The Cradle of Knowledge: African Journal of Educational and Social Science Research
AJESSR - ISSN 2304-2885-p, 2617-7315-e
Volume 14, Issue 4, 2026
P.O. Box 555 (00202), Nairobi. Kenya
editor@serek.or.ke

SOCIETY OF EDUCATIONAL RESEARCH AND EVALUATION IN KENYA

Education Costs and Multidimensional Poverty Among Families Raising Children with Developmental Disabilities in Tanzania

Neema Mfugale[1,2], Richard Kiplangat Siele[2] & Yabesh Ombwori Kongo[2]
[1]Economics, Institute of Accountancy, Arusha, Tanzania
[2]Economics, Moi University, Eldoret, Kenya
[*]Email: naspedito@gmail.com

Abstract
Children with developmental disabilities often require additional educational support, creating financial demands that may undermine household welfare, particularly in low- and middle-income countries. This study examines the association between education costs and multidimensional poverty among families raising children with developmental disabilities in Tanzania. Using cross-sectional data collected from 385 caregivers in Dar es Salaam, Kilimanjaro and Shinyanga, the study applies a two-stage Probit-Tobit estimation framework to investigate service access and the relationship between specific education costs and household multidimensional poverty. The first-stage results indicate that caregiver gender, formal-sector employment, household size and income are positively associated with access to services, while combined physical and intellectual disabilities are negatively associated with access. The second-stage results, based on 144 households reporting service access, reveal that shadow teacher expenditure is positively and significantly associated with household multidimensional poverty ($\beta = 0.025$, $p = 0.020$). Conversely, tuition expenditure ($\beta = -0.007$, $p = 0.052$) and educational transport costs ($\beta = -0.011$, $p = 0.081$) exhibit negative associations with deprivation, while learning material expenditure is not statistically significant. Household deprivation is also higher among families raising children with combined physical and intellectual disabilities and autism spectrum disorder. The findings reveal the distinct welfare implications of education expenditure components and suggest that privately financed specialised educational support may impose considerable financial pressure on households. The study recommends strengthening inclusive education provision, subsidising specialised learning support and improving access to affordable educational transport to reduce disability-related household deprivation in Tanzania.

Keywords: *developmental disability; education costs; inclusive education; multidimensional poverty; Tanzania*

1. Introduction

Developmental disabilities are among the most common but least costed health and social conditions affecting children. The WHO and UNICEF Global Report estimates that about 317 million children and young people worldwide were living with conditions contributing to a developmental disability in 2019 (World Health Organization, 2023). The burden falls mostly on low- and middle-income countries, which were home to roughly 95 percent of the 52.9 million children under five with developmental disabilities in the 2016 Global Burden of Disease estimates (Olusanya, et al., 2018). For these children, education is the main route to later participation in economic and social life, yet it is also where exclusion is most visible. Across 15 low- and middle-income countries, children with disabilities were 30.9 percentage points less likely to attend school than their non-disabled peers, and this gap persisted across household wealth levels (Mizunoya, Mitra, & Yamasaki, 2018). Earlier household-survey evidence from 14 developing countries likewise found that disability lowers school participation and progression, often by as much as or more than other recognized sources of disadvantage such as poverty or rural residence (Filmer, 2008). These gaps are costly to societies. Cross-country estimates suggest that excluding people with disabilities from education and work represents a substantial loss of national income (Devandas Aguilar, 2017).

This work is licensed under a Creative Commons Attribution 4.0 International License

Tanzania has pledged to fill this gap formally. It ratified the UN Convention on the Rights of Persons with Disabilities in 2009, and passed the Persons with Disabilities Act of 2010 (Hendriks, 2007; Cosmas, 2026). It also has a policy for basic education without fees, which it has adopted since the end of 2015 (Shukia, 2020). A child with a developmental disability, therefore, has a right to attend a school on paper, without paying school fees. According to the UNICEF situation analysis, access to inclusive education is a weak point of the disability support system in Tanzania (Nyimbi & Kajiru, 2024). Parents regularly articulate that the financial burden of supporting a child with special needs to attend and remain in school is significantly greater than for other children, partly because of high transportation costs, lengthy and complicated admissions procedures, and time requirements (Bhalalusesa, Babyegeya, & Mnyanyi, 2023). Qualitative research also shows that in rural Tanzania households for which sending a child with a developmental disorder was never considered or abandoned because it was too expensive to keep a child in school (Castellani, et al., 2022).

