Cost efficiency and budget impact analysis of inclusive education in Zambia - Tusambilile Chapamo project

Original report March 2026, updated in September 2026

Funded by the European Union

Sightsavers Ireland - Zambia Federation of Disability Organisations

Sightsavers

The Republic of Zambia
Ministry of Education

Contents

Abbreviations

ABC	Activity-based Costing
BCC	Behaviour change communication
BIA	Budget impact analysis
CYWD	Children and youths with disabilities
CSEN	Children with special educational needs
GBP	British pound sterling
IIEP	International Institute for Education Planning
M&E	Monitoring and evaluation
MoE	Ministry of Education
TC	Tusambilile Chapamo (inclusive education project)
UNESCO	United Nations Educational, Scientific and Cultural Organization
USD	United States Dollar
WASH	Water, sanitation and hygiene
ZMW	Zambian Kwacha

Introduction

Inclusive education is a cornerstone of equitable development and a fundamental human right (1). It ensures all learners, regardless of ability, background or circumstances, can access and thrive within mainstream education systems Inclusive education is a cornerstone of equitable development and a fundamental human right (1). It ensures all learners, regardless of ability, background or circumstances, can access and thrive within mainstream education systems (2). In Zambia, the pursuit of inclusive education has gained momentum through national policies and international commitments, including the ratification of the Convention on the Rights of Persons with Disabilities (CRPD) in 2010 and the enactment of the Persons with Disabilities Act No. 6 of 2012 (3).

Despite these efforts, significant challenges persist in translating inclusive education policy into practice. Children with disabilities in Zambia continue to face systemic barriers to education, including inaccessible infrastructure, a shortage of teachers trained in inclusive education, limited assistive technologies, and prevailing social stigma (3, 4). Financial challenges related to inclusive education have also been highlighted, including insufficient government funding and prohibitive costs incurred by parents (5).

Barriers to inclusive education are particularly pronounced in rural and underserved areas, where educational resources are particularly stretched (4, 6). As a result, many children with disabilities are either excluded from school entirely or receive substandard education that does not meet their needs (7). The urgency of addressing these challenges is underscored by Zambia's broader educational context, where enrolment and completion rates, particularly in secondary education remain relatively low and disparities in learning outcomes persist across gender, socio-economic status and geographies (8). Furthermore, the COVID-19

pandemic reversed some of the gains made in the previous decades (3) and the quality of education remains suboptimal, with an estimated 99 per cent late primary age children unable to read and understand an age-appropriate text (9).

Inclusive education is not only a moral imperative but also a strategic investment in national development. It promotes social cohesion, reduces inequality and enhances the overall quality of education systems (2). However, implementing inclusive education requires more than good intentions and normative policy statements, it also demands tangible actions backed up by good quality data and evidence to inform planning, efficient resource allocation and monitoring progress towards intended goals.

In this paper we present results of an economic evaluation of an inclusive education project, Tusambilile Chapamo (TC) (Let's Learn Together), implemented in Chinsali District, Muchinga Province, in the northeastern Zambia between 2021 and 2024. The project was a partnership initiative co-implemented by the Zambia Ministry of Education, the Ministry of Community Development and Social Services, the Chinsali District Education Board, the Zambia Federation of Disability Organisations (ZAFOD), and the international non-governmental organisation (iNGO) Sightsavers. The project was funded by the European Commission.

The aim of TC was to establish a scalable and cost-effective inclusive education model to support learners with special education needs and disabilities (LSEND) to access and participate in schools. The project improved educational opportunities for children and young people with disabilities, from pre-school through to secondary and tertiary education, and helped them with the transition from education to employment. The project provided financial and technical support; trained educators, social workers, and local community organisations to better support LSEND and advocate for inclusive practices; made educational

environments more disability inclusive and physically accessible; and supported advocacy and community mobilisation activities. The project worked across 24 learning centres across Chinsali district, which included early years, primary and secondary schools and resource centres.

Economic evaluations are important tools for planning education services. They provide a structured framework for assessing the costs and benefits of education interventions that enable policymakers to identify cost drivers, evaluate the efficiency of different educational approaches and make informed decisions about scaling up successful models (10). In countries like Zambia, where education budgets are constrained and competing priorities are numerous, such evaluations are critical to promote, plan and implement effective and sustainable inclusive education practices aiming at achieving good learning outcomes for all. However, evidence on the costs of implementing inclusive education in Africa, including Zambia, remains scarce even in the grey literature (11-13). Beyond the educational, social and economic benefits of an inclusive system (14, 15), improving this evidence would help make the case for inclusive education (16) and would support better decision-making and resource allocation to improve the access to, and quality of, education for all.

Drawing on financial data and implementation experiences, this evaluation seeks to inform future programming and policy by highlighting the cost structures and efficiencies and estimating the cost of scaling up the inclusive education model in the entire province and beyond.

Methodology

Study design

The economic evaluation employed a mixed financial analysis framework combining activity-based top-down micro costing and budget impact analysis (BIA). The top-down micro costing approach allowed for an accurate identification of expenditures by activities, tasks, and outputs (17, 18). The BIA model, populated with the micro-costing results, estimated the financial implications of provincial scale up over a five-year horizon, followed by an estimate of the annual full recurrent cost requirements required once the system has reached steady state implementation (19). The recurrent expenditure after five years is assumed to include the training of community structures, the sensitisation and awareness raising campaigns, training of new teachers, and the cost of referral and provision of assistive devices for all new entrants needing it. Community structures refer to the local grassroots groups and leadership bodies such as Community Welfare Assistant Committees (CWACs), Parent Teacher Committees (PTCs), traditional leaders, faith leaders, village headpersons or Organisation of Persons with Disabilities (OPDs) that the project worked with to identify, support, and advocate for children and youth with disabilities. The cost of renovations for new schools was not included, as it is assumed that the implementation of the Persons with Disabilities Act No. 6 of 2012, specifically Sections 40-42, would result in public buildings and services, including schools, being made accessible to persons with disabilities (20).

Costing scope

The study adopted the perspective of the implementing organisations and the Ministry of Education (MoE) as the primary budget holders, focusing strictly on incremental costs, which are the costs directly attributable to the inclusive education interventions. General education costs, in-kind contributions and opportunity costs (such as volunteer time or government staff not directly funded by the project) were excluded as we valued and estimated the incremental cost of inclusive education activities based on an existing education system.

The time horizon for the activity-based costing covered the entire project duration (48 months) and all costs are presented in current Zambian kwacha (ZMW) and Great British Pound (GBP), based on monthly exchange rate data (21).

Data sources and classification

Financial data was compiled from the project's accounting systems and validated through cross-checks with implementation teams. Expenditure records were categorised by year, activity (Table 1) and sub-activity. Output data, such as the number of schools supported (which was divided by five for a gradual implementation), teachers trained, and children reached, were obtained from project monitoring and evaluation reports. Expenditure data covered the period 2021–2024. As all programme activities were completed in December 2024, no additional costs occurred after this point. Costs have been averaged for each activity and divided by a common denominator to simplify the analysis. For instance, the number of children provided with assistive devices (611) has been used as the common denominator and divided by the cost of the whole activity (school and community-based screening, transportation to health facilities, provision of assistive devices when needed and the related coordination).

Table 1: Activities included in the costing analysis

Activities	Description of activities
Community support to children and youth with disabilities	• Training community members (Community Welfare Assistant Committees (CWACs), Parent Teacher Committees (PTCs), traditional leaders, faith leaders, village headpersons, Organisation of Persons with Disabilities (OPDs) on disability identification, safeguarding, inclusion, stigma reduction, gender and rights. • Conducting door-to-door identification campaigns to find excluded children with disabilities. • Running community sensitisation meetings, outreach events, marches, and local awareness campaigns. • Developing, adapting, translating and distributing Information, Education, and Communication (IEC) and Social and Behaviour Change (SBC) materials (posters, radio messages, local-language materials). • Supporting community-school referral pathways and follow-up for children screened/identified.
Education staff support	• Training teachers, school leaders, zonal teams and assessment centres on disability, inclusion, safeguarding, mental health and psychosocial support, and gender. • Training staff to use functional screening tools and conducting school-based screening of learners to identify children with: visual impairments, hearing impairments, physical impairments, intellectual and developmental disabilities, multiple disabilities, speech and language impairments and other health-related impairments. • Classroom observation, coaching and mentoring on inclusive pedagogy and classroom adaptations. • Developing, adapting, translating and piloting teacher training manuals and screening tools. • Coordination with health schools and referral services for follow-up assessments (vision, hearing, mobility, speech).
Inclusive infrastructure equipment	• Conducting accessibility audits in schools (including assessment of ramp, pathway, sanitation, and classroom accessibility). • Renovating water, sanitation and hygiene facilities, ramps, doors, classroom layouts, and play areas in schools to improve inclusion.

