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Caregiver Labour-Market Disruptions and Multidimensional Poverty among Households Raising Children with Developmental Disabilities in Tanzania

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Abstract: This study examines the relationship between caregiver labