that the available budget is used efficiently on health care intervention, proper analytical methods such as BIA help inform priority setting and budget allocation (Hanseen, 2008)

Key features of a budget impact analysis include determining the eligible population size, the current and foreseen patient pathways, changes in intervention utilization, changes in the disease profile, and changes in the cost of delivering the health intervention (NICE, 2019)

8.1 BIA Approaches

8.1.1 cost calculator

The cost calculator is a recommended approach to computing the budget impact analysis (Sullivan et al., 2014). This approach takes into consideration the cost changes related to the delivery of the health technology or health intervention (Sullivan et al., 2014). Attributable to the purpose of the budget impact analysis, the budget impact analysis must be comprehensible to the budget holders (Sullivan et al., 2014).

8.1.2 Condition-specific cohort/ individual simulation model

Condition-specific cohort/ individual simulation model considers the changes that may occur in the other aspects of delivering the health intervention or health technology (Sullivan et al., 2014). These changes may include changes in the eligible population size, disease profile, access, and possible foreseen modifications in the healthcare intervention (Sullivan et al., 2014).

8.2 Data sources of Budget-impact analysis

Input parameters should be obtained from data sources that are context-specific to the budget holders (Garattini et al.,2011). These sources include national census data in the country or region of interest and World Bank data which provides data on health indicators, health prevalence, and incidence.

Data may also be directly obtained from the budget holders themselves (Bilinski *et al.*, 2017). Data that pertains to the disease profile may be obtained from retrospective non-randomized clinical trials and other international sources with similar populations and practice patterns (Garattini and Van De Vooren, 2011). Data on the responsiveness (uptake, usage, and intervention compliance) of the target population to the health intervention/ health technology can be obtained and contextualized.

Additionally, data can be obtained through market research of alternative options to identify trends in treatment patterns.

8.3 Analytical Framework of a Budget Impact Analysis

A budget impact analysis model should have limited generalizability (Bilinski *et al.*, 2017). This is done by not using the normative "base case" that is generally applicable (Burchett *et al.*, 2020). Consideration must be taken of the architecture of the local health system and contextual factors surrounding the delivery of the intervention such as:

8.3.1 Perspective of the Budget Holder

A fundamental step in a budget impact analysis is understanding who the respective budget holder is, either individuals or a collective of various budget holders such as donors or the Ministry of Health (Burchett *et al.*, 2020). A clear distinction between the budget holder allows the model inputs to be more accurately linked to the delivery of the health intervention/ health technology (Burchett *et al.*, 2020).

8.3.2 Eligible population

Data on the Inclusion and exclusion criteria of the population who receive the health intervention or health technology is needed (Pearson, 2018). Furthermore, the current sample size and how their responsiveness to the health intervention will impact cost in the time horizon of interest (Garattini and Van De Vooren, 2011). Does the intervention result in longevity of life and continuous use of the health intervention? This information informs the budget holder that the receipts pool will increase with time (Pearson, 2018). Alternatively, an equilibrium may be reached which is the participants who engage with the health intervention/health technology are constant (Pearson, 2018). Data on the number of the target population who may access the health intervention and those within the target but may have barriers to accessing the intervention.

8.3.3 Total Cost and Unit Cost of the Current Intervention

The current unit cost and total cost of the delivery of the health intervention to the sample size at present (Garattini and Van De Vooren, 2011). A cost estimation analysis involving cost inputs relating to the delivery of the health intervention from the perspective of the provider (Garattini and Van De Vooren, 2011).

8.3.4 Impact on Other Costs

When considering the budget impact analysis, the model should reflect how the cost of the respective intervention will affect other components within the health care system. Additionally, it is important to evaluate the trade-offs that may be present (Garattini and Van De Vooren, 2011). This data will further help the decision makers in making a more informed decision in resource allocation and budget setting (Bilinski *et al.*, 2017). Health care does not exist in isolation from other systems within a country,

therefore it is important to evaluate how the budget will impact the performance of other systems (Grépin, 2012).

9.0 Defining Affordability

(Pearson, 2018), argued that affordability cannot be empirically defined because simply put affordability of the health technology or services is within the confines of the available resources of the payer or buyer. Therefore, a good or service is assumed to be affordable unless the funding of the good or service will result in harm through one or more of these mechanisms:

1. Trade-off of other health care benefits/interventions to the same target population. Fewer benefits from the new intervention compared to the existing intervention.
2. Allocating new resources or increased budget that could have been allocated to other health services that could yield overall benefits to the target population or other at-risk populations
3. Increasing the amount that individual health users must pay to access health intervention to the point of unreasonable sacrifices.
4. Re-allocating resources from other sectors such as education, or resulting in increased revenue collection such as increased taxes that would cause a greater loss to the bigger society than the estimated health benefits from the health intervention

   Conclusively affordability involves the evaluation of the opportunity cost affiliated with the intervention in the context of existing healthcare services (Pearson, 2018).

9.1 Determining Affordability of Health Intervention

The nature of low-to-middle-income countries is characterized by constrained resources and limited ability to meet health needs (Wiseman *et al.*, 2016). As a result, a well-informed methodological process of determining health priorities and budget allocation of new interventions will ensure that prioritized interventions are the best value for money (Wiseman et al., 2016). The recommended time horizon of the budget impact analysis is 5 years as this informs the budget without losing relevancy (Pearson, 2018).

There is a gap in the literature with the recommendations on the optimal spending threshold of social and behavioural interventions (Wiseman *et al.*, 2016). The affordability of health care interventions can be determined from the ICER value framework, which methodologically conducts a budget impact analysis within the context of the national budget (setting whereby the health intervention will be delivered/ implemented) with a pre-determined spending threshold (Pearson, 2018). If the results of the Budget impact analysis indicate that the new intervention exceeds the pre-determined threshold, this informs decision-makers that the health system may struggle to meet the delivery of the new intervention without displacing other health services, a trade-off may be needed (Pearson, 2018)

9.2 Zimbabwe Health Budget

In 2021 the Zimbabwean health budget was US$684 million which translates to 13% of the overall national government budget (*Zimbabwe 2023 Health Budget)*. The Ministry of Health in Zimbabwe is fragmented into four programs namely: Policy and Administration, public health, curative services and bio-medical science, pharmaceuticals, and bio-pharmaceutical production. The budget allocation and distribution were ,70% in curative services, ,18% policy and administration, 10%public health services, and 2% bio-medical science, pharmaceutical, and bio-pharmaceutical production. Adolescent health and violence are classified within the public health services, including the family health budget of US$23 million in 2021 (*Zimbabwe 2023 Health Budget – Community Working Group on Health*,). This budget covers reproduction, maternal, newborn, child, adolescent,and nutrition services. A high-level policy dialogue on child protection financing in Zimbabwe, the budget series in July 2022(*Zimbabwe 2023 Health Budget – Community Working Group on Health*,). The dialogue included input from various policymakers from the Ministry of Public Services, labor, and social welfare, UNICEF, and the Zimbabwean economics society. Recommendation towards national policy and priority setting of child protection investment within the national budget. Child protection services in Zimbabwe expenditure report of the health sector indicated spending range between 0.01 % and 0.08% % of the GDP in 2022. The Zimbabwe government intends to strengthen its child protection systems through the National Action Plan for Orphans and Vulnerable Children and the Child Protection Fund (*Zimbabwe 2023 Health Budget – Community Working Group on Health*,).

TABLE 4: COST ANALYSIS OF PARENTING PROGRAMS IN LMICS

Study	study objectives	Economic Context	Intervention	Study Population Group	Costing model	Costing method	Costing perspective	Cost inputs	Outcome measure	Adjusting for purchasing power parity	Summary of results
Redfern A, Cluver LD, Casale M, et al. Cost and Cost-effectiveness of a parenting program to prevent violence against Adolescents in South Africa (2019)	Estimation of costs and cost- cost-effectiveness of 'Parenting for Lifelong Health: Sinovuyo Teen', a non-commercialized parenting program aimed at preventing violence against adolescents in low-income and middle-income countries.	Upper-middle income Country (UNFPA, 2019)	Parenting for Lifelong Health	Adolescents (aged 10–18) and their caregivers	Cost analysis /Cost-effectiveness study	Retrospective costing gross costing top-bottom	program provider/payer perspective	1. Set up costs: training cost, participant recruitment, community liaison. 2. Program delivery cost: Personnel cost (staff time), transport cost, materials needed for implementation cost, monitoring cost (administrative cost for data management i.e. attendance list and facilitators checklist). 3. Overhead cost: proportion of office running costs and management support incurred by the implementation partner during the implementation period.	(1) the best estimates of disability-adjusted life years (DALYs) lost in South Africa due to different forms of child abuse	15 % the replacement rate of physical goods	The total cost is US$ 135 954 per 270 families. Unit Cost US$ 504 per family. Total Cost at a scale of 1000 families = US$ 266 380, Unit Cost US$ 266 per family. The cost per incident of past-month abuse avoided during the trial was US$1862 (95% CI US$4688 to US$1152). Assuming continued results at scale, the cost per incident of abuse avoided decreases to US$972 (95% CI US$2480 to $610).
Lopez Garcia I, Saya UY, Luoto JE (2021) Cost-effectiveness and	estimation of the cost-effectiveness, benefit-cost ratios (BCRs), and returns on investment (ROIs) for 2	Lower-middle-income countries (UNFPA, 2019)	Msingi Bora ("Good Foundation" in Swahili) , a group-	Caregivers and children of 6 to 24 months	1. Cost analysis 2. Incremental cost-effectiveness ratios (ICER) 3. Benefit-	Step down accounting costing methodology using actual program cost to obtain costing data/	Cost Analysis-Providers perspective /Incremental Cost Effectiveness ratio-	**Direct cost**: Personnel cost/ Time use cost/ Travel and accommodation/ Food and supplements. **Indirect cost**: Start-up cost (Online data transfer) **Societal**	Standard Deviation as improvement in each outcome per	An annual discount rate of 5%	**The total program costs**= US$56,171 (group-only arm). **Total program cost**= US$58,103(mixed-delivery arm). Total cost per Child = US$140 (Group arm)

Economic Returns of Group-based Parenting interventions to Promote Early Childhood Development Results from a randomized controlled trial in Rural Kenya	effective group-based delivery models of an ECD parenting intervention that utilized Kenya's network of local community health volunteers (CHVs).		based parenting intervention among rural Kenyan households with children aged 6 to 24 months		cost Ratio (BCR) and Return on Investment (ROI) 4. Sensitivity analysis	Economic costing methods (including direct and indirect cost)	providers perspective / Benefit Cost Analysis-societal perspective (using the opportunity cost of the mothers' time and venue hire for group sessions)	**cost**: Venue hire for group sessions and the opportunity cost of the mothers	US$100/ Gains in lifetime wages investment by intervention arm		/US$47.423 (Mixeddelivery arm). **Incremental cost-effectiveness ratios (additional SD per US$100): Provider cost only (group only delivery/Mixed delivery respectively):** Cognition 0.44 (0.133)/0.28 (0.120). Receptive language 0.35(1.148)/ 0.16 (0.086) Socioemotional 0.19(0.088) /0.18 (0.069). **Total Societalcost (Group only delivery/ mixed delivery respectively):** Cognition 0.37 (0.113)/ 0.23 (0.100). Receptive language 0.30 (0.125)/0.14 (0.072) Socioemotional 0.16 (0.074) 0.15 (0.058).**BCRs and ROIs: gains in lifetime wages from participation in the program=US$2,729 per child in group-only delivery and US$1,784 in the mixed delivery arm. Long-term cost per cost =US$176 and US$ 168 respectively.BCR (group only delivery) = 15.5 ROI=127% BCR (mixed delivery)=10.6 and ROI=55% .**

9.3 Cost estimation and analysis of parenting programs in LMIC

The success of any intervention within a health care system depends on the capacity of the system to implement it. Behavioural interventions in Low to middle-income countries have many times not taken up priority, even with the supported empirical evidence of their efficacy in behavioural modification. Decision-making for the adoption of these parenting programs in Low-to-middle-income countries has lacked research support. Particularly in the study of cost estimation and determination of affordability of these interventions. There is a limited scope of economic evaluations and budget impact analysis in low to middle-income countries. (Redfern et al., 2019) conducted a cost and effectiveness analysis of a violence prevention parenting program 'Parenting for Lifelong Health: Sinovuyo Teen', which targets adolescents in low-income and middle-income countries. The costing study aimed to inform priority setting and budget planning in low to middle-income countries considering the limited literature on running parenting programs in the specified settings. A provider's perspective was utilized, and data were collected retrospectively from the implementation partners who were the service providers of an NGO (Clowns without Borders).

The organizational level of operations methodologically categorized costs, i.e. Set-up cost, Program delivery cost, and overhead cost. Program development costs were excluded from the cost analysis. A replacement rate of 14% was applied to all physical costs. Costs were incurred in South African rands and converted to US dollars through the OECD exchange rate of 2015. Cost estimation of the Sinovuyo Teen Program with a total of 270 families indicated a Total cost of US$ 135 954 with a marginal cost of US$504 per family. Measures of frequency showed that 58% of the total cost was allocated towards staff time during the implementation phase, initial facilitators' training and preparation (community and household visits before implementation) accounted for 5% of the total cost, logistics of transporting the staff and the families to the implementation site accounted for 15 % of the total cost, 9% was for the food and refreshments given to the participants at each session, 1% was the stationary and necessary equipment needed for the implementation of each session. Following up on the participants who missed the session accounted for 22% of the total cost.

The study modeled the program delivery to a scale of 1000 families, which resulted in the total cost equating to $266 380 and US$266 per family. This scaling model indicated that the benefits of the intervention were more favourable in the context of higher utilization. Whilst a diac family approach to violence interventionin older children In Thailand the "Happy Families" program which included 12 weekly sessions estimated that a unit cost of $900 per family or 0.2 standard deviation change in parenting practice of $200 and $500. Although there is a great amount of research and investment in the implementation of social and behavioural interventions to combat violence in children there is inadequate research with the use of health economics fundamentals in evaluating the cost of implementing the interventions in resource-constrained contexts Limited research papers were available to produce a fair comparison with the costing of parenting programs.

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PART C:

JOURNAL MANUSCRIPT

Abstract

Introduction

The Parenting for Lifelong Health (PLH) aims to bridge the gap in empirical framework and literature in low-to-middle-income countries. This will be done by creating effective, fit-for-purpose parenting programs, that are context-specific and tailored for low-to-middle-income countries, which are affordable (not for profit) and accessible to all. Thereafter reviewing the frameworks and effectiveness thereof. These PLH programs for children and teens will be implemented in 25 low-to-middle-income countries, one of which is Zimbabwe. This study is a sub-study linked to the PLH main study. The study aimed to determine whether the Parenting for Lifelong Health (PLH) for Parents and Teens program is affordable at a national level in Zimbabwe, to determine the total and unit costs of the (PLH-Teens) program in Zimbabwe. Furthermore, estimate the budget impact of scaling up the (PLH-Teens) program on a national level.

Methods

An economic cost analysis was conducted to obtain the total cost, of implementing the PLH program in Zimbabwe. The costing was done from the provider's perspective within the time frame of one financial year, in the 2021 USD. The total cost of providing the intervention to 5 537 families was obtained as the sum of capital cost and recurrent cost. Capital costs were annuitized using a discount rate of 5%. The intervention was scaled up to 250 000 families and a budget impact analysis was conducted to estimate the cost implication. A one-way sensitivity analysis was performed to determine changes in cost output.

Results

The Total Cost of implementation of the PLH-Teens in Zimbabwe for 5 537 participants in 2021 was US $823 704,47 The Unit cost per family (completing 16 sessions) was US $148,76 and the unit cost per session was US $9,30. When scaling the program to 250,000 families, approximately 96,36% of the initial study population projected a budget impact cost of US $37 190 915,98.

Conclusion

Parenting for Lifelong Health (PLH) for Parents and Teens program demonstrates relatively low unit costs of US $148.76 per family; the total projected cost of scaling up the intervention to a national level (US $37.2 million) highlights a significant financial burden for a low-income country like Zimbabwe. Despite the supposed low running cost, the program's large-scale implementation is unlikely to be feasible without substantial and sustained donor support. These findings underscore the lack of affordability of social and behavioral interventions in LMIC; furthermore, the importance of securing external funding and integrating such interventions into broader national and international development strategies to ensure accessibility and long-term sustainability.

Background

A shift in the burden of disease is evident in middle to low-income countries from communicable disease to non-communicable disease (Hansen and Chapman, 2008). The mortality rate due to violence and injury is rapidly increasing (Benziger et al., 2016). Children and Adolescents are not excluded from experiencing the adverse effects of this repositioning, more particularly within the household. Discipline is at times misconstrued as violence, this increases the risk of exposure against children and adolescents to various forms of violence (Simango and Mafa, 2022). In the Zimbabwean context, the status quo of discipline involves both physical and non-physical forms of violence (Simango and Mafa, 2022). In 2015 the Zimbabwean high court outlawed corporal punishment in schools and in the household. A law that was not endorsed by many Zimbabwean communities as they believed that this would compromise child discipline (Simango and Mafa, 2022). Community members believed that the government was taking a Western approach to creating laws and norms for African society (Simango and Mafa, 2022).

There is a significant incline in the incidents of violence perpetrated toward children globally (Benziger et al., 2016) . Childhood, violence affects the early childhood developmental process, which further translates to altered psychosocial development in adulthood (Benziger et al., 2016) . Despite the social change observed in many cultures worldwide, concerning parenting styles and awareness regarding the harms of violence in its various forms, there is still a need for more effort in creating interventions that are aimed at mitigating the burden of childhood violence (Chigiji et al., 2018). Global leaders have formed partnerships and pledged their commitment to achieving the 2030 agenda, target 16.2 of ending all forms of violence, abuse, and neglect against children (Desai and Reece, 2017).

The implementation of parenting programs in high-income countries has been shown to be an effective intervention in the reduction of violence (Cluver et al., 2018). These parenting programs take a multidisciplinary approach to address the underpinning causes of violence such as poverty, lack of knowledge in the caregiver regarding effects of abuse/neglect, dealing with mental health issues, parenting styles, and caregivers themselves being victims of childhood violence (Cluver et al., 2018) . Evidence of the effectiveness of these programs has been based on literature in the context of high-income countries (Cluver et al., 2018). There is a gap in knowledge about the effectiveness of parenting programs in low-income countries (Cluver et al., 2018). Adopting these parenting programs in the context of low to middle-income countries low-to-middle-income countries is challenging because these countries rely on external funding and lack capacity in terms of skilled human resources, instructional technologies, and social/cultural barriers (Cluver et al., 2018). Therefore, to successfully have an effective parenting program in low-to-middle income countries, there is a need that the parenting programs are context-specific and acceptable in the societies in which they will be implemented, not merely have an umbrella approach (Cluver et al., 2018).

In 2012, the development of the Parenting for Lifelong Health (PLH) for teens commenced with efforts to combat the widely spreading pandemic of childhood violence, in low to middle-income countries (Cluver et al., 2018). The intervention was established through collaborative efforts and partnerships among international governmental organizations such as the World Health Organization (WHO), the United Nations Children's Emergency Fund (UNICEF), the President's Emergency Plan for AIDS Relief (PEPFAR), and the US Agency for International Development (USAID) (Cluver et al., 2018). Furthermore, a coalition was formed with various multidisciplinary research teams from the University of Cape Town, Stellenbosch University, Bangor University, Reading University, and the University of Oxford, with the function of developing an evidence-basedbest practice parenting program (Cluver et al., 2018).

The effectiveness of parenting programs in HICs cannot be used to determine their effectiveness in LMICs. Cultural and religious differences impact behavioral parenting interventions. The Global Parenting Initiative (GPI), the University of Cape Town (UCT), Plan International Zimbabwe, and Clowns Without Borders South Africa (CWBSA) completed a pilot study of an adapted version of the Parenting for Lifelong Health (PLH) program for teenagers and families. The initiative was designed to address both violence against women and violence against children. The PLH Teen program was piloted in Zimbabwe, with a greater concentration on reducing violence against women and engaging fathers. The goal was to evaluate its efficacy, building on the evidence base for parent skills training treatments that are helpful in avoiding violence against children. Limited resources onthe cost of parenting interventions in low-to-middle-income countries are available. Historically the burden of communicable diseases such as HIV AND TB over burdened the health care system in low-income countries. Consequently, establishing a data pool of financing data on parenting programs is imperative, for the adoption of the intervention in the wider health care system in low- to-middle income countries where behavioural and social interventions may have been previously neglected.

Methods

Study Design

The study was done using a quantitative study design to conduct a cost estimation and a cost analysis of the Parenting for Long-life Health (PLH) Program for parents and teens in Zimbabwe.The cost analysis was done using cost inputs from the providers' perspective within the one-financial year time horizon. The economical costing approach was applied, and the 2021 USD currency was used. The total cost of providing the intervention to 5537 families in 2021 was the sum of capital costand recurrent cost. A replacement rate of Capital cost was obtained using a 5% discount rate. The total cost estimated was used to calculate the cost per family for the 16 sessions of the PLH delivery (1 pre-session, 14 main sessions, and 1 post-session), then the unit cost per session for each family was obtained.

Study Population

The study was conducted in Zimbabwe, which is classified as a Lower-Middle income country by the World Bank in 2022. This classification was premised on the Gross National Income (GNI) per capita of

Zimbabwe of US $1.200 (in the current US dollars) calculated from the World Development Indicator. According to the World Bank 2023, a country is classified as a low-income country if its GNI per capita is less than US $1.135. Middle income countries are defined in two categories, lower middle- income where the GNI per capita is between US $1,136 and US $4,465, and upper middle income where the GNI per capita is between US $4,466 and US $13,845. Zimbabwe's GNI per capita of US $1,200 classifies it as a lower-middle-income Country (Charasika, 2020).

The cost estimation was performed using 5537 enrolled participants aged 10-17 years with their caregivers. The population target size was 250,000 families throughout Zimbabwe (Charasika, 2020). Costing data used in this study was collected from 6 of the implementation sites; Child line Bulawayo, Gweru, Lupane, Nkayi, Mazowe and Insiza. The main service provider is Catholic Relief Services with the support of community partnering organizations such as Childline Zimbabwe (Charasika, 2020).

Data Collection

Costing data was obtained retrospectively from the 6 implementation partner sites in Zimbabwe (Insiza, Nkayi, Lupani, Childline Bulawayo, Gweru and Mazowe). Interviews were conducted with the various implementation site partners in Zimbabwe. Expenditure reports, Personnel remuneration data, time sheets, Inventory list, and information regarding donated items used for the implementation of the PLH-Teens in Zimbabwe. Study limitations of the study were nested within political sensitivities and government bureaucracy, which result in a lack of transparency in the financial data (i.e, national budgets and expenditure reports). Parenting programs in LMIC involve community volunteers, who are often omitted from the programs' cost reports.

Capital Costs

Capital costs are defined as goods or services whose life span exceeds that of one financial year (Špacírová et al., 2020). In this study capital costs identified were equipment/ furniture, initial training, and program manuals and vehicles. Data regarding these costs was obtained from an inventory list with procurement data on equipment and furniture within each implementation site. Procurement data exhibited that most equipment and furniture was donated by Clowns Without Borders therefore, the valuation of these items was done through finding the current market prices online. Three different quotations were obtained from retailers of office equipment and furniture to determine the mean cost of each item. Each item was allocated 5 Effective life years with a 5% discount rate to determine the replacement value. Expenditure reports of the Initial training of the facilitators/coaches and trainers were used. Cost allocation of the training included transportation accommodation, food, and study materials. Clowns Without Borders donated a total of 12 Toyota Hilux 2019 White double cabs, 12 Honda XR125 2018 2-wheeler motorcycles, and 12 Land Cruiser 2020 white SUVs. These Vehicles were distributed evenly amongst the 6 implantation sites. The current replacement market value of each vehicle was obtained in US$. These costs were obtained from the official vehicle manufacturers' dealership websites. 5 years life span was assigned to each vehicle with a 5% discount rate and a utilization allocation factor

of 25% to obtain the current replacement value in US$. The 25% allocation factor on vehicles was applied as the vehicles were utilized equally amongst 4 interventions provided at each implementation site.

TABLE 5: RECURRENT COST DATA

Recurrent Cost	Cost category	Costing method	Related information for allocation purposes	Source of Data	Valuation methods	Source of Data
	Recurrent costs					
Personnel Cost	Administration staff Facilitators Support staff Management staff (program manager)	Documenting staff time on these activities Total remuneration package costs External support staff from NGOs Each category of personnel costed separately	The number of hours spent per session and other activities (training / preparation time for workshops/ time spent on the workshops/ time spent coaching) Gross remuneration per annum	Staff Time sheets and Logbooks Staff interviews	Remuneration rates per category per annum	Remuneration packages records from implementing partners Catholic Relief Services
Overhead cost	Electricity, water, and other utilities Rent Telephones, faxes & postage Stationery, computer consumables & photocopies	Utility rates Lease agreement where applicable Actual price on Airtime and Data Actual Market costing data on stationery and consumables utilized	Actual amount paid for utilities and rent for the sessions Required consumables and equipment per session	program manuals and equipment used per session Facility utility records Logbook data on airtime and data used	Expenditure records	Expenditure record of financial year of costing
Transport Cost	Transport/Vehicle running costs Fuel Cost Contract vehicles	Type of transportation used by facilitators to access participants Travel cost per kilometre travelled by implementors to the participants	Cost of car rental/ public transport used by facilitator Number of sessions travelled by each facilitator per day/week/month and year	Logbook of kilometers travelled by facilitators to the participants	Expenditure records on transport	Expenditure records on transport

TABLE 6: CAPITAL COST DATA

Capital Cost	**Categories**	**Costing method**	**Related information for allocation purposes**	**Source of Data**	**Valuation Method**	**Source of Data**
Capital costs						
Buildings	Office space Venues for intervention session with participants	Current replacement cost 30-year lifespan 5% discount rate for annuitization	Space (square metres) used the number of sessions done per family is used within each center.	Review property records	Replacement and contract prices	City council in Zimbabwe (property valuation department)
Office furniture and other equipment	Laptops/ computers/ Office stationery/ chairs and desk Office phone and Printer	Actual current replacement cost 5-year lifespan for equipment 5% discount rate for annuitization	Resources used by each cost center (i.e., which cost center uses which furniture and equipment)	Review records of number of computers/ Laptop/ Office phone printers and other office stationery from implementing partners	Replacement cost	Procurement data
Training Cost	Facilitator's training	The actual current cost of training 2-year lifespan 5% discount rate for annuitization	Number of facilitators to be trained Equipment and resources needed for the training. Who will provide training? will the trainers be paid? How long does the training take (Total time used for training)	Training records of facilitators	Course fees	Clowns without borders (Training providers in Zimbabwe)

Recurrent Costs

Recurrent costs involve costs that are paid for within one financial year such as salaries, transportation, utilities, administrative costs, refreshments, and cleaning costs. Personnel Costs (Salaries) employee and volunteer directory with timesheets. Data regarding salaries was provided by the financial managers at the various implementation sites. An allocation factor was determined by getting the aggregate hours worked weekly and then determining the proportion of hours worked towards the PLH program. An allocation factor was then applied to the gross annual salaries. Parameters of the shared costs/ overhead costs were categorized as Utilities, Administrative costs, Transportation costs, refreshments, and cleaning materials. Time-driven activity-based costing method was used to determine the allocation factor percentage of each component of the overheads.

Budget impact analysis

A budget impact analysis was calculated to determine the overall budget required to fund an intervention by multiplying the unit cost per family by the number of at-risk teenagers in Zimbabwe (10-17). Scale-up was done through the modification of the population size eligible to enroll in the PLH program. This study was linked to the PLH-SUPER, therefore the target population of the scale-up was informed by the main study. The scale-up proposed a delivery of the PLH for Teens program (Sinovuyo Teens) to reach 250,000 vulnerable children and orphans over a 5-year delivery cycle. A Scale-up was done to analyses the budget impact of delivering the PLH- Teens to 250,000 families in Zimbabwe.

Sensitivity analysis

A one-way sensitivity analysis was performed by varying the discount rate in the annuitization factor of the capital cost. The results changes were observed in the total and unit costs by changing the discount rate from 5% to 3% and 8% respectively.

Results

The total cost of implementation of the PLH-Teens in Zimbabwe for 5537 participants in 2021 was US $823 704,41 (Table 7 below). The Unit cost per family (completing 16 sessions) was US $148,76 and the unit cost persession was US $9,30. Capital cost accounted for 10.42 % of the total cost per 5537 families. Recurrent costs account for a significant portion (89.57%) of the total expenditure. Vehicles accounted for 6.93% of the total cost of the program delivery to 5537 families. The implementation of the PLH in Zimbabwe is designed in that the facilitators/trainers and coaches travel to the study participants. The cost reflects the logistical requirements of running a program of this scale, which requires reliable vehicles for transportation and mobility across different regions.

Personnel costs (salaries) represent the most significant portion of recurrent expenses, and 67.21% of the overall total cost. The social and behavioural nature of the PLH intervention involves the collaboration of a vast team of differently skilled personnel with different expertise. Refreshment costs contributed significantly to the overall cost structure. Refreshment costs contributed 7.91% of the total cost, this cost

component is critical in maintaining participant engagement as it works as an incentive for program completion. Despite being shared costs with other interventions being implemented at the offices administrative and utility costs accounted for 4.54% and 6.6% respectively. These costs reflect the logistical coordination and facilities management required for the PLH program.

TABLE 7: COST AND BUDGET IMPACT ANALYSIS OF THE PLH-TEENS ZIMBABWE 2021 IN US $

COST CATERGORY	TOTAL COST IN US$ (5537 families)	UNIT COST PER FAMILY IN US$	UNIT COST PER SESSION IN US$ 14 session plus one pre and one post session (16 sessions)	Budget impact Analysis of 250 000 families
Capital Cost				
Equipment and Furniture	$2 576,63	$0,47	$0,03	$116 336,71
Initial Training and program manuals	$26 144,48	$4,72	$0,30	$1 180 444,24
Vehicles	$57 152,51	$10,32	$0,65	$2 580 481,54
Recurrent Cost				
Personnel (Salaries)	$553 612,50	$99,98	$6,25	$24 996 049,30
Transportation cost	$25 262,63	$4,56	$0,29	$1 140 628,05
Utilities	$54 818,00	$9,90	$0,62	$2 475 076,76
Administrative cost	$37 373,47	$6,75	$0,42	$1 687 442,09
Refreshment cost	$65 219,20	$11,78	$0,74	$2 944 699,30
Cleaning	$1 545,00	$0,28	$0,02	$69 757,99
Total	**$823 704,41**	**$148,76**	**$9,30**	**$37 190 915,98**

Distribution of the cost between the 6 implementation partner sites did not indicate that geographical placement of the site affected the cost of implementation of the PLH, in Zimbabwe. However, it is noteworthy that resource distribution to the implementation site was done by the number of participants and personnel delivering the intervention. A standardized pattern was also apparent in resource allocation at the various sites i.e. personnel cost in salaries was similar, and a facilitator in Gweru and a facilitator in Mazowe were remunerated at the same pay scale.

When scaling the program to 250,000 families, approximately 96,36% of the initial study population projected a budget impact cost of US $37 190 915,98. Personnel costs remain the greatest expense, even when scaled, underlining the significance of skilled and trained professionals in program delivery. However, as the program grows, administrative and utility expenses do not increase significantly, implying that larger implementations have the potential for greater operational efficiency. The results of the sensitivity analyses (Table 8) show no significant change in the costs.

TABLE 8: SENSITIVITY ANALYSIS (VARIATION OF THE DISCOUNT RATE)

COST CATERGORY	TOTAL COST IN US$ (5537 families) ANNUITIZED AT 5%	TOTAL COST PER 5537 FAMILIES ANNUITIZED AT 3%	TOTAL COST PER 5537 FAMILIES ANNUTIZED AT 8%
Capital Cost			
Equipment and Furniture	$2 576,63	$2 435,86	$2 793,97
Initial Training and program manuals	$26 144,48	$25 405,30	$27 264,75
Vehicles	$57 152,51	$54 030,13	$61 973,54
Recurrent Cost			
Personnel (Salaries)	$553 612,50	$553 612,50	$553 612,50
Transportation cost	$25 262,63	$25 262,63	$25 262,63
Utilities	$54 818,00	$54 818,00	$54 818,00
Administrative cost	$37 373,47	$37 373,47	$37 373,47
Refreshment cost	$65 219,20	$65 219,20	$65 219,20
Cleaning	$1 545,00	$1 545,00	$1 545,00
Total	**$823 704,41**	**$819 702,08**	**$829 863,06**
Unit Cost	**$148,76**	**$146,42**	**$149,88**

Discussion

To understand the implications of the scale-up budget impact analysis of the PLH-teens, the analysis needs to be within the context of the Zimbabwean national budget. Using the world development indicators from the World Bank data platform, Zimbabwean Gross Domestic (GDP) was estimatedat USD 22.4 billion. The national budget was allocated 22,3% of the GDP which amounted to USD 5 billion in 2021 (Zimbabwean Minister of Finance and Economic Development, 2020). Budget allocation towards Social Protection programs in 2021 was USD 135 million (Zimbabwean Ministerof Finance and Economic Development, 2020). Social Protection services incorporate, The Ministryof Public Services, Labour, and Social Welfare (Zimbabwean Minister of Finance and Economic Development, 2020). Parenting programs such as the PLH-Teens are included within the social welfare budget allocation, under the assistance of orphans and vulnerable children (OVC) division (Zimbabwean Minister of Finance and Economic Development, 2020). The budget allocation of OVC interventions was USD 27 million (Zimbabwean Minister of Finance and Economic Development, 2020). This budget is towards assistance and supplementation of basic needsinterventions, educational interventions, and health interventions of the at-risk (OVC) population (UNICEF Zimbabwe, 2021).

The scale-up budget impact analysis total cost of US $37 190 915,98 for 250,000 families accounts for 137.74% of the national budget allocated to child protection interventions. Additionally, the scale up cost exceeds the total budget allocated for violence prevention in orphaned and vulnerable children. Implementation modification would have to be incorporated to the program delivery to minimize cost and make the intervention accessible to the population in need.

CONCLUSION

The Parenting for lifelong health (PLH) in Teens has been shown to be an effective causal moderator in the reduction of caregiver-teen violence in low to middle-income countries. A cost estimation indicated that the total cost of implementation would be affordable within the Zimbabwean context. As the PLH-Teens is currently donor-funded, the willingness to pay for this intervention by the Zimbabwean Government will need to be considered. Through Agenda setting and multiple resource collection, the PLH has a potential of being effectively implemented in Zimbabwe.

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PART D:

POLICY BRIEF

HEALTH ECONOMICS UNIT

POLICY BRIEF

Parenting for Lifelong Health programme for parents and teens in Zimbabwe: Cost estimation and the budget impact analysis,

KEY FINDINGS

- The total capital costs for implementing the program amounted to US $85 873,61, with recurrent costs of US $737 830,80. The total cost incurred was US $823 704,41 for 5537 families
- Resulting in a unit cost of US $148,76 per family.Scaling the program nationally to 250,000 families is estimated to require US $37 190 915,98.
- The program not only focuses on reducing childhood violence but also aims to improve broader child well-being, including addressing the HIV epidemic among orphaned and vulnerable children.

A 2020 report from the World Health Organization revealed that worldwide one billion children between the age of 2 and 17 years have encountered some form of violence (physical, sexual, emotional, or neglect) within the past year (1). These childhood traumas drastically impact lifelong health and wellbeing (1). The biology of violence has shown that traumatic stress experienced because of violence may disrupt brain development, immune status, metabolic systems, and inflammatory response (2). In children, these episodes of violence may influence genetic alteration of the DNA (Hillis et al.,2016). Target 16.2 of the 2030 Agenda for Sustainable Development is to “end abuse, exploitation, trafficking and all forms of violence against, and torture of, children” (3).

Violence towards children is a global pandemic, however, the burden of injury and violence is noted more in lower-middle-income countries (4). Despite the socio-economic disparities evident in the prevalence of childhood violence (4) recognized that parenting is a crucial key component in the aetiology of child maltreatment. Parents who were victims of childhood violence themselves tend to create a cascade chain of violence within their children (4). Furthermore, parents with limited knowledge in childhood development, who utilize authoritarian parenting skills are less nurturing and expose their children to various forms of violence (4).

KEY CONCEPT

1. Cost Analysis: Program cost analysis is an approach to estimate the costs of implementing a program or intervention.
2. Budget Impact Analysis: A budget impact analysis (BIA) is an economic assessment that estimates the financial consequences of adopting a new intervention.
3. Sensitivity Analysis: Sensitivity analysis is used to illustrate and assess the level of confidence that may be associated with the conclusion of an economic evaluation. It is performed by varying key assumptions made in the evaluation (individually or severally) and recording the impact on the result (output) of the evaluation.

In 2012, the development of the Parenting for Lifelong Health (PLH) for teens was commenced with efforts to combat the widely spreading pandemic of childhood violence, in low to middle-income countries (5). The intervention was established through collaborative efforts and partnership amongst international governmental organizations such as the World Health Organization (WHO), United Nations Children's Emergency Fund (UNICEF), the President's Emergency Plan for AIDS Relief (PEPFAR), and the US Agency for International Development (USAID) (5). Furthermore, a coalition was formed with various multidisciplinary research teams from the University of Cape Town, Stellenbosch University, Bangor University, Reading University, and the University of Oxford, with the function to develop an evidence-based best practice parenting programme (5). A Zimbabwean population-based survey done in 2011 on 2,410 respondents aged 13 to 24 years, by the National Baseline Survey of the Life Experiences of Adolescents (NBSLEA), reported that 60.9 % of boys report experiencing more physical violence perpetrated by the parent or caregiver and 39.1% emotional violence (6). In girls, the trends displayed 47.8% and 29.0% respectively (6). In 2014, although research has shown the tremendous barriers to health-seeking behaviour, Childline Zimbabwe received a total of 15,446 abuse-related reports, 54% of which were sexual abuse, 25% negligence related, 22% physical abuse, 12 % emotional abuse, and 2% bullying (6).

It is also with interest to note that (5) recognized the lack of theoretical frameworks that addressed parenting programme in low-to-middle-income countries. In efforts to bridge the gap, a scale-up of parenting evaluation research to study the implementation of the PLH-Teens programmes in other Low-income-countries was initiated (5). Countries involved in the scale-up study are DRC (Lubumbashi), DRC (Kinshasa), Montenegro, South Sudan, Eswatini, Kenya Cameroon, Cote d'Ivoire, Haiti, South Africa, Uganda, Zimbabwe, Lesotho Tanzania, Ethiopia, Botswana (7). In Zimbabwe a five-year PLH-Teen's programme was started in 2018 (7). The intervention is designed to improve wellbeing through comprehensively meeting the needs of orphaned and vulnerable children in the different spheres of their lives with the main goal to positively contribute towards the control of the HIV epidemic (7). The population target size is 25 000 families throughout Zimbabwe (7). Since the commencement of the programme 6361 pairs of teens aged 10-17 years and their caregivers are currently enrolled in nine of the sixteen regions in Zimbabwe (7). The main service provider is Catholic Relief Services with the support of community partnering organizations such as Childline Zimbabwe (7). The intervention is funded by USAID Zimbabwe through the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) (7).

About this study

This research study is linked to the Parenting for Lifelong Health (PLH) - Scale-Up of Parenting Evaluation Research (SUPER) study and will focus on determining and quantifying the implementation and scale-up costs of the PLH programme for teens and parents in Zimbabwe.

Study Design

A cost and budget impact analysis were performed to inform the planning and budgeting of the PLH- SUPER study within the Zimbabwean context. A retrospective costing analysis using the economic costing concept from the provider's perspective. Costs estimation was done in the 2021 USD. Cost implication on scaling up of the PLH to 250000 families was determined through a budget impact analysis. A one-way sensitivity analysis was performed on the costing model.

Key Findings

Total and unit costs of the (PLH-Teens) programme in Zimbabwe.

The total capital costs amounted to US $85 873,61 which covered various costs associated with the project. The total recurrent costs amounted to US $737 830,80. The number of total family participant in the PLH study was 5537 families. The total cost incurred is US $823 704,41 which encompasses all expenses related to the operation. Additionally, the unit cost per family is US $148,76 and US $9,30 per family, per session.

The budget impact of scaling up the (PLH-Teens) programme on a national level.

The budget impact was assumed at 250,000 families at scale-up and a Total Cost of US $37 190 915,98

Policy Recommendations

1. Prioritize Cost-Effective Implementation, through the clustering of behavioural interventions that are already within the health care system. This would promote optimizing resource utilisation and identify areas where efficiencies can be achieved without compromising service quality.

2. Incorporate Monitoring and Evaluation (M&E) Systems, which ensure the programme's effectiveness and inform future budget allocations, robust M&E systems should be integrated into the scaling process. Develop a Phased Scaling Plan, considering the significant financial investment required for scaling, a phased implementation approach should be adopted.