The experience in other settings offers some explanations of why free tuition does not take the financial sting out of college. Perna asserts that the actual expense of special education is obscured in the public budget, as large portions of special education funds are "displaced" to private households (Perna, 2014). A study of the Malaysian families revealed that education-related and developmental costs are one of the most significant categories of families' expenditure on children with cerebral palsy and autism spectrum disorders. They spent an average of RM 20,989 per year on autism and that's particularly for low-income families (Kamaralzaman, et al., 2018). Poverty and disability compound each other, and a family's child with a disability will have greater needs for specialized materials, therapy and assistive support, and less money to cover those needs (Parish & Cloud, 2006). A part of these costs is particularly significant if public classrooms do not have the appropriate facilities to support individual needs. This is the shadow teacher, a privately hired teacher working with the child in or in conjunction with the mainstream classroom. The shadow teacher falls under the larger category of “shadow education”, defined as private supplementary education which supplements the public educational system where it is seen as insufficient (Bray, 2011). A shadow teacher is a stark expression of the lack of individualised support in a country where schooling is supposed to be free, and is one of the few ways a family can achieve it.

Sen's Capability Approach provides a useful theoretical framework for examining these costs by conceptualising well-being in terms of individuals' substantive freedoms, opportunities and capabilities to achieve valued ways of living, rather than focusing exclusively on income or material resources (Sen, 1980, 1985, 1999). Complementing this perspective, (Nussbaum, 2000, 2011) emphasises the importance of essential human capabilities in enabling individuals to achieve a dignified life and participate meaningfully in society. Developmental disabilities require additional resources and support to achieve the same educational outcome as non-disabled children, as they turn into different outcomes based on personal and social situations (Mitra, 2006). This is also because income-based poverty measures underestimate the poverty experienced by households with a disabled member, and because measures that take account of multiple dimensions of poverty, such as the Multidimensional Poverty Index (MPI) are better able to examine disability and poverty jointly (Mitra et al, 2013). In this context, the term education spending can have two definitions. It can be a strategic investment to increase the opportunity for the child, or a remuneration for a service the public system has already committed to provide but not yet fulfilled.

In spite of this expanding body of work, there are three areas that remain. First, most cost studies consider education as a single line item of expenditure, or incorporate it into the total expenditure on disability; there is no information on which part of expenditure on education has the greatest welfare impact (Kamaralzaman, et al., 2018). Secondly, the shadow teacher is not differentiated as a cost of education with a unique welfare signature, separate from tuition, learning materials and transport. Third, the evidence comes primarily as qualitative and descriptive (Bhalalusesa, Babyegeya, & Mnyanyi, 2023). It has not been associated with any multidimensional measure of household deprivation and disaggregated education costs. These gaps are significant policy issues. A policy action even a blanket subsidy, will not be well targeted if some education costs are planned investments by relatively better-resourced households and others are imposed unplanned burdens as a result of gaps in public provision. The identification of the costs that indicate the failure of the system will indicate where public investment in inclusive education could ease the burden on households the most.

The present study investigates the linkages between four categories of education spending (tuition fees, special learning materials, shadow teacher support and educational transport) and multidimensional poverty of households with a developmental disability child in Tanzania. It relies on primary data from 385 caregivers in Dar es Salaam,

This work is licensed under a Creative Commons Attribution 4.0 International License

Kilimanjaro and Shinyanga districts, and applies a two-stage Probit–Tobit framework to address selection into access to services. It includes answers to three research questions. Which parts of the education costs have a positive association with the higher household MPI? (2) Which are not related to it? (3) What are the ones linked with lower MPI, and does this constitute planned investment by wealthier households or a welfare cost of the spending? Based on the Capability Approach the study hypothesize that (H1) the shadow teacher cost is negatively related with the MPI of the households; because the shadow teachers address the unmet needs in public classrooms. We also hypothesize that (H2) tuition and transport cost is not positively related with MPI, since it represents planned expenses of the households with higher financial capacity. This study is one of the few studies to quantitatively estimate the individual welfare impacts for Tanzanian households for raising a child with a developmental disability from each of the components of individual education costs, and also offers evidence on the order of priority for supporting these children.

2. Methods

The study used a cross-sectional analytical design within a post-positivist research paradigm, appropriate for testing the relationship between disability-related education expenditure and household welfare using structured quantitative data (Creswell & Creswell, 2016). The study was conducted in Dar es Salaam, Kilimanjaro and Shinyanga regions of Tanzania, selected to capture geographical variation in disability prevalence and examine education cost and multidimensional poverty. According to the 2022 Population and Housing Census (URT, 2022), the three regions comprised an estimated 1,095,088 households: Dar es Salaam (602,978), Kilimanjaro (283,876) and Shinyanga (198,234). The unit of analysis was biological and non-biological households of children aged 5–17 years with confirmed developmental disabilities, including cerebral palsy, autism spectrum disorder, Down syndrome and related physical or intellectual impairments. Using Cochran's (1977) formula at a 95% confidence level and 5% margin of error, a sample of 385 households was determined and proportionally allocated across the selected regions and districts. Households were selected through simple random sampling. Data were collected from January to April 2026 by eight enumerators using Kobo Toolbox questionnaires administered in English and Swahili.

The study included biological and non-biological primary caregivers responsible for children aged 5–17 years with a confirmed diagnosis of developmental disability, including cerebral palsy, autism spectrum disorder, Down syndrome, or related physical and intellectual impairments, residing in the selected study regions. Eligible participants were required to have primary caregiving responsibilities and be willing to provide informed consent. The study excluded caregivers of children without a confirmed developmental disability, those caring for children outside the specified age range, individuals who were not primary caregivers, and those unwilling to participate.

Table 1: *Sample Distribution per District*

Region	Sample Size	District	Sample
Dar es Salaam	214	Ilala	66
		Temeke	54
		Kigamboni	12
		Ubungo	43
		Kinondoni	39
Kilimanjaro	101	Moshi DC/MC	41
		Hai	13
		Siha	8
		Rombo	15
		Same	16
		Mwanga	8
Shinyanga	70	Shinyanga	22
		Kahama	14
		Kishapu	10
		Ushetu	12
		Msalala	12
Total	**385**		**385**

This work is licensed under a Creative Commons Attribution 4.0 International License

The sample selection procedure for the two-stage estimation framework, showing how the initial sample of 385 households were reduced to 382 observations for the probit model and subsequently to 144 eligible household for the second stage Tobit estimations, based on the reported services-access status rather than data attrition.

Table 2: *Sample Flow*

Stage	N	Notes
Full survey sample	385	All caregivers interviewed across three regions of Tanzania
Less: missing values on	−3	Incomplete responses
First-stage Probit estimation sample	382	All households with valid access responses enter the Probit model
Less: households reporting no perceived joint access (A = 0)	−238	Retained in Probit only; excluded from second-stage Tobit
Households reporting perceived joint access (A = 1)	144	Eligible for second-stage bounded Tobit estimation
Less: missing cost or covariate values	0	No further attrition within the access subsample
Final Tobit estimation sample	144	Used across second-stage bounded Tobit models

Ethical approval and research authorization were obtained from the Tanzania Commission for Science, Technology and Innovation (COSTECH) before data collection (Permit No. CST00001636-2025-2026-00083), covering Dar es Salaam, Shinyanga and Kilimanjaro regions. The study involved parents and primary caregivers of children with developmental disabilities. Participants were informed about the study objectives, procedures, voluntary participation and their right to withdraw without consequences. Oral informed consent was obtained before data collection. Confidentiality and privacy were maintained throughout the research process. Participants' names were excluded from questionnaires, analyses and reports, while completed questionnaires and electronic datasets were securely stored, with access restricted to the research team. Findings were reported in aggregate form to prevent identification of individual participants, households or children. Importantly, data were collected exclusively from adult parents and caregivers; children with developmental disabilities were neither directly interviewed nor subjected to research procedures.

The multidimensional poverty index (MPI) used in this study was constructed following the Alkire-Foster counting methodology, incorporating three equally weighted dimensions: education, health, and living standards (Alkire & Foster, 2011). For each dimension, a binary deprivation indicator was generated, taking the value 1 if the household was deprived in that dimension and 0 otherwise. The composite MPI score for each household was then calculated as the unweighted mean of these three deprivation indicators, yielding a deprivation score ranging from 0 (deprived in no dimension) to 1 (deprived in all three dimensions), with intermediate values of 0.33 and 0.67 representing deprivation in one and two dimensions, respectively.

Table 3: *Study Variables*

Variable	Definition and measurement	Initials
Multidimensional Poverty Index (MPI)	Overall well-being and quality of life experienced by household members. Multidimensional Poverty Index (MPI) capturing deprivations across health, education, and standard of living	MPI
Tuition costs	Fees/contributions paid for a child's educational instruction and enrolment for the education of a child with a developmental disability, Total self-reported annual expenditure through primary data structured questionnaire	Tuition
Learning material costs	Expenditure on textbooks, stationery and other learning resources. Total self-reported annual expenditure through primary data structured questionnaire	LearnMat

This work is licensed under a Creative Commons Attribution 4.0 International License

Shadow teacher	Cost of hiring an individual learning support assistant. Total self-reported annual expenditure through primary data structured questionnaire	ShadowTeach
Educational Transport	Expenses incurred transporting a child to and from school. Total self-reported annual expenditure through primary data structured questionnaire	EduTransp
Gender of Household Head	Binary variable equal to 1 for male-headed households and 0 for female-headed households. Binary classification (1 = male-headed, 0 = female-headed)	Gender
Child's Age	Age of the child with a disability, measured in years	ChildAge
Household Size	Total number of household members	HHSize
Caregiver Marital Status	Caregiver marital status captured via dummy variables (Married, Divorced, Widowed), relative to single caregivers (reference category)	MarStatus
Disability Type	Child's disability profile captured via dummy variables (Physical Only, Intellectual Only, Physical and Speech, Physical and Intellectual), relative to speech-only disability (reference category)	DisabType
Medical Condition	Child's primary medical diagnosis captured via dummy variables (Autism Spectrum Disorder, Down Syndrome), relative to Cerebral Palsy (reference category)	MedCond
Informal Credit Use	Binary variable equal to 1 if the household relies on informal credit as a coping strategy	InfCredit