	• Procuring and distributing assistive devices: spectacles, hearing aids, wheelchairs, crutches, mobility aids. • Covering costs for children's medical examinations and specialist referrals (e.g., eye testing, hearing assessments, surgeries).

Budget impact analysis

The analysis involved aggregating costs by activity and year, then calculating unit costs for key outputs (for example, cost per trained teacher, cost per school supported). Activities were further classified as either startup (one time investment) or recurrent (ongoing costs) to assess sustainability and inform scale up planning.

The BIA was conducted to estimate the financial requirements of scaling the TC inclusive education model across Muchinga Province over a time horizon of five years, to match the duration of the Ministry of Education's strategic plan (22). An additional year, also referred to later as 'sustainability cost', was added to illustrate the recurrent costs of the inclusion model once all schools, schoolchildren and community structures have been made disability inclusive (based on the proposed model). The analysis adopted a bottom-up approach, using unit costs derived from the TC implementation and applying them to projected coverage targets (summary of the BIA model in Appendix, Table A1). Hearing aid unit costs were not included in the cost projection as they are expected to continue to be donated by the provincial Beit-CURE Children's Hospital of Zambia.

The target population of the BIA model was all schoolchildren in the public primary and secondary schools of the eight districts of Muchinga Province, expecting to represent 94.5 per cent of all primary school pupils and 90.4 per cent of secondary school students (23). Following the United Nations Educational and Cultural Organization (UNESCO) International Institute for Education Planning (IIEP) guidelines, a flow model was developed and used to estimate the future enrolment of schoolchildren in the province (24). The model was based on 2024 school enrolment, drop-out rate, student promotion rates and the number of children

with special educational needs (SEN) enrolled in schools (22). New entrants' growth rate was calculated using 2023 figures, available in the Education Statistics Bulletin 2024, and an exponential growth rate approach (22, 25). Prices remained unchanged throughout the analysis period and future financial flows were evaluated without applying any discounting. All inputs and assumptions used in the BIA model are presented in Table 2, in the Appendix.

Table 2: Cost projection model's inputs and assumptions

Indicator	Assumption	Source
Administrative units:		
Number of provinces	1	Scenario's target
Number of districts (A1)	8	Scenario's target
Community support:		
Number of community structures per school (C1)	6	Based on expert opinion. Includes: parent support groups, traditional leaders, faith-based organisations, community welfare members, organisations of people with disabilities and parent-teacher committees.
Number of community members to train per school (B3)	22	Based on expert opinion
Number of trainees per trainer	14.5	Output from TC project (2022–2025)
Education data, Muchinga:		
Estimated annual growth rate of new entrants in primary schools	7.5%	MoE Education Statistics Bulletin, Zambia 2024
Estimated annual growth rate of new entrants in secondary schools	3%	
Implementation recommendation:		
Schools		
Year 1: All schools to be audited and renovated (B1)	822	MoE Education Statistics Bulletin, Zambia 2024
Year 2: New schools (for structures and community members to be trained)	37	
Year 3: as per year 2	38	
Year 4: as per year 2	40	
Year 5: as per year 2	42	
Future years: as per year 2	44	
Number of years to cover all schools (B2)	5	Scenario's target
Children with special educational needs		
Year 1: Screening of all children in primary and secondary school (E1)	7,706	MoE Education Statistics Bulletin, Zambia 2024
Year 2: New entrants in primary and secondary school screened	1,900	
Year 3: as per year 2	2,008	
Year 4: as per year 2	2,135	
Year 5: as per year 2	2,283	
Future years: as per year 2	2,500	
Number of years to screen and equip or refer all children (E3)	5	Scenario's target

Training:		
Number of education staff to educate per school (D1)	10	Output from TC project (2022 – 2025)
Percentage of children with Special Education Needs needing assistive device of referral (E2)	65%	Number of children with Special Education Needs needing an assistive device-based TC project data (2022 – 2025)
Number of children refracted and provided with spectacles (E6)	19%	
Number of children equipped with assistive devices for mobility (E8)	2%	
Number of children referred for further treatment (E10)	94%	
Number of children equipped with hearing aid	1%	

Sensitivity analysis

To assess the robustness of the cost projections and identify key cost drivers, both deterministic and multivariate sensitivity analyses were conducted. The deterministic univariate analysis varied each major input parameter independently by plus or minus 25 per cent from its baseline value. The multivariate analysis explored 81 scenarios - combining all possible permutations of minimum, median and maximum values across four key variables. These were determined through the univariate sensitivity analysis- number of schools covered, cost of renovation per school, cost of braille equipment per school and the number of community members to train. This approach enabled a comprehensive understanding of how simultaneous changes in multiple parameters could influence the total cost envelope, providing a realistic range of potential budget outcomes for scale-up planning.

Results

Muchinga Province has an estimated population of 918,296 people and eight administrative districts. In 2021, the year the project started, the province had 702 schools and an estimated 262,816 enrolled learners.

The project worked in 24 mainstream learning centres, including early childhood schools, primary and secondary schools, resource centres and community schools in Chinsali District. Of these, 22 were audited and renovated to include disability accommodations. The project supported the enrolment of 1,017 children with disabilities. On average, 152 students per year were assessed and provided with assistive technology or medical interventions, resulting in 611 children over four years. The total number of students with and without disabilities supported in these schools was 8,281.

Financial analysis of the TC project reveals a total expenditure of ZMW 21,154,446 (see table 3 for details in ZMW) or £782,541 (see table 4 for details in GBP) over the four-year implementation period (2021–2024). As shown in tables 3 and 4, the distribution of costs was relatively balanced across 2022-2024. Each year accounted for approximately 28 to 30 per cent of the total budget (GBP figures). The highest annual expenditure occurred in 2024, reflecting a peak in implementation activities.

A significant portion of the spending, over half (64 per cent), was allocated to grant project management and overheads - underscoring the administrative and coordination demands of a multi-stakeholder, multi-site initiative. Coordination activities alone accounted for 33 per cent of the total, highlighting the emphasis placed on inter-agency collaboration, stakeholder engagement and logistical support.

Table 3: Breakdown of project expenditure by activity, sub-activity and year of implementation (in current ZMW)

Activities/years	2021	2022	2023	2024	Total
Grant project management and overheads	2,241,495 (11%)	3,232,399 (15%)	3,468,571 (16%)	4,551,844 (22%)	13,494,310 (64%)
Coordination	890,039 (4%)	1,522,165 (7%)	2,221,682 (11%)	2,321,962 (11%)	6,955,848 (33%)
Finance	78,848 (0%)	78,848 (0%)	78,848 (0%)	78,848 (0%)	315,390 (1%)
M&E	29,907 (0%)	166,336 (1%)	221,611 (1%)	25,536 (0%)	443,390 (2%)
Media	(0%)	(0%)	201,399 (1%)	5,121 (0%)	206,520 (1%)
Overheads	1,161,560 (5%)	321,695 (2%)	344,965 (2%)	404,520 (2%)	2,232,739 (11%)
Technical support	81,141 (0%)	1,143,356 (5%)	400,066 (2%)	1,715,858 (8%)	3,340,422 (16%)
Community support to CYWD	48,987 (0%)	447,330 (2%)	123,724 (1%)	265,871 (1%)	885,911 (4%)
Adaptation, development, situation analysis translation and coordination related to behaviour change, sensitisation and awareness-raising in communities.	40,177 (0%)	414,699 (2%)	106,646 (1%)	140,751 (1%)	702,273 (3%)
Training and identification	8,810 (0%)	32,630 (0%)	17,078 (0%)	125,120 (1%)	183,638 (1%)
Education staff support	81,002 (0%)	66,594 (0%)	9,262 (0%)	397,211 (2%)	554,069 (3%)
Assessment, adaptation, development, translation and coordination related to screening and assessment tools.	8,387 (0%)	63,337 (0%)	3,799 (0%)	158,890 (1%)	234,413 (1%)
Inclusion training	72,615 (0%)	3,257 (0%)	5,463 (0%)	238,321 (1%)	319,656 (2%)
Inclusive infrastructure equipment	78,521 (0%)	949,890 (4%)	1,592,896 (8%)	1,558,937 (7%)	4,180,244 (20%)
Accessibility audit	1,465 (0%)	22,081 (0%)	3,419 (0%)	83,189 (0%)	110,154 (1%)
Assistive device, examination, club, training, coordination and provision.	54,692 (0%)	89,623 (0%)	451,800 (2%)	301,877 (1%)	897,992 (4%)