Conclusions

The PLH program, in particular the PLH-Teen's intervention has shown substantial potential to address issues of child violence and the ability to improve the well-being of vulnerable populations in low and middle-income countries. The program's successful implementation in Zimbabwe, where it has reached thousands of families, has presented evidence of scalability. In providing evidence-based parenting support, PLH offers a valuable framework for breaking cycles of violence and contributing to broader public health goals, including controlling the HIV epidemic. Expanding the program through phased scaling and efficient resource allocation will be critical to meeting the needs of more families, ultimately fostering a healthier future for adolescents and caregivers in Zimbabwe.

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PART E:

APPENDICES

APPENDIX 1: GUIDE FOR AUTHORS: BMC PUBLIC HEALTHJOURNAL

Criteria

Research articles should report on original primary research or new experimental or computational methods, tests or procedures. Manuscripts reporting results of a clinical trial must conform to CONSORT 2010 guidelines. Authors of randomized controlled trials should submit a complete CONSORT checklist alongside their manuscript, available at www.consort-statement.org. Research articles may also report on systematic reviews of published research provided they adhere to the appropriate reporting guidelines which are detailed in our editorial policies. Please note that non-commissioned pooled analyses of selected published research and bibliometric analyses will not be considered. Studies reporting descriptive results from a single institution or region will only be considered if analogous data have not been previously published in a peer reviewed journal and the conclusions provide distinct insights that are of relevance to a regional or international audience.

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Preparing your manuscript

The information below details the section headings that you should include in your manuscript and what information should be within each section.
Please note that your manuscript must include a 'Declarations' section including all of the subheadings (please see below for more information).

Title page

The title page should:

present a title that includes, if appropriate, the study design e.g.:

"A versus B in the treatment of C: a randomized controlled trial", "X is a risk factor for Y: a case control study", "What is the impact of factor X on subject Y: A systematic review"
or for non-clinical or non-research studies a description of what the article reports
list the full names and institutional addresses for all authors
If a collaboration group should be listed as an author, please list the Group name as an author. Ifyou would like the names of the individual members of the Group to be searchable through their individual PubMed records, please include this information in the “Acknowledgements” section inaccordance with the instructions below
Large Language Models (LLMs), such as ChatGPT, do not currently satisfy our authorship criteria. Notably an attribution of authorship carries with it accountability for the work, which cannot be effectively applied to LLMs. Use of an LLM should be properly documented in the Methods section (and if a Methods section is not available, in a suitable alternative part) of the manuscript.
indicate the corresponding author

Abstract

The Abstract should not exceed 350 words. Please minimize the use of abbreviations and do not cite references in the abstract. Reports of randomized controlled trials should follow the CONSORT extension for abstracts. The abstract must include the following separate sections:

Background: the context and purpose of the study

Methods: how the study was performed and statistical tests used
Results: the main findings
Conclusions: brief summary and potential implications

Trial registration: If your article reports the results of a health care intervention on human participants, it must be registered in an appropriate registry and the registration number and date of registration should be stated in this section. If it was not registered prospectively (before enrollment of the first participant), you should include the words 'retrospectively registered'. See our editorial policies for more information on trial registration

Keywords

Three to ten keywords representing the main content of the article.

Background

The Background section should explain the background to the study, its aims, a summary of the existing literature and why this study was necessary or its contribution to the field.

Methods

The methods section should include:

the aim, design and setting of the study

the characteristics of participants or description of materials

a clear description of all processes, interventions and comparisons. Generic drug names should generally be used. When proprietary brands are used in research, include the brand names in parentheses

the type of statistical analysis used, including a power calculation if appropriate

Results

This should include the findings of the study including, if appropriate, results of statistical analysis which must be included either in the text or as tables and figures.

Discussion

This section should discuss the implications of the findings in context of existing research and highlight limitations of the study.

Conclusions

This should state clearly the main conclusions and provide an explanation of the importance and relevance of the study reported.

List of abbreviations

If abbreviations are used in the text they should be defined in the text at first use, and a list of abbreviations should be provided.

Declarations

All manuscripts must contain the following sections under the heading 'Declarations':

Ethics approval and consent to participate

Consent for publication

Availability of data and materials

Competing interests

Funding

Authors' contributions

Acknowledgements

Authors' information (optional)

Please see below for details on the information to be included in these sections.

If any of the sections are not relevant to your manuscript, please include the heading and write 'Not applicable' for that section.

Ethics approval and consent to participate

Manuscripts reporting studies involving human participants, human data or human tissue must:

include a statement on ethics approval and consent (even where the need for approval was waived)
include the name of the ethics committee that approved the study and the committee's reference number if appropriate
Studies involving animals must include a statement on ethics approval and for experimental studies involving client-owned animals, authors must also include a statement on informed consent from the client or owner.
See our editorial policies for more information.

If your manuscript does not report on or involve the use of any animal or human data or tissue, please state "Not applicable" in this section.

Consent for publication

If your manuscript contains any individual person's data in any form (including any individual details, images or videos), consent for publication must be obtained from that person, or in the case of children, their parent or legal guardian. All presentations of case reports must have consent for publication.
You can use your institutional consent form or our consent form if you prefer. You should not send the form to us on submission, but we may request to see a copy at any stage (including after publication).
See our editorial policies for more information on consent for publication.

If your manuscript does not contain data from any individual person, please state "Not applicable" in this section.

Availability of data and materials

All manuscripts must include an 'Availability of data and materials' statement. Data availability statements should include information on where data supporting the results reported in the article can be found including, where applicable, hyperlinks to publicly archived datasets analysed or generated during the study. By data we mean the minimal dataset that would be necessary to interpret, replicate and build upon the findings reported in the article. We recognise it is not always possible to share research data publicly, for instance when individual privacy could be

compromised, and in such instances data availability should still be stated in the manuscript along with any conditions for access.

Authors are also encouraged to preserve search strings on searchRxiv https://searchrxiv.org/, an archive to support researchers to report, store and share their searches consistently and to enable them to review and re-use existing searches. searchRxiv enables researchers to obtain a digital object identifier (DOI) for their search, allowing it to be cited.

Data availability statements can take one of the following forms (or a combination of more than one if required for multiple datasets):

The datasets generated and/or analysed during the current study are available in the [NAME] repository, [PERSISTENT WEB LINK TO DATASETS]

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

All data generated or analysed during this study are included in this published article [and its supplementary information files].

The datasets generated and/or analysed during the current study are not publicly available due [REASON WHY DATA ARE NOT PUBLIC] but are available from the corresponding author on reasonable request.

Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.

The data that support the findings of this study are available from [third party name] but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of [third party name].

Not applicable. If your manuscript does not contain any data, please state 'Not applicable' in this section.

More examples of template data availability statements, which include examples of openly available and restricted access datasets, are available here.

BioMed Central strongly encourages the citation of any publicly available data on which the conclusions of the paper rely in the manuscript. Data citations should include a persistent identifier (such as a DOI) and should ideally be included in the reference list. Citations of datasets, when they appear in the reference list, should include the minimum information recommended by Data Cite and follow journal style. Dataset identifiers including DOIs should be expressed as fullURLs. For example:

Hao Z, AghaKouchak A, Nakhjiri N, Farahmand A. Global integrated drought monitoring and prediction system (GIDMaPS) data sets. figshare.
2014. http://dx.doi.org/10.6084/m9.figshare.853801

With the corresponding text in the Availability of data and materials statement:

The datasets generated during and/or analysed during the current study are available in the [NAME] repository, [PERSISTENT WEB LINK TO DATASETS].[Reference number]
If you wish to co-submit a data note describing your data to be published in *BMC Research Notes*, you can do so by visiting our submission portal. Data notes support open data and help authors to comply with funder policies on data sharing. Co-published data notes will be linked to the research article the data support (example).

Competing interests

All financial and non-financial competing interests must be declared in this section.

See our editorial policies for a full explanation of competing interests. If you are unsure whether you or any of your co-authors have a competing interest please contact the editorial office.
Please use the authors initials to refer to each authors' competing interests in this section.

If you do not have any competing interests, please state "The authors declare that they have no competing interests" in this section.

Funding

All sources of funding for the research reported should be declared. If the funder has a specific role in the conceptualization, design, data collection, analysis, decision to publish, or preparation of the manuscript, this should be declared.

Authors' contributions

The individual contributions of authors to the manuscript should be specified in this section.
Guidance and criteria for authorship can be found in our editorial policies.
Please use initials to refer to each author's contribution in this section, for example: "FC analyzed and interpreted the patient data regarding the hematological disease and the transplant. RH performed the histological examination of the kidney, and was a major contributor in writing the manuscript. All authors read and approved the final manuscript."