Because education-related expenditure is only observed among households that have actually enrolled a child in school and accessed related services, a two-stage estimation framework was used to correct for this selection. The first stage estimated a Probit model on the full sample (n = 385) of the determinants of perceived joint access to education services:

$$\mathrm{P}(A_i = 1|\boldsymbol{Z_i}) = \Phi(\gamma_0 + \gamma_1 Gender_{\mathrm{i}} + \gamma_2 \mathrm{MarStatus}_{\mathrm{i}} + \gamma_3 \mathrm{Employ}_{\mathrm{i}} + \gamma_4 \mathrm{Education}_{\mathrm{i}} + \gamma_5 \mathrm{HHSize}_{\mathrm{i}} + \gamma_6 \ln(\mathrm{Income_i})_{\mathrm{i}} + \gamma_7 \mathrm{DisabType}_{\mathrm{i}} + \gamma_8 \mathrm{ChildAge}_{\mathrm{i}\ \mathrm{i}} + \gamma_9 \mathrm{DisabBirth}_{\mathrm{i}_{\mathrm{i}}}$$

The second stage estimated a bounded Tobit model on the sub-sample of 144 households reporting service access, with household MPI (bounded between 0 and 1) as the dependent variable. The Tobit estimator was used because MPI is censored at both bounds. The education cost model was specified as:

$$\mathrm{MPI}_i^* = \beta_0 + \beta_1 Gender_i + \beta_2 ChildAge_i + \beta_3 HHSize_i + \beta_4 MarStatus_i + \beta_5 DisabType_i + \beta_6 MedCond_i + \beta_7 InfCredit_i + \delta_1 ln\,(Tuition)_i + \delta_2 ln\,(LearnMat)_i + \delta_3 ln\,(ShadowTeach)_i + \delta_4 ln\,(EduTransp)_i + \varepsilon_i$$

where the four logged cost variables represent annual tuition fees, special learning material costs, shadow teacher costs, and educational transport costs. All cost variables were logged to reduce skewness and allow coefficients to be read as elasticities. The model was estimated with Huber-White robust standard errors, and adequacy was verified with the Ramsey RESET test and the Breusch-Pagan test for heteroscedasticity.

3. Analysis Results

3.1 Descriptive Statistics

This section summarises the caregiver, child, and expenditure characteristics that are directly relevant to interpreting the education cost model. Table 4 shows the age profile of the 385 caregivers and their children. The mean caregiver age was 38.3 years (SD = 9.99, range 19–74), and the mean child age was 9.86 years (SD = 3.47, range 5–17), placing

SEREK publication https://www.serek.or.ke

This work is licensed under a Creative Commons Attribution 4.0 International License

most children in this sample at or near primary-school age, the stage at which enrolment decisions and their associated costs become most consequential for the household.

Table 4: *Age of Respondents and Child with Disability*

Variable	Obs	Mean	Std. Dev.	Min	Max
Age of Respondent	385	38.31	9.99	19	74
Child Age	385	9.86	3.47	5	17

Table 5 reports the caregiver characteristics used as controls in the education cost model. Female caregivers made up 83.9 percent of the sample, a distribution that helps explain why gender is a consistently significant control in the education model as in the others. Just over half of caregivers were married (55.6 percent), and 41.6 percent were unemployed, with only 15.8 percent in formal-sector employment, a labour market position that constrains how much a household can realistically budget for tuition, transport, and other planned education costs.

Table 5: *Household Demographic Characteristics*

Variable	Category	Frequency	Percentage
Gender	Female	323	83.90
	Male	62	16.10
Marital status	Single	79	20.63
	Married	213	55.61
	Divorced	27	7.05
	Widowed	64	16.71
Employment status	Unemployed	160	41.56
	Self-employed	128	33.25
	Employed, informal sector	36	9.35
	Employed, formal sector	61	15.84

Table 6 presents the clinical and functional profile of the children, which enters the education model as the disability-type and medical-condition controls. Children with combined physical and intellectual disabilities made up 47.5 percent of the sample, the profile most strongly associated with needing a privately financed shadow teacher, followed by intellectual-only disabilities (33.5 percent). By diagnosis, cerebral palsy was most common (53.1 percent), followed by autism spectrum disorder (38.7 percent), the condition most consistently linked to elevated MPI in the education model reported table 6.