Renovation, BCC in schools, WASH stations, social environments, etc.	22,364 (0%)	838,186 (4%)	1,137,678 (5%)	1,173,871 (6%)	3,172,099 (15%)
Dissemination advocacy and policy	59,808 (0%)	546,124 (3%)	547,473 (3%)	886,506 (4%)	2,039,911 (10%)
Grand total	2,509,813 (12%)	5,242,338 (25%)	5,741,926 (27%)	7,660,369 (36%)	21,154,446 (100%)

Table 4: Breakdown of project expenditure by activity, sub-activity and year of implementation (in current GBP)*

Activities/years	2021	2022	2023	2024	Total
Grant project management and overheads	80,947 (10%)	136,919 (17%)	135,635 (17%)	144,290 (18%)	497,791 (64%)
Coordination	34,715 (4%)	72,712 (9%)	76,139 (10%)	70,839 (9%)	254,406 (33%)
Finance	2,793 (0%)	2,793 (0%)	2,793 (0%)	2,793 (0%)	11,174 (1%)
M&E	1,016 (0%)	5,766 (1%)	8,137 (1%)	769 (0%)	15,688 (2%)
Media	(0%)	(0%)	8,665 (1%)	161 (0%)	8,826 (1%)
Overheads	39,732 (5%)	15,192 (2%)	14,345 (2%)	12,400 (2%)	81,670 (10%)
Technical support	2,690 (0%)	40,454 (5%)	25,555 (3%)	57,328 (7%)	126,027 (16%)
Community support to CYWD	1,643 (0%)	20,489 (3%)	4,653 (1%)	8,022 (1%)	34,807 (4%)
Adaptation, development, situation analysis translation and coordination related to behaviour change, sensitisation and awareness-raising in communities.	1,355 (0%)	18,908 (2%)	3,991 (1%)	4,293 (1%)	28,547 (4%)
Training and identification	287 (0%)	1,581 (0%)	663 (0%)	3,729 (0%)	6,260 (1%)
Education staff support	3,560 (0%)	3,265 (0%)	350 (0%)	11,719 (1%)	18,894 (2%)
Assessment, adaptation, development, translation and coordination related to screening and assessment tools.	356 (0%)	3,113 (0%)	141 (0%)	4,859 (1%)	8,469 (1%)
Inclusion training	3,204 (0%)	151 (0%)	210 (0%)	6,860 (1%)	10,425 (1%)
Inclusive infrastructure equipment	3,264 (0%)	46,403 (6%)	58,581 (7%)	48,126 (6%)	156,374 (20%)
Accessibility audit	52 (0%)	1,051 (0%)	125 (0%)	2,479 (0%)	3,707 (0%)
Assistive device, examination, club, training, coordination and provision.	2,268 (0%)	4,458 (1%)	17,730 (2%)	8,767 (1%)	33,223 (4%)

Renovation, BCC in schools, WASH stations, social environments, etc.	944 (0%)	40,895 (5%)	40,726 (5%)	36,880 (5%)	119,444 (15%)
Dissemination advocacy and policy	2,250 (0%)	25,426 (3%)	20,748 (3%)	26,252 (3%)	74,676 (10%)
Grand total	91,664 (12%)	232,501 (30%)	219,967 (28%)	238,409 (30%)	782,541 (100%)

*Percentages differ slightly from table in ZMW because monthly exchange rate conversion was applied to each cost line before aggregation, which introduces minor distortions compared to using a single average rate.

Figure 1 is a Sankey diagram that shows cost allocation by activity and sub-activity - visually illustrating the flow of resources from broad cost categories into specific interventions. It shows that, while management and coordination functions consumed a large share of the costs, substantial spending were also made in areas such as inclusive infrastructure, assistive devices and training.

Figure 2 further disaggregates expenditures by thematic cost category. This reveals that capital and personnel costs were the most important categories in terms of expenditure, followed by transportation and equipment and supplies. Capital costs were almost exclusively related to the renovation of schools, whereas personnel costs were shared across activities.

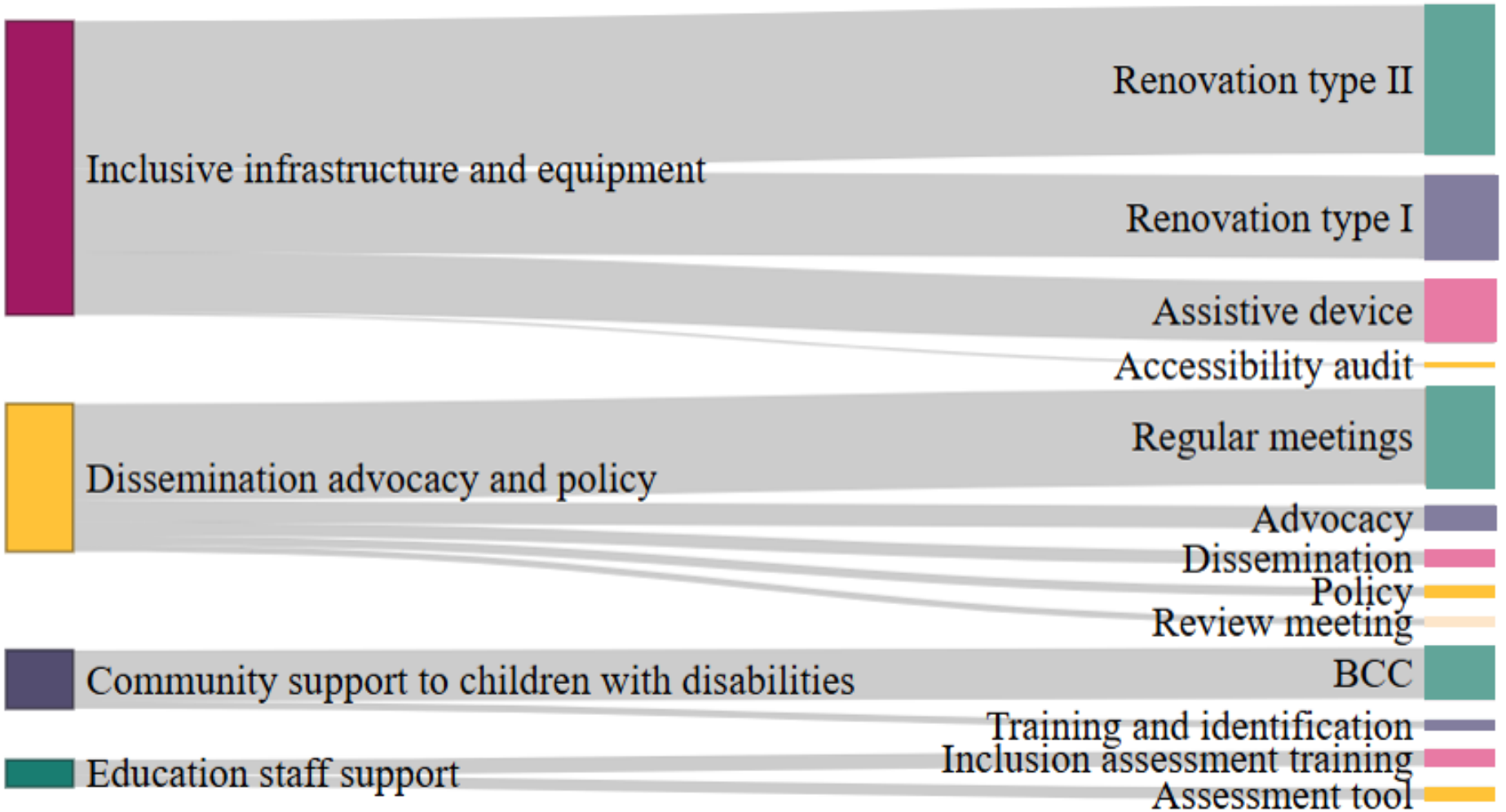

Inclusive infrastructure and equipment
Dissemination advocacy and policy
Community support to children with disabilities
Education staff support
Renovation type II
Renovation type I
Assistive device
Accessibility audit
Regular meetings
Advocacy
Dissemination
Policy
Review meeting
BCC
Training and identification
Inclusion assessment training
Assessment tool