Acknowledgements

Please acknowledge anyone who contributed towards the article who does not meet the criteria for authorship including anyone who provided professional writing services or materials.
Authors should obtain permission to acknowledge from all those mentioned in the Acknowledgements section.
See our editorial policies for a full explanation of acknowledgements and authorship criteria.

If you do not have anyone to acknowledge, please write "Not applicable" in this section.

Group authorship (for manuscripts involving a collaboration group): if you would like the names of the individual members of a collaboration Group to be searchable through their individual PubMed records, please ensure that the title of the collaboration Group is included on the title page and in the submission system and also include collaborating author names as the last paragraph of the "Acknowledgements" section. Please add authors in the format First Name, Middle initial(s) (optional), Last Name. You can add institution or country information for each author if you wish, but this should be consistent across all authors.
Please note that individual names may not be present in the PubMed record at the time a published article is initially included in PubMed as it takes PubMed additional time to code this information.

Authors' information

This section is optional.

You may choose to use this section to include any relevant information about the author(s) that may aid the reader's interpretation of the article, and understand the standpoint of the author(s). This may include details about the authors' qualifications, current positions they hold at institutions or societies, or any other relevant background information. Please refer to authors using their initials. Note this section should not be used to describe any competing interests.

Footnotes

Footnotes can be used to give additional information, which may include the citation of a reference included in the reference list. They should not consist solely of a reference citation, and they should never include the bibliographic details of a reference. They should also not contain any figures or tables.
Footnotes to the text are numbered consecutively; those to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data).
Footnotes to the title or the authors of the article are not given reference symbols.
Always use footnotes instead of endnotes.

References

Examples of the Vancouver reference style are shown below.

See our editorial policies for author guidance on good citation practice

Web links and URLs: All web links and URLs, including links to the authors' own websites, should be given a reference number and included in the reference list rather than within the text of the

manuscript. They should be provided in full, including both the title of the site and the URL, as well as the date the site was accessed, in the following format: The Mouse Tumor Biology Database. http://tumor.informatics.jax.org/mtbwi/index.do. Accessed 20 May 2013. If an author or group of authors can clearly be associated with a web link, such as for weblogs, then they should be included in the reference.
Example reference style:

Article within a journal

Smith JJ. The world of science. Am J Sci. 1999;36:234-5.

Article within a journal (no page numbers)

Rohrmann S, Overvad K, Bueno-de-Mesquita HB, Jakobsen MU, Egeberg R, Tjønneland A, et al. Meat consumption and mortality - results from the European Prospective Investigation into Cancer and Nutrition. BMC Medicine. 2013;11:63.
Article within a journal by DOI

Slifka MK, Whitton JL. Clinical implications of dysregulated cytokine production. Dig J Mol Med. 2000; doi:10.1007/s801090000086.
Article within a journal supplement

Frumin AM, Nussbaum J, Esposito M. Functional asplenia: demonstration of splenic activity by bone marrow scan. Blood 1979;59 Suppl 1:26-32.
Book chapter, or an article within a book

Wyllie AH, Kerr JFR, Currie AR. Cell death: the significance of apoptosis. In: Bourne GH, Danielli JF, Jeon KW, editors. International review of cytology. London: Academic; 1980. p. 251-306.
Online First chapter in a series (without a volume designation but with a DOI)

Saito Y, Hyuga H. Rate equation approaches to amplification of enantiomeric excess and chiral symmetry breaking. Top Curr Chem. 2007. doi:10.1007/128_2006_108.
Complete book, authored

Blenkinsopp A, Paxton P. Symptoms in the pharmacy: a guide to the management of common illness. 3rd ed. Oxford: Blackwell Science; 1998.

Online document

Doe J. Title of subordinate document. In: The dictionary of substances and their effects. Royal Society of Chemistry. 1999. http://www.rsc.org/dose/title of subordinate document. Accessed 15 Jan 1999.

Online database

Healthwise Knowledgebase. US Pharmacopeia, Rockville. 1998. http://www.healthwise.org. Accessed 21 Sept 1998.

Supplementary material/private homepage

Doe J. Title of supplementary material. 2000. http://www.privatehomepage.com. Accessed 22 Feb 2000.

University site

Doe, J: Title of preprint. http://www.uni-heidelberg.de/mydata.html (1999). Accessed 25 Dec 1999.

FTP site

Doe, J: Trivial HTTP, RFC2169. ftp://ftp.isi.edu/in-notes/rfc2169.txt (1999). Accessed 12 Nov 1999.

Organization site

ISSN International Centre: The ISSN register. http://www.issn.org (2006). Accessed 20 Feb 2007.

Dataset with persistent identifier

Zheng L-Y, Guo X-S, He B, Sun L-J, Peng Y, Dong S-S, et al. Genome data from sweet and grain sorghum (Sorghum bicolor). GigaScience Database. 2011. http://dx.doi.org/10.5524/100012.

APPENDIX 2:
Ethics

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

Room 45 E-52-E-Floor- Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6492
Email: hrec-submissions@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics/forms

23 May 2022

HREC REF: 279/2022

Prof E Sinanovic
Division of Health Economic Unit
FHS
Email: Edina.sinanovic@uct.ac.za
Student: ZWDYOL001@myuct.ac.za

Dear Prof Sinanovic

PROJECT TITLE : PARENTING FOR LIFELONG HEALTH PROGRAMME FOR PARENTS AND TEENS IN ZIMBABWE: COST ESTIMATION AND THE BUDGET IMPACT ANALYSIS (MASTERS CANDIDATE-MS YOLANDE ZWIDZA)

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee (HREC) for review.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

This approval is subject to strict adherence to the HREC recommendations regarding research involving human participants during COVID -19. Please refer to guidance letter dated 02 February 2022 on our website:
http://www.health.uct.ac.za/fhs/research/humanethics/forms

Approval is granted for one year until the 30 May 2023.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

The HREC acknowledge that the student: Ms Yolande Zwidza will also be involved in this study.

Please quote the HREC REF 279/2022 in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, FACULTY OF HEALTH SCIENCES HUMAN RESEARCH ETHICS COMMITTEE
Federal Wide Assurance Number: FWA00001637. Institutional Review Board (IRB) number: IRB00001938 NHREC-registration number: REC-210208-007
This serves to confirm that the University of Cape Town Human Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use: Good Clinical Practice (ICH GCP), South African Good Clinical Practice Guidelines (DoH 2020), based on the Association of the British Pharmaceutical Industry Guidelines (ABPI), and Declaration of Helsinki (2013) guidelines. The Human Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

FACULTY OF HEALTH SCIENCES
Human Research Ethics Committee

FHS016: Annual Progress Report / Renewal

HREC office use only (FWA00001637; IRB00001938) **This serves as notification of annual approval, including any documentation described below.**			
☑ Approved	Annual progress report	Approved until/next renewal date	30.11.2025
☐ Not approved	See attached comments		
Signature Chairperson of the HREC/ Designee		Date Signed	3/12/2024

Note: Please email this form and supporting documents (if applicable) in a combined pdf-file to hrec-enquiries@uct.ac.za.