Table 6: *Clinical and Functional Profile of Children with Developmental Disabilities*

Variable	Category	Frequency	Percentage
Disability type	Speech Only	17	4.42
	Physical Only	44	11.43
	Intellectual Only	129	33.51
	Physical & Speech	12	3.12
	Physical & Intellectual	183	47.53
Medical condition	Cerebral Palsy	200	53.05
	Autism Spectrum Disorder	146	38.73
	Down Syndrome	31	8.22

Table 7 reports twelve-month education expenditure across the full sample of 385 households (a value of zero indicates the household incurred no cost in that category during the recall period). Tuition fees carried by far the largest mean expenditure (TZS 326,068) and the widest range, reaching TZS 6,000,000 at the maximum, consistent with the model's finding that tuition is a planned, and sometimes substantial, household investment. Educational transport

This work is licensed under a Creative Commons Attribution 4.0 International License

averaged TZS 83,317, learning materials TZS 11,538, and shadow teacher support the smallest mean (TZS 5,623) but reaching up to TZS 300,000 among the households that relied on it, a cost concentrated among the minority of families whose children could not be supported in a mainstream classroom without dedicated assistance.

Table 7: *Summary Statistics of Education Expenditure (TZS)*

Expenditure Category	N	Mean	Std. Dev.	Min	Max
Tuition Fees	385	326,067.50	1,023,205.00	0	6,000,000
Special Learning Materials	385	11,537.66	61,532.62	0	700,000
Shadow Teacher Support	385	5,623.38	29,828.08	0	300,000
Educational Transport	385	83,316.88	364,809.80	0	4,000,000

3.2 First-Stage Access Determinants

The first-stage Probit model uses 382 observations to estimate the likelihood of households accessing joint disability-related services for children with developmental disabilities in Tanzania. Marginal effects identify socioeconomic and disability-related factors influencing service access, with results presented table 8.

Table 8: *First stage of the Double Hurdle Model – Probit Model*

Perceived Access (n=385)	dy/dx	Std. Error	P value
Gender (Ref : female)			
Male	0.131**	0.061	0.031
Marital status (Ref: Single)			
Married	0.045	0.062	0.461
Divorced	-0.095	0.088	0.283
Widowed	0.111	0.076	0.146
Employment status (Ref: Unemployed)		.	.
Self-employed	0.068	0.056	0.226
Employed informal sector	0.137	0.090	0.128
Employed formal sector	0.173**	0.081	0.033
Education level		.	.
(No formal education=0)			
Primary	0.127	0.116	0.273
Secondary	0.005	0.118	0.965
Tertiary	0.086	0.129	0.507
Household size	0.044***	0.014	0.002
Log_household income	0.123***	0.039	0.002
Disability type (Ref: Speech Only)		.	.
Physical Only	-0.151	0.130	0.247
Intellectual Only	-0.035	0.118	0.766
Physical & Speech	-0.193	0.178	0.278
Physical & Intellectual	-0.326***	0.114	0.004
Child age_	0.004	0.007	0.595
Disability_since_birth		.	.
(Ref: Acquired later)			
Since birth	0.060	0.068	0.380

*** represents 1%, ** represents 5%, and * represents 10%

The first-stage Probit results in Table 8 indicate that perceived joint access to education services among households raising children with developmental disabilities is significantly associated with caregiver gender, employment status, household characteristics and the child's disability profile. Specifically, male caregivers are 13.1 percentage points more likely to report joint access to services than female caregivers ($p = 0.031$). Similarly, caregivers employed in the formal sector are 17.3 percentage points more likely to report joint access compared with unemployed caregivers ($p = 0.033$). Household size and household income also exhibit positive and statistically significant associations with service access. An additional household member increases the probability of joint access by 4.4 percentage points ($p = 0.002$), while a 1% increase in household income is associated with approximately a 0.123-percentage-point increase

This work is licensed under a Creative Commons Attribution 4.0 International License

in the probability of access (p = 0.002). Regarding disability characteristics, households raising children with combined physical and intellectual disabilities are 32.6 percentage points less likely to report joint access than those with children with speech-only disabilities (p = 0.004), suggesting that children with multiple impairments may encounter greater barriers to accessing educational services simultaneously. In contrast, marital status, caregiver education level, self-employment, informal-sector employment, child age and the onset of disability do not demonstrate statistically significant associations with perceived joint access. The findings suggest that economic resources, employment conditions and the complexity of children's disability profiles are important correlates of access to essential educational services. These results emphasise the need for targeted interventions that address the financial and service-delivery barriers faced by households raising children with more complex developmental disabilities, particularly those with combined physical and intellectual impairments.