Figure 1:Sankey diagram of cost allocation by activity and sub-activity

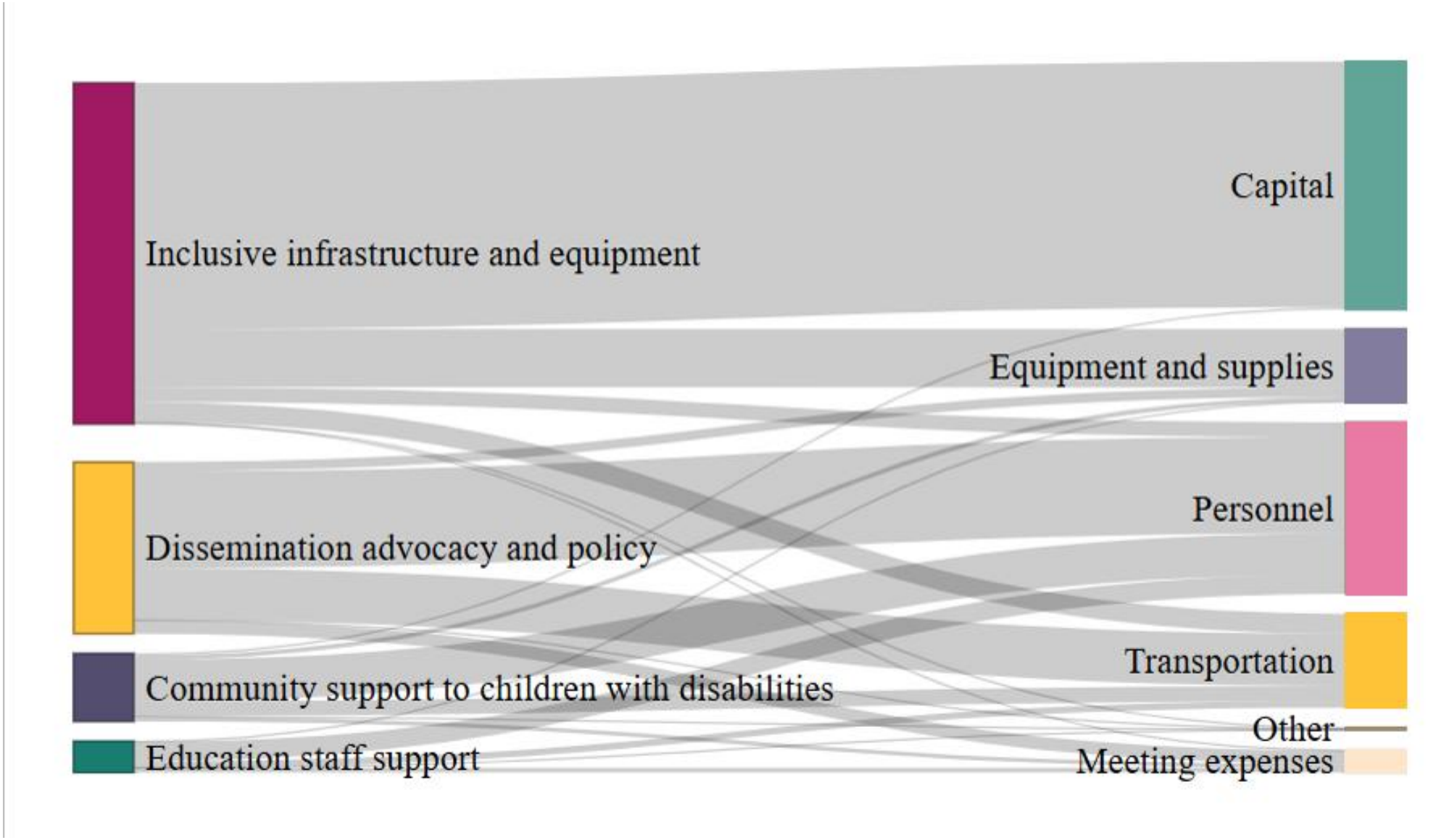


Figure 2: Sankey diagram of cost allocation by activity and category

Table 5 shows costs that are estimated to be start-up, recurrent or semi-recurrent. A total of 57 to 58%of the costs were considered 'one-off' expenditures or related to the pilot activities. For example, these include any cost related to the development of training materials, the assessment of staff or communities to be trained, or other expenses related to grant management.

Recurrent and semi-recurrent costs (42 to 44%) are related to activities that are expected to be replicated throughout the duration of the project and ideally beyond, for example, screening and referral of new entrant schoolchildren or newly built schools. Some of these costs are considered semi-recurrent, such as training of education staff or community members, because they would not necessarily be yearly and completed but would require refresher training every two or three years.

Table 5: Recurrence of costs*

Activities/years	Start-up (in ZMW)	Recurrent or semi-recurrent (in ZMW)	Start-up (in GBP)	Recurrent or semi-recurrent (in GBP)
Grant project management and overheads	6,095,071 (43%)	8,016,465 (57%)	227,697 (44%)	288,747 (56%)
Community support to CYWD	614,098 (87%)	95,463 (13%)	25,882 (88%)	3,595 (12%)
Education staff support	146,238 (39%)	231,481 (61%)	5,805 (43%)	7,760 (57%)
Inclusive infrastructure equipment	3,105,903 (79%)	809,816 (21%)	117,822 (79%)	30,558 (21%)
Dissemination advocacy and policy	2,039,911 (100%)	-	74,676 (100%)	-

Grand total	12,001,221 (57%)	9,153,225 (43%)	451,881 (58%)	330,660 (42%)

*Percentages differ slightly from table in ZMW because monthly exchange rate conversion was applied to each cost line before aggregation, which introduces minor distortions compared to using a single average rate.

Table 6 presents the total number of project outputs and a breakdown of unit costs associated with key activities and outputs. The most resource-intensive interventions were related to infrastructure and accessibility. Renovation and environmental improvements in schools, including water, sanitation and hygiene stations and social environment enhancements, had an average unit cost of ZMW 144,186 per school (£5,429). Auditing schools for their accessibility cost, on average, ZMW 5,007 (£168) per school.

Over the four-year period, 611 children were assessed and provided with assistive technology or medical interventions, with the average cost of provision of assistive devices and referral, including coordination and training, reaching ZMW 1,470 (£54) per child equipped or referred. This included 114 children who received custom-made spectacles with a hard case following refraction at a unit cost of ZMW 449 (£15) per child. Braille equipment was provided to 22 schools at a unit cost of ZMW 10,797 (£446) per school, and 10 children received assistive devices for mobility at a unit cost of ZMW 3,276 (£161) per child.

For education system strengthening (outcome 2), training and support for education staff were delivered at a cost of ZMW 695 (£23) per person. Meanwhile, the development and coordination of screening tools incurred a cost of ZMW 78,138 (£2,823) per tool.