Please use the latest form found on our website:
http://www.health.uct.ac.za/fhs/research/humanethics/forms

Comments to PI from the HREC
Thank you for the deviation document

Principal Investigator to complete the following:

1. Protocol information

Date (when submitting this form)	02/12/2024		
HREC REF Number	HREC REF: 279/2022	Current Ethics Approval was granted until	05/2023
Protocol title	Parenting for lifelong health programme for parents and teens in Zimbabwe: Cost Estimation and budget impact analysis		
Protocol number (if applicable)			

Are there any sub-studies linked to this study?	✓ Yes	No
If yes, could you please provide the HREC Reference number for all sub-studies? **Note:** A separate FHS016 must be submitted for each sub-study.	PSY2017-040	

Principal Investigator	Edina Sinanovic
Department and email address	Division of Health Economics Unit FHS Edina.Sinanovic@uct.ac.za

1.1 Does this protocol receive US Federal funding?	☐ Yes	✓ No
1.2 If the study receives US Federal Funding, does the annual report require full committee approval? **Note**: Any annual approvals for **Full Committee** review MUST be submitted on the monthly HREC submission dates. (Please send electronic combined copy if for full committee review to hrec-submission@uct.ac.za)	☐ Yes	☐ No

If yes in 1.2 please complete section 1.3 below for invoicing purposes

1.3 Ethics Renewal Fee

Please **(tick ✓)**appropriate box for billing purposes:

Submission Type	***Description***	***New fee (Vat Incl.)***	***tick ✓***
Research funded solely from UCT departmental/ divisional/group budget/self-initiated research	Annual evaluation of research progress report for re-certification	**R0,00**	✓
Non-sponsored student research for degree purposes at UCT/Other Universities & Colleges	Annual evaluation of research progress report for re-certification	**R0,00**	☐
Annual re-certification / Progress report (FHS016 Form)	Clinical Trial & International Grant Funded Research - Annual evaluation of research progress report for re-certification for Full Committee Approval	**R7700,00**	☐
Annual re-certification / Progress report (FHS016 Form)	Clinical Trial & International Grant Funded Research - Annual evaluation of research progress report for re-certification for Expedited review	**R3800.00**	☐
Annual re-certification / Progress report (FHS016 Form)	National grant funded research - Annual evaluation of research progress report for re-certification for Full Committee Approval	**R5000.00**	☐
Annual re-certification / Progress report (FHS016 Form)	National Grant funded research for Annual evaluation of research progress report for re-certification for Expedited review	**R1650,00**	☐

NB: Protocols funded by UCT (e.g. departmental funding / student research) and by certain grant funding organizations (e.g. MRC, NRF, CANSA,) are exempt from these charges.

Please provide details for Invoicing, either complete section 1 or 2 :

1. Invoice billing – Directly to Sponsor

Sponsor's name	

Billing Address of Sponsor:	
Vat Number:	
Contact person	
Telephone number	
Email Address	
2. **Internal Journal Billing:**	
Fund Number:	
Cost Centre Number:	
Account Holder Name:	
Division of Account Holder:	

2. List of documentation included to support this approval where applicable

- Previous Ethics renewal letter HREC REF: 279/2022

3. Protocol status (tick ✓)

☐	Open Enrolment
✓	Closed to enrolment (tick ✓)
☐	Research-related activities are ongoing
☐	Research-related activities are complete, long-term follow-up only
☐	Research-related activities are complete, data analysis only
☐	Main study is complete but sub-study research-related activities are ongoing
✓	Publication or thesis submitted and final completion?
☐	Study is closed → Please submit a Study Closure Form (FHS010)

4. Enrolment

Number of participants enrolled to date	
Number of participants enrolled, since last HREC Progress report (continuing review)	
Additional number of participants still required	

5. Refusals

Total number of refusals (participants invited to join the study, but refused to take part)	

6. Cumulative summary of participants

Total number of participants who provided consent	
Number of participants determined to be ineligible (i.e. after screening)	
Number of participants currently active on the study	
Number of participants completed study (without events leading to withdrawal)	
Number of participants withdrawn at participants' request (i.e. changed their mind)	
Number of participants withdrawn by PI due to toxicity or adverse events	
Number of participants withdrawn by PI for other reasons (e.g. pregnancy, poor compliance)	
Number of participants lost to follow-up. Please comment below on reasons for loss of follow-up.	
Number of participants no longer taking part for reasons not listed above. Please provide reasons below:	

7. Progress of study

Please provide a brief summary of the research to date including the overall progress and the progress since the last annual report as well as any relevant comments/issues you would like to report to the HREC:
Data collection of the study, which included, costing data from the implementation partners of the intervention was obtained in December 2022. Data analysis was done throughout the year 2023 until May, thereafter student unable to submit thesis due to financial issues that prevented academic registration. Funding is now received, student is now registered for the academic year and is ready to conclude and submit research.

8. Protocol violations and exceptions (tick ✓ all that apply)

✓	No prior violations or exceptions have occurred since the original approval
☐	Prior violations or exceptions have been reported since the original approval and have already been acknowledged or approved If so, did these occur in the last review period

☐	Unreported minor violations that have occurred since the last review, as well as significant deviations not yet reported, are attached for review

9. Amendments (tick ✓ all that apply)

✓	No Prior amendments have been made since the original approval
☐	Prior amendments have been reported since the last review and have already been approved
☐	New protocol changes/ amendments are requested as part of this continuing review (See note below)

Note: If new protocol changes are being requested in this review, please complete an amendment form (FHS006).
Specific changes in the amended protocol and consent/assent forms must be **bolded**, *italicised* or tracked and all changes must include a rationale.

10. Adverse events

10.1 Please provide below or attach a narrative summary of serious adverse events and/ or unanticipated problems since the last progress report. Please indicate changes made to the protocol and informed consent document(s) as a result (if not already reported to the HREC). Please comment on whether causality to any study procedure or intervention could be established.
No research related adverse events occurred. Research was paused as the student was not registered due to finances.

10.2 Have participants received appropriate treatment/ follow-up/ referral when indicated (e.g. in the case of abnormal or incidental clinical findings, distress or anxiety)?		
☐ Yes	☐ No	✓ Not applicable
If yes, please describe:		

11. Summary of Monitoring and Audit Activities (tick ✓)

11.1 Was this study monitored or audited by an external agency (e.g. SAHPRA, FDA)?		
☐ Yes	☐ No	✓ Not applicable

11.2 Did a Data and Safety Monitoring Board publish a report?		
☐ Yes	☐ No	✓ Not applicable

11.3 If yes, please identify the agency and attach a summary of the findings.					
Agency Name		Report attached	☐ Yes	☐ No	☐ Not applicable
		DSMB report attached	☐ Yes	☐ No	☐ Not applicable

11.4 Has there been any agency, institutional or other inquiry into non-compliance in this study, or any finding of non-compliance concerning a member of the research team?	
☐ Yes	✓ No
If yes, please explain:	

12. Level of risk (tick ✓)

12.1 In light of your experience of this research, please indicate whether the level of risk to participants has:	
☐	Increased
☐	Decreased
	Shown no change
If there has been a change, please explain:	

12.2 Please provide a narrative summary of recent relevant literature that may have a bearing on the level of risk.

13. Insurance

Please confirm that valid no fault insurance is still in place? **(tick ✓)**			
☐ Yes		✓ No	
If yes, please complete the following:			
Insurer's name:			
Policy no.		*Coverage Period:	
For UCT sponsored studies please liaise the Insurance office via fhs.sponsorship@uct.ac.za regarding the required documentation and information required obtain a renewed UCT No-fault Insurance Certificate.			

14. Statement of conflict of interest

Has there been any change in the conflict of interest status of this protocol since the original approval? (tick ✓)	
☐ Yes	✓ No

If yes, please explain and if necessary, attach a revised conflict of interest statement (Section #7 in the New Protocol Application Form FHS013 :)

15. Signature

My required signature certifies that the above is complete and correct.			
Signature of PI	Signed by candidate	Date	02.12.2024.

Form FHS011: Study deviation

HREC office use only (FWA00001637; IRB00001938)			
This serves as acknowledgement of a protocol deviation as described below.			
Chairperson of the HREC signature/ Designee		Date	3/12/2024

Note: Please note that incomplete submissions will not be reviewed.
Please email this form and supporting documents (if applicable) in a combined pdf-file to hrec-enquiries@uct.ac.za. Our website address: https://health.uct.ac.za/home/human-research-ethics

Principal Investigator to complete the following:

1. Protocol information

Date (when submitting this form)	02/12/2024
HREC REF Number	HRECREF 279/2022
Project Title	Parenting for lifelong health programme for parents and teens in Zimbabwe: Cost estimation and the budget impact analysis.
Protocol number (if applicable)	
Principal Investigator	Prof Edina Sinanovic
Department and Email address	Division of Health Economics Unit FHS Edina.sinanovic@uct.ac.za

2. Protocol deviation description

Please describe the deviation below, including the reason why the deviation has occurred.
Deviation occurred because the research was not submitted for marking as the student was not registered due to financial reasons.

3. Follow-up actions

3.1 Please describe any follow-up action(s) taken or planned as a result of this deviation e.g. DSMB reporting, report to sponsor, informing participants.
Student now registered and ready to conclude research for submission.

3.2 Please describe what action(s) have or will be taken to prevent similar deviations in future.
Student received funding to ensure that she is registered.

4. Principal Investigator's acknowledgement of responsibility

The required signature indicates the PI has reviewed the deviation, taken appropriate follow-up action and implemented or plans to implement preventative steps where possible.			
Signature of PI	Signed by candidate	Date	02.12.2024.