3.3 Effect of Education Costs on Household MPI

The second stage uses a bounded Tobit model to examine how caregiving education costs influence household welfare, measured by MPI among 144 households. Given MPI's 0-1 range, maximum likelihood estimation accounts for its bounded nature and incorporates boundary observations, providing estimates of the relationship between disability-related education costs and household deprivation.

Table 9: *Tobit Regression Model: Effect of Education Costs on the Multidimensional Poverty Index*

Variable	Coefficient	Robust Std. Error	p-value
Gender (Ref: Female)	-0.204***	0.066	0.003
Child Age	-0.008	0.009	0.38
Household Size	-0.038*	0.02	0.055
Marital Status (Ref: Single)			
Married	0.0002	0.081	0.998
Divorced	0.056	0.106	0.601
Widowed	0.06	0.084	0.479
Disability Profile (Ref: Speech Only)			
Physical Only	0.089	0.148	0.549
Intellectual Only	0.228*	0.125	0.071
Physical & Speech	0.268	0.176	0.13
Physical & Intellectual	0.384***	0.137	0.006
Medical Condition (Ref: Cerebral Palsy)			
Autism Spectrum Disorder	0.177**	0.07	0.013
Down Syndrome	0.076	0.092	0.41
Coping Strategy			
Informal Credit (Yes)	0.064	0.046	0.166
Education Costs (Logged)			
Log of Tuition Costs	-0.007*	0.004	0.052
Log of Learning Material Costs	-0.009	0.007	0.221
Log of Shadow Teacher Costs	0.025**	0.01	0.02
Log of Educational Transport	-0.011*	0.006	0.081
Constant	0.357	0.217	0.103
Number of Observations (n)	144		
F (17, 127)	3.55		
Prob > F	0.0000		

SEREK publication https://www.serek.or.ke

This work is licensed under a Creative Commons Attribution 4.0 International License

*** represents 1%, ** represents 5%, and * represents 10%

Table 9 presents the second-stage Tobit regression results examining the association between education-related expenditure and household multidimensional poverty among 144 households reporting perceived access to education services. The findings indicate that caregiver gender is negatively and significantly associated with household MPI, suggesting that households with male primary caregivers have 0.204 points lower MPI scores than those with female primary caregivers ($\beta = -0.204$, $p = 0.003$). Household size is also negatively associated with MPI, with an additional household member corresponding to a 0.038-point reduction in MPI ($\beta = -0.038$, $p = 0.055$), significant at the 10% level. Regarding disability profiles, intellectual-only disabilities are positively associated with household MPI ($\beta = 0.228$, $p = 0.071$), while households raising children with combined physical and intellectual disabilities experience significantly higher MPI scores ($\beta = 0.384$, $p = 0.006$) relative to those with speech-only disabilities. Similarly, autism spectrum disorder is positively associated with household MPI compared with cerebral palsy ($\beta = 0.177$, $p = 0.013$), whereas Down syndrome does not demonstrate a statistically significant association. With respect to education-related expenditure, tuition costs ($\beta = -0.007$, $p = 0.052$) and educational transport costs ($\beta = -0.011$, $p = 0.081$) exhibit negative associations with household MPI, both significant at the 10% level.

In contrast, shadow teacher expenditure is positively and significantly associated with MPI ($\beta = 0.025$, $p = 0.020$), suggesting that the financial requirements of specialised educational support may contribute to greater household deprivation. Expenditure on learning materials, informal credit, child age and marital status are not statistically significant predictors of household MPI. Furthermore, the model is statistically significant ($F = 3.55$, $p < 0.001$), indicating that the explanatory variables are jointly associated with household multidimensional poverty. The findings suggest that household deprivation is associated with the complexity of children's disability conditions and the financial demands of specialised educational support, suggesting the importance of strengthening affordable inclusive education, subsidising specialised learning assistance and reducing the indirect costs of accessing educational services.

4. Discussion

The study results provide evidence that the relationship between education-related expenditure and household multidimensional poverty varies across expenditure components and children's disability profiles. The positive and statistically significant association between shadow teacher expenditure and household MPI suggests that households spending more on individualised educational support experience greater multidimensional deprivation. This finding is consistent with Perna (2014), who argues that the actual costs of special education are partly transferred from public institutions to households, creating financial responsibilities that are not fully reflected in public education budgets. Similarly, Bray (2011) conceptualises shadow education as private supplementary provision that emerges when mainstream educational systems are insufficient to meet learners' individual needs. In Tanzanian this finding is particularly relevant because the provision of fee-free basic education does not necessarily eliminate the indirect and specialised costs associated with educating children with developmental disabilities. Bhalalusesa, Babyegeya and Mnyanyi (2023) identify transportation expenses, complicated admission procedures and additional time requirements as important financial and non-financial barriers faced by families, while Castellani et al. (2022) document cases in rural Tanzania where schooling was abandoned because households could not sustain its associated costs.

The positive association between shadow teacher expenditure and MPI therefore suggests that the need to privately finance individualised educational support may represent an additional household welfare burden rather than simply an educational investment. Conversely, tuition expenditure and educational transport expenditure are negatively associated with MPI, although both relationships are statistically significant only at the 10% level. These associations indicate that households able to sustain expenditure on school participation and transportation are also better positioned to maintain children's educational engagement and access to essential services. Also, learning material expenditure is not statistically significant, indicating that its relationship with household deprivation is not clearly established in this sample. These findings contribute to the literature by distinguishing the welfare implications of different education expenditure components rather than treating education costs as a single household expenditure category, as is common in studies such as Kamaralzaman et al. (2018).

The results further demonstrate that household multidimensional poverty is strongly associated with the nature and complexity of children's disabilities. Households raising children with intellectual-only disabilities and combined physical and intellectual disabilities experience higher MPI scores relative to households with children with speech-only disabilities, although the former association is significant only at the 10% level. Similarly, households raising

This work is licensed under a Creative Commons Attribution 4.0 International License

children with autism spectrum disorder have higher MPI scores than those raising children with cerebral palsy. These findings support the capability approach by (Sen,1980,1985,1999) and (Nussbaum, 2000,2011), which emphasises that individuals require different levels of resources to achieve comparable wellbeing and functioning. Mitra (2006) further explains that disability can increase the resources required to achieve similar educational and social outcomes, while Mitra, Posarac and Vick (2013) demonstrate the importance of multidimensional poverty measures in capturing deprivation associated with disability. The findings are also consistent with (Banks, 2020; Enefwa et al., 2006; Parish & Cloud, 2006), who highlight how additional disability-related needs can intensify household poverty through increased expenditure and reduced resources available for other necessities.

Regarding household characteristics, male primary caregivers are associated with significantly lower MPI scores than female primary caregivers, while household size has a negative association with MPI. These relationships suggest that household resource availability and caregiving arrangements may influence welfare outcomes. Taken together, the findings reinforce the argument that the economic burden of developmental disability extends beyond direct medical expenditure to include the additional resources required for meaningful educational participation. In Tanzania, where inclusive education remains a challenge despite commitments under the Persons with Disabilities Act of 2010 and the fee-free basic education policy, the results point to the need for targeted public financing of specialised educational support. In particular, subsidising shadow teachers, strengthening the capacity of inclusive classrooms and improving accessible school transport could reduce the extent to which households privately finance services that are necessary for children's educational participation. This also addresses the research gap identified in the existing literature by demonstrating that different components of education expenditure have distinct associations with household multidimensional deprivation.

5. Conclusion

The study concludes that raising a child with a developmental disability is associated with considerable economic and welfare challenges for households in Tanzania. These challenges extend beyond direct medical and educational expenditures to include difficulties accessing essential disability-related services, disruptions to caregivers' employment and the additional resources required to meet children's specific developmental needs. The findings demonstrate that caregivers who completely withdraw from employment are more likely to experience higher levels of multidimensional household deprivation, highlighting the importance of maintaining livelihood opportunities alongside caregiving responsibilities. Furthermore, households caring for children with intellectual impairments, combined physical and intellectual disabilities, and autism spectrum disorder experience relatively greater welfare disadvantages, suggesting that the nature and complexity of a child's support needs are important dimensions of household economic vulnerability. The findings indicate that developmental disability is not solely a health or educational concern but also a household welfare issue requiring coordinated policy responses. Addressing these challenges is essential to improving the economic security and well-being of affected families.

6. Recommendation

The study recommends that the Tanzanian government strengthen the implementation of the Persons with Disabilities Act, 2010, and the National Strategy for Inclusive Education by increasing resources for disability-inclusive education, specialised learning support, rehabilitation and accessible transport. The Ministry of Education, Science and Technology, PO-RALG and local government authorities should work together to strengthen inclusive education services, improve the availability of trained specialist teachers and consider targeted subsidies for specialised educational support, including shadow teachers, to reduce the financial burden on households. Furthermore, the Ministry responsible for social welfare, through local government social welfare officers, should improve the identification and support of vulnerable households, particularly those in which caregivers have withdrawn from employment because of intensive caregiving responsibilities. Flexible working arrangements, respite care and targeted social protection support should be considered to protect caregivers' livelihoods and household welfare. These interventions require coordinated implementation across the education, health, labour and social protection sectors, alongside longitudinal evaluations to establish their effectiveness in reducing disability-related household deprivation.