Table 6: Unit cost by main outcome and used for cost projection

Activities	Output	Unit definition	Unit cost (in ZMW)	Total cost (in ZMW)	Unit cost (in GBP)	Total cost (in GBP)
Community support (outcome 1)	**1,017**	**Children with disabilities enrolled**	**871**	**885,911**	**34**	**34,807**
Training of community members on identification of CYWD.	303	Community members	606	183,638	21	6,260
Community capacity building to address stigmatisation, discrimination of CYWD and support to education access.	117	Community structure	6,002	702,273	244	28,547
Education staff support (outcome 2).	**460**	**Education staff**	**1,204**	**554,069**	**41**	**18,894**
Education staff trained on inclusion, disability and gender.	460	Education staff	695	319,656	23	10,425
Assessment, adaptation, development, translation and coordination related to screening and assessment tool.	3	Tools developed	78,138	234,413	2,823	8,469

Inclusive infrastructure and equipment (Outcome 3)	**22**	**Schools made accessible**	**190,011**	**4,180,244**	**7,108**	**156,374**
Accessibility audit	22	Schools audited	5,007	110,154	168	3,707
Assistive device, examination, club, training, coordination, and provision or referral (including transportation).	611	Assistive devices provided	1,470	897,992	54	33,223
Examination, training and coordination of assistive device and referral	611	Assistive devices provided and persons referred	701	428,277	23	14,263
Spectacles	114	Children refracted and provided with spectacles	449	51,220	15	1,705
Braille equipment or related	22	Schools equipped	10,797	237,540	446	9,820
Assistive for mobility	10	Children with assistive devices for mobility	3,276	32,764	161	1,607
Transportation for referral	573	Number of children referred	259	148,191	10	5,828
Hearing aid	6	Number of children equipped	-	-	23	14,263
School renovation type I*	9	Schools renovated/adapted	100,327	902,941	4,790	43,106
School renovation type II*	13	Schools renovated/adapted	174,551	2,269,159	5,872	76,339

*List of renovations in Appendix

Table 7 presents the projected cost of scaling up the TC inclusive education model across all public schools in Muchinga Province over a five-year period (Appendix Table A3 in GBP). The model is based on the assumption that over five years, all public schools in the province will be reached to set up inclusive education practices (as per the TC project model). The total estimated cost over five years is ZMW 200.9 million (£7.6 million), with an average cost of ZMW 40.2 million (£1.5 million) per year. The last column shows the recurrent cost of sustaining inclusive education in Muchinga province, once all community members and teachers have been trained, schools renovated and schoolchildren assessed and equipped when required. The budget impact model suggests that the yearly recurrent cost would be ZMW 3.9 million (£0.1 million) following the initial five-year scale-up.

Table 7: Cost of scaling up TC approach to Muchinga Province (ZMW 2024)

Inclusive education	Muchinga province						
Activities	Year 1	Year 2	Year 3	Year 4	Year 5	**Total**	Recurrent costs
Start-up costs							
Start-up preparation and review meetings							
Number of districts	8	8	8	8	8		
Cost per district	120,473	120,473	120,473	120,473	120,473		
Total sub-activity	963,788	963,788	963,788	963,788	963,788	**4,818,939**	-
Community support cost							
Training of community members on identification of children							
Number of schools to cover in one year	166	201	202	204	206	**979**	44
Number of community members to train (22 per school)	3,652	4,422	4,444	4,488	4,532	**21,538**	968
Cost of training one person	606	606	606	606	606		606
Total sub-activity	2,213,353	2,680,023	2,693,357	2,720,024	2,746,691	**13,053,447**	586,672
Adaptation coordination related to behaviour change, sensitisation and awareness raising in communities.							
Number of community structures per school	6	6	6	6	6		
Number of community structures to cover	996	1,206	1,212	1,224	1,236	**5,874**	264
Cost of sensitisation and awareness raising campaign per community structure	6,002	6,002	6,002	6,002	6,002		6,002
Total sub-activity	5,978,328	7,238,819	7,274,833	7,346,861	7,418,889	**35,257,729**	1,584,617
Education staff support							

Education staff trained on inclusion, disability and gender							
Number of education staff to educate per school	10	10	10	10	10		
Number of staff to train	1,660	2,010	2,020	2,040	2,060	**9,790**	440
Cost of training one staff member	695	695	695	695	695		695
Total sub-activity	1,153,541	1,396,757	1,403,706	1,417,604	1,431,502	**6,803,110**	305,758
Inclusive infrastructure, environment and equipment							
Assistive device, examination, club, training, coordination and provision.							
Number of children with disabilities needing referral and/or equipped children	1,001	2,234	2,305	2,387	2,482	10,408	1,623
Number of children refracted and provided with spectacles	187	417	430	445	463	1,942	303
Number of children equipped with assistive devices for mobility	36	80	83	86	89	375	58
Number of children referred for further treatment	16	37	38	39	41	170	27
Cost per child of examination, training and coordination	701						
Cost per child of spectacles	449						
Cost of braille equipment	10,797						
Cost assistive device for mobility	3,276						
Cost of transportation	259						
Total sub-activity	2,699,975	3,796,719	3,860,911	3,935,702	4,022,272	**18,315,578**	1,472,274
Audit, Renovation, BCC in schools, WASH stations, social environments, etc.							
Number of schools to audit and renovate	166	164	164	164	164		
Cost per school	149,193	149,193	149,193	149,193	149,193		149,193

Total sub-activity	24,766,090	24,467,703	24,467,703	24,467,703	24,467,703	**122,636,903**	-
Total	37,775,073	40,543,809	40,664,297	40,851,682	41,050,844	200,885,706	3,949,320

Figure 3 presents a deterministic univariate sensitivity analysis, illustrating the impact of varying individual cost drivers on the total projected cost of scaling the TC model. The analysis shows that the number of schools covered and the cost per facility renovation are the most influential parameters, with potential cost swings of over ZMW 44 million (£1 million) (see Figure A1 for GBP). Other variables, such as the number of community members to train and the unit cost per assistive device, also contribute significantly to budget variability. The standard scenario is set at ZMW 201 million (£7.6 million), while lower and upper bounds range from approximately ZMW 156 million to ZMW 240 million (£5.9 million to £9.2 million).

Figure 3: Deterministic univariate sensitivity analysis (variation +/-25%, in thousands)

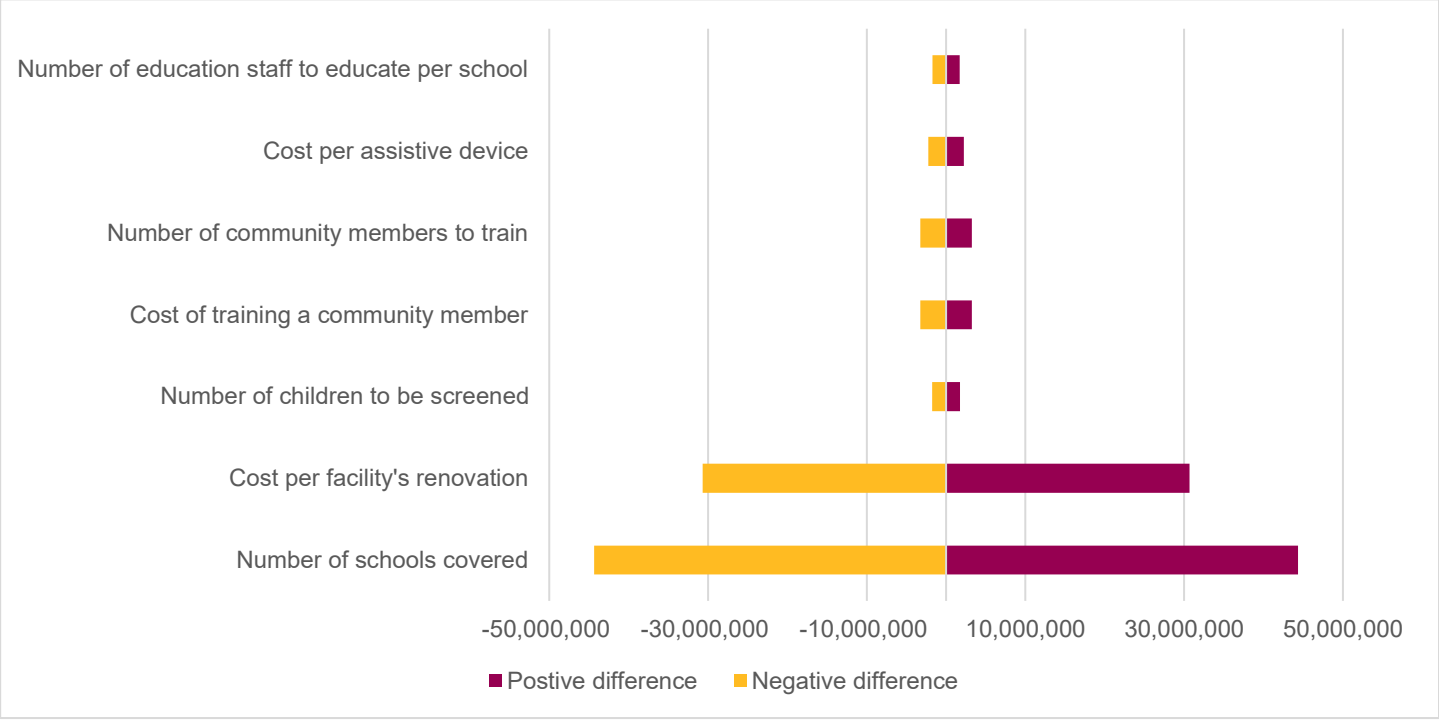
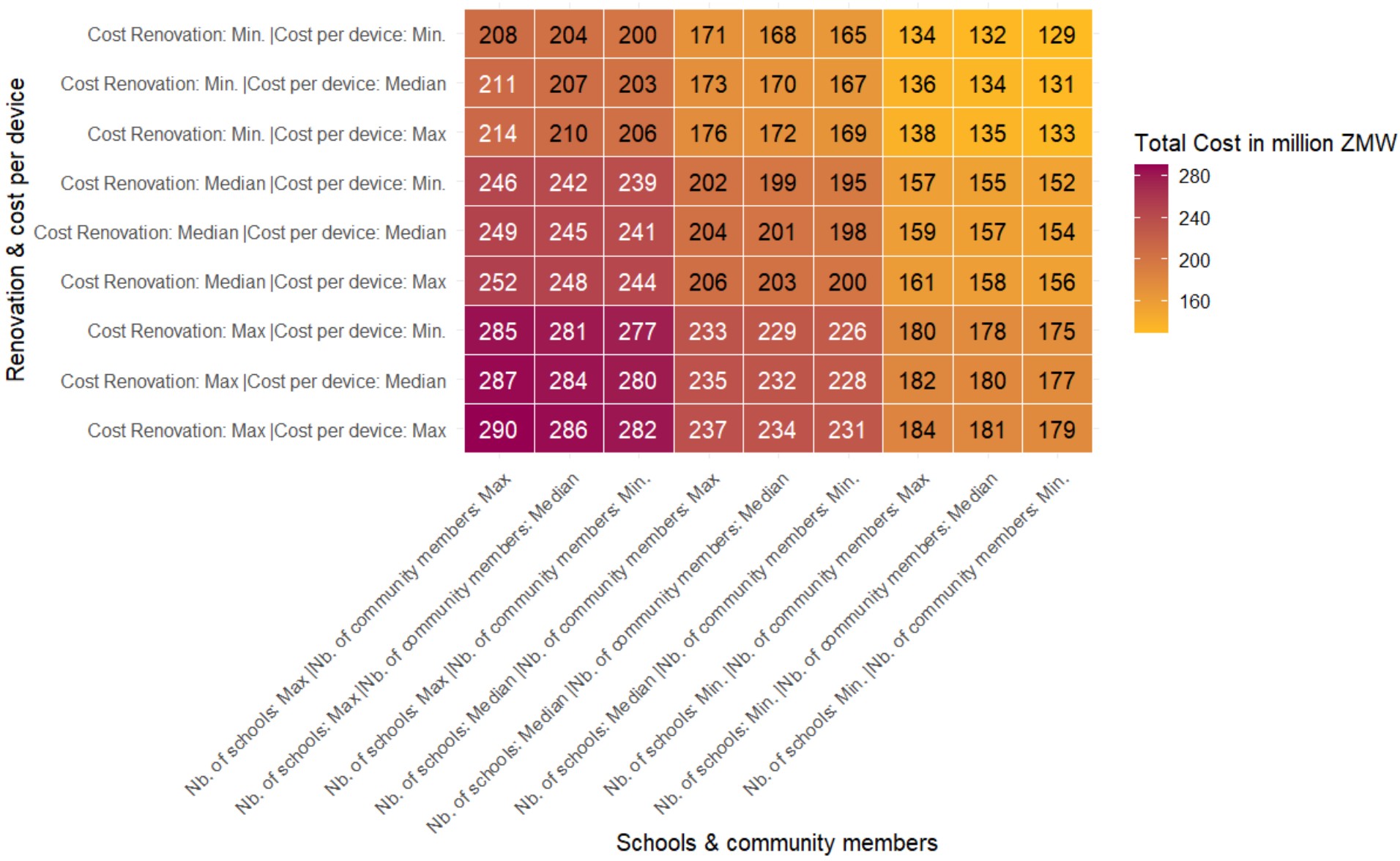


Table 3 presents a four-way multivariate sensitivity analysis, exploring 81 scenarios that vary four key cost drivers: number of schools covered; cost of renovation per school; number of community members to train; and cost of braille equipment provided (see Appendix Table A4 for GBP). Each variable was adjusted by plus or minus 25 per cent from its baseline. The resulting total costs range from a best-case scenario of ZMW 129 million (or £4.9 million) to a worst-case scenario of ZMW 290 million (or £10.9 million). Notably, renovation cost and school coverage exert the strongest influence on budget variability, reinforcing their role as primary cost drivers.

Table 8: Four-way heatmap of multivariate sensitivity analysis in million ZMW


Renovation & cost per device
Cost Renovation: Min. |Cost per device: Min. 208 204 200 171 168 165 134 132 129
Cost Renovation: Min. |Cost per device: Median 211 207 203 173 170 167 136 134 131
Cost Renovation: Min. |Cost per device: Max 214 210 206 176 172 169 138 135 133
Cost Renovation: Median |Cost per device: Min. 246 242 239 202 199 195 157 155 152
Cost Renovation: Median |Cost per device: Median 249 245 241 204 201 198 159 157 154
Cost Renovation: Median |Cost per device: Max 252 248 244 206 203 200 161 158 156
Cost Renovation: Max |Cost per device: Min. 285 281 277 233 229 226 180 178 175
Cost Renovation: Max |Cost per device: Median 287 284 280 235 232 228 182 180 177
Cost Renovation: Max |Cost per device: Max 290 286 282 237 234 231 184 181 179
Nb. of schools: Max |Nb. of community members: Max
Nb. of schools: Max |Nb. of community members: Median
Nb. of schools: Max |Nb. of community members: Min.
Nb. of schools: Median |Nb. of community members: Max
Nb. of schools: Median |Nb. of community members: Median
Nb. of schools: Median |Nb. of community members: Min.
Nb. of schools: Min. |Nb. of community members: Max
Nb. of schools: Min. |Nb. of community members: Median
Nb. of schools: Min. |Nb. of community members: Min.
Schools & community members
Total Cost in million ZMW
280
240
200
160

Discussion

Economic evaluation of the TC project highlights the financial costs of implementing inclusive education in a relatively low-income region of Zambia (26). The cost structure is marked by substantial initial investments in coordination, infrastructure and training to integrate inclusive practices into mainstream education systems. Table 5 shows that a large share of this inclusive education project costs are non-recurrent. Indeed, 57% of total expenditures were classified as start-up or pilot-related, such as the development of training materials and school renovations. Recurrent or semi-recurrent costs, such as screening new students and refresher trainings, made up the remaining 43%. This suggests that future phases could be delivered more cost-efficiently once foundational systems and capacities are in place.

From the costing analysis, in Table 6, the results further support the notion that inclusive education requires a mix of costs. For example, the cost of making a school more accessible in TC was between ZMW 100,327 (£4,790) and ZMW 174,551 (£5,872) (depending on the type of renovation, see Appendix Table A2 for the list of renovations), while training a community member to identify children with disabilities cost just ZMW 606 (£21). This pattern is consistent with global evidence showing that, while physical accessibility improvements are capital intensive, investments in human capacity, such as teacher training and community sensitisation, can be scaled more affordably (27).

Indeed, several activities of the TC project would not be recurrent if scaled up. For instance, all the costs related to the development of training materials, the adaptation of referral systems or renovation of schools would only occur once. The yearly recurrent costs are expected to be lower over the course of a longer-term project (for example, training for new teachers, screening and assistive devices provided to new students only).

Considering that the existing Ministry of Education zonal staff and special education department would coordinate the programme, the BIA model estimates a total cost of ZMW 201 million (£7.6 million) for scaling the TC model across Muchinga Province over five years (Table 7). This front-loaded investment strategy is typical of systems-strengthening interventions and suggests potential for cost efficiencies in future phases, as shown by the costs of sustaining inclusive education once all schools and communities are covered, with

recurrent costs after the initial five-year period estimated to be ZWM 3.9 million, or £0.1 million.

Multivariate sensitivity analysis confirms the robustness of the model, with total costs ranging from ZMW 129 million to 290 million (or £4.9 million to £10.9 million) depending on variations in key parameters (Figure 3). The number of schools in the province to cover and their renovation costs emerged as the most influential cost drivers, indicating areas where strategic adjustments could yield significant savings.

These findings have important implications for policy and planning. According to the UNICEF Zambia Education Budget Brief 2023, the Ministry of Education's expected budget in 2023 was ZMW 23.2 billion (28). Assuming a proportional budget to population, Muchinga Province is estimated at about 5% of the national education budget, which translates to approximately ZMW 1.2 billion per year. This means the TC model average yearly cost (ZMW 40 million) would consume around 3.3% of Muchinga's entire education budget each year during five years, with the assumption that the education budget remains at ZMW 23.2 billion per year.

This is an important initial investment to cover all schools, communities and students. However, after these five years, the inclusive education programme would only cover primary schools' new entrants and refresher training for community members and education staff, drastically reducing the yearly costs (Table 3 and Figure 1 & 2). Indeed, the budget impact analysis suggests that following an initial investment over five years, an annual requirement of only 0.3% of the provincial education budget would be necessary to cover the recurrent costs of sustaining an already implemented TC programme in Muchinga.

In addition, different strategies could be sought to further decrease the cost of inclusive education, for instance with the local funding of school renovation by grants from the Ministry of Education or the Constituency Development Fund (CDF) (29). As an additional analysis, where the cost of school renovation would be covered by such grants, we estimate that over five years the total cost of TC would be lower and reach approximately ZMW 14.9 million (approximately £558,000) per year, or the equivalent of 1.2% of the provincial education yearly budget. There may also be potential cost savings if assistive devices could be funded from the CDF or other domestic sources, in addition to the already donated hearing aids. This highlights the importance of adopting a flexible funding approach to inclusive education,

adapting to the local context and the availability of funding from a variety of domestic sources.

In future phases of the project, revisiting cost estimates based on refined implementation models and real-time data will be essential. Institutionalising inclusive education practices, such as embedding training into teacher education curricula and leveraging community structures, can further reduce costs and improve outcomes. Ultimately, the TC project offers a compelling case for inclusive education as both a moral imperative and a strategic investment in Zambia's development.

Limitations

The cost and budget impact analysis of the Tusambilile Chapamo project is an important contribution to the limited evidence base on inclusive education in sub-Saharan Africa. It is, to our knowledge, the only study to estimate the costs and affordability of inclusive education in Zambia. However, the study has a number of limitations. Firstly, it should be recognised that the analysis focusses on a pilot project delivering a specific set of activities, designed in partnership with the Ministry of Education to promote inclusive education in Muchinga Province. Caution should be taken when considering the generalisability of the cost estimates to other settings and contexts. Secondly, the costs presented does not fully capture the total economic cost of implementing the inclusive education pilot, since they do not include in-kind contributions and opportunity costs (such as volunteer time) due to difficulties in identifying and quantifying these.

Conclusion

The approach taken to promote and foster inclusion and equity in education will vary across different settings and contexts. Country specific information on the costs and budget impacts of inclusive education is essential for evidence-informed decision-making about resource allocation to support the inclusion of learners with disabilities in public education. The Tusambilile Chapamo project developed an inclusive education model to support learners with special education needs and disabilities to access and participate in Muchinga Province, Zambia. Evidence on the cost of the project and investment required to scale up

this approach across the province will support future efforts to move from pilot to policy, adopting inclusive education practices to ensure that no child is left behind.

Appendix

Table A1. Summary of budget impact analysis included activities.

Implementation financial costs of inclusive education
I. Start-up preparation and review meetings
Number of districts (A1)
Cost per district (A2)
Total sub-activity (A) = (A1) x (A2)
II. Training of community members on identification of CYWD
All schools to be audited and renovated (B1)
Number of years to cover all schools (B2)
Number of community members to train per school (B3)
Number of schools to cover in one year (B4) = (B1) / (B2)
Number of community member to train (B5) = (B3) x (B4)
Cost of training one person (B6)
Total sub-activity (B) = (B5) x (B6)
III. Adaptation, coordination related to behaviour change, sensitisation, and awareness raising in communities
Number of community structures per school (C1)
Number of community structures to cover (C2) = (B1) x (C1)
Cost of sensitisation and awareness raising campaign per community structure (C3)
Total sub-activity (C) = (C2) x (C3)
IV. Education staff trained on inclusion, disability and gender
Number of education staff to educate per school (D1)
Number of staff to train (D2) = (B1) x (D1)
Cost of training one staff member (D3)
Total sub-activity (D) = (D2) x (D3)
V. Assistive device, examination, club, training, coordination, and provision
Screening of all children in primary and secondary (E1)
Percentage of children with Special Education Needs needing assistive device or referral (E2)
Number of years to screen and equip or refer all children (E3)
Number of children with disabilities needing assistive device or referral (E4) = ((E1/E3) x (E2))
Percentage of children needing **spectacles** (E5)
Number of children refracted and provided with **spectacles** (E6) = (E4) x (E5)
Percentage of children needing an assistive **device for mobility** (E7)
Number of children equipped with assistive **devices for mobility** (E8) = (E4) x (E8)
Percentage of children needing to be **referred for further treatment** (E9)
Number of children **referred for further treatment** (E10) = (E4) x (E10)
Cost per child of examination, training and coordinating provision of assistive device and referral (E11)
Cost per child of spectacles (E12)
Cost of braille equipment per school (E13)
Cost assistive device for mobility (E14)
Cost of transportation per referred child (E15)
Total sub-activity (E) = (E4) x (E11) + (E6) x (E12) + (B4) x (E13) + (E8) x (E14) + (E10) x (E15)

VI. Audit, Renovation, BCC in schools, WASH stations, social environments etc.
All schools to be audited and renovated (F1)
Number of years to cover all schools (F2)
Number of schools to audit and renovate (F3) = (((F1) / (F2)) +2*)
Cost per school (F4)
Total sub-activity (F) = (F3) x (F4)
Total = (A) + (B) + (C) + (D) + (E) + (F)

*+2 because number of schools needs to be an integer

Table A2. Renovation types

Type of renovations	Type of toilet	Other renovation
Type I	Ventilated improved pit latrine	Ramps, walkway (handrails in one school), lighting work for visually impaired children and accessible handwash station.
Type II	Waterborne toilet	Ramps, walkway (handrails in two schools), supply clean water (in one school) and accessible handwash station.

Table A3. Cost of scaling up TC approach to Muchinga Province (GBP 2024)

Inclusive education	Muchinga province						
Activities	Year 1	Year 2	Year 3	Year 4	Year 5	**Total**	Recurrent costs
Start-up costs							
Start-up preparation and review meetings							
Number of districts	8	8	8	8	8		
Cost per district	4,334						
Total sub-activity	34,676	34,676	34,676	34,676	34,676	173,378	-
Community support cost							
Training of community members on identification of CYWD							
Number of schools to cover in one year	166	201	202	204	206	979	44
Number of community members to train (22 per school)	3,652	4,422	4,444	4,488	4,532	21,538	968
Cost of training one person	21	21	21	21	21		21
Total sub-activity	75,451	91,360	91,814	92,723	93,632	444,981	19,999
Adaptation coordination related to behaviour change, sensitisation and awareness raising in communities.							
Number of community structures per school	6						
Number of community structures to cover	996	1,206	1,212	1,224	1,236	5,874	264
Cost of sensitisation and awareness raising campaign per community structure	244	244	244	244	244		244
Total sub-activity	243,017	294,255	295,719	298,647	301,575	1,433,212	64,414
Education staff support							
Education staff trained on inclusion, disability and gender							
Number of education staff to educate per school	10						

Number of staff to train	1,660	2,010	2,020	2,040	2,060	9,790	440
Cost of training one staff member	23	23	23	23	23		23
Total sub-activity	37,619	45,551	45,778	46,231	46,684	221,864	9,971
Inclusive infrastructure, environment and equipment							
Assistive device, examination, club, training, coordination and provision.							
Nb of children with disabilities needing referral and/or equipped children	1,001	2,234	2,305	2,387	2,482	10,408	1,623
Nb of children refracted and provided with spectacles	187	417	430	445	463	1,942	303
Nb of children equipped with assistive devices for mobility	36	80	83	86	89	375	58
Nb of children referred for further treatment	16	37	38	39	41	170	27
Cost per child of examination, training and coordination	23						
Cost per child of spectacles	41						
Cost of braille equipment	446						
Cost assistive device for mobility	161						
Cost of transportation	10						
Total sub-activity	106,203	144,875	147,146	149,792	152,855	700,870	52,086
Audit, Renovation, BCC in schools, WASH stations, social environments, etc.							
Number of schools to audit and renovate	166	164	164	164	164		
Cost per school	5,598	5,598	5,598	5,598	5,598		5,598
Total sub-activity	929,232	918,037	918,037	918,037	918,037	4,601,379	
Total	1,426,198	1,528,753	1,533,169	1,540,105	1,547,458	7,575,685	146,471