References

Alkire, S., & Foster, J. (2011). Counting and multidimensional poverty measurement. Journal of public economics, 95(8), 476-487. https://doi.org/10.1016/j.jpubeco.2010.11.006

This work is licensed under a Creative Commons Attribution 4.0 International License

Banks, J. (2020). Examining the cost of special education. In J. Banks & K. Hytten (Eds.), Oxford research encyclopedia of education. Oxford University Press. https://doi.org/10.1093/acrefore/9780190264093.013.1025

Bhalalusesa, E. P., Babyegeya, E., & Mnyanyi, E. (2023). The dynamics of preparing children with special educational needs to start schooling in Tanzania. Papers in Education and Development, 41(1), 18–36.

Bray, M. (2011). Confronting the shadow education system: What government policies for what private tutoring? The Asian Journal of Educational Research and Synergy, 3(1), 1–1.

Castellani, J., Kimbute, O., Makasi, C., Mrango, Z. E., Paulus, A. T., Evers, S. M., & Gomes, M. (2022). Daily life and challenges faced by households with permanent childhood developmental disability in rural Tanzania: A qualitative study. Journal of Developmental and Physical Disabilities, 34(3), 471–490. https://doi.org/10.1007/s10882-021-09809-6

Cosmas, J. K. (2026). Article 24 of UNCRPD and its influences on legal, policy, and strategic frameworks for inclusive education in Tanzania. Journal of Ethics in Higher Education, 8(2), 119–148. https://doi.org/10.26034/fr.jehe.2026.9337

Creswell, J. W., & Creswell, J. D. (2016). Research design: Qualitative, quantitative, and mixed methods approaches. SAGE Publications.

Devandas Aguilar, C. (2017). Social protection and persons with disabilities. International Social Security Review, 70(4), 45–65. https://doi.org/10.1111/issr.12152

Enwefa, R. L., Enwefa, S. C., & Jennings, R. (2006). Special education: Examining the impact of poverty on the quality of life of families of children with disabilities. Forum on Public Policy Online, 1, 1–27.

Filmer, D. (2008). Disability, poverty, and schooling in developing countries: Results from 14 household surveys. The World Bank Economic Review, 22(1), 141–163. https://doi.org/10.1093/wber/lhm021

Hendriks, A. (2007). UN Convention on the Rights of Persons with Disabilities. European Journal of Health Law, 14(3), 273–298. https://www.jstor.org/stable/48711822

Kamaralzaman, S., Ying, T. C., Mohamed, S., Toran, H., Satari, N., & Abdullah, N. (2018). The economic burden of families of children with cerebral palsy in Malaysia. Malaysian Journal of Public Health Medicine, 156–165.

Mitra, S. (2006). The capability approach and disability. Journal of Disability Policy Studies, 16(4), 236–247. https://doi.org/10.1177/10442073060160040501

Mitra, S., Posarac, A., & Vick, B. (2013). Disability and poverty in developing countries: A multidimensional study. World Development, 41, 1–18.

Mizunoya, S., Mitra, S., & Yamasaki, I. (2018). Disability and school attendance in 15 low- and middle-income countries. World Development, 104, 388–403. https://doi.org/10.1016/j.worlddev.2017.12.001

Nussbaum, M. C. (2000). Women and human development: The capabilities approach. Cambridge University Press.

Nussbaum, M. C. (2011). Creating capabilities: The human development approach. Belknap Press of Harvard University Press.

Nyimbi, I., & Kajiru, I. (2024). Education for persons with disabilities in Tanzania. In I. Nyimbi, I. Kajiru, & N. C. Umeh (Eds.), Inclusive education developments in Africa (Vol. 114). Springer. https://doi.org/10.1007/978-3-031-64549-5_7

Olusanya, B. O., Davis, A. C., Wertlieb, D., Boo, N. Y., Nair, M. K., Halpern, R., & Kassebaum, N. J. (2018). Developmental disabilities among children younger than 5 years in 195 countries and territories, 1990–2016: A systematic analysis for the Global Burden of Disease Study 2016. The Lancet Global Health, 6(10), e1100–e1121.

Parish, S. L., & Cloud, J. M. (2006). Financial well-being of young children with disabilities and their families. Social Work, 51(3), 223–232. https://doi.org/10.1093/sw/51.3.223

Perna, A. (2014). Breaking the cycle of burdensome and inefficient special education costs facing local school districts. New England Law Review, 49.

Sen, A. (1980). Equality of what? In S. McMurrin (Ed.), The Tanner lectures on human values (Vol. 1, pp. 195–220). Cambridge University Press.

Sen, A. (1985). Commodities and capabilities. North-Holland.

Sen, A. (1999). Development as freedom. Alfred A. Knopf

Shukia, R. (2020). Fee-free basic education policy implementation in Tanzania: A 'phenomenon' worth rethinking. Huria, 27(1), 115–138.

This work is licensed under a Creative Commons Attribution 4.0 International License