Figure A1. Deterministic univariate sensitivity analysis (variation +/-25%, in GBP)

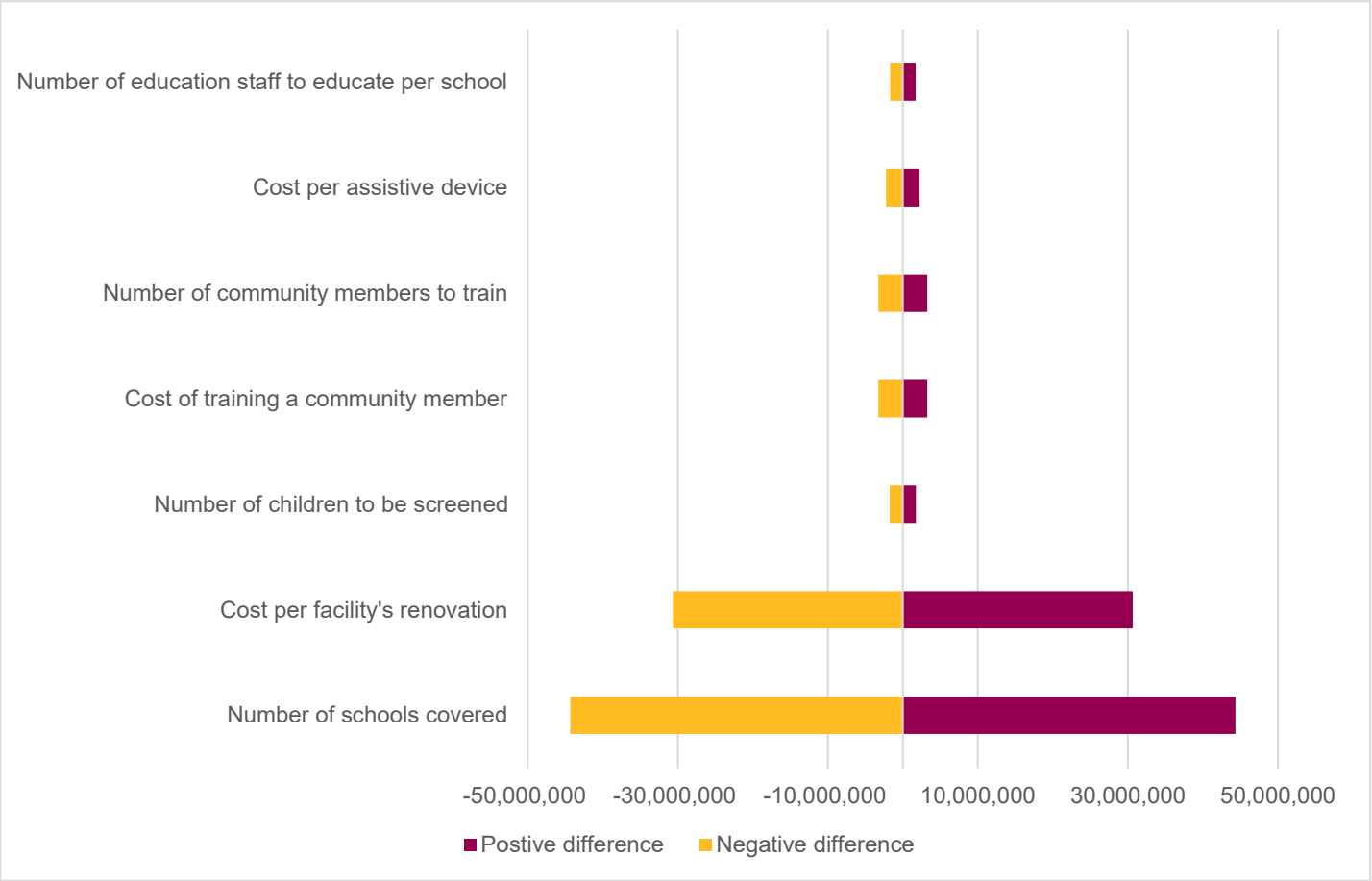
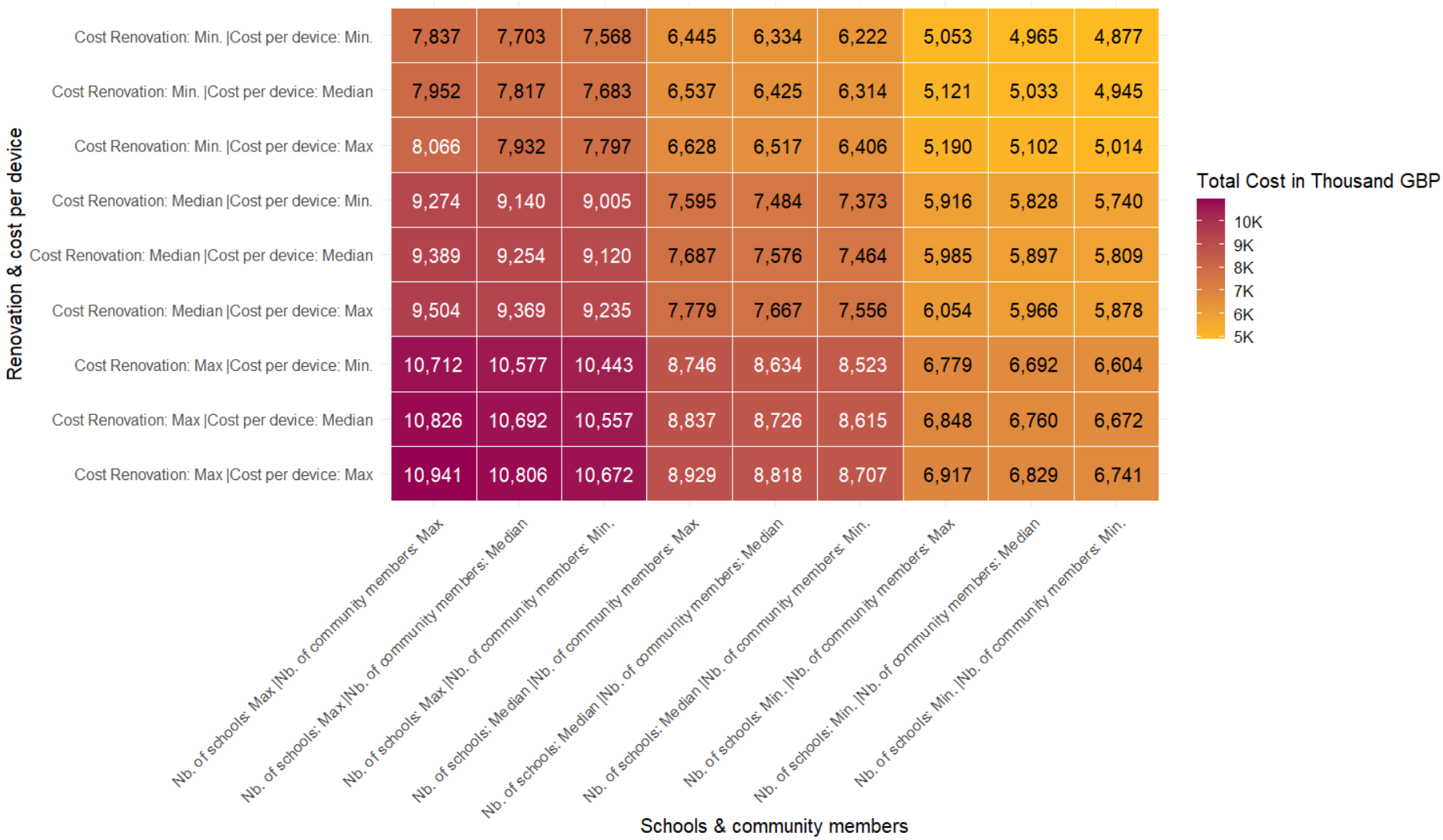


Table A4. Four-way heatmap of multivariate sensitivity analysis in thousand GBP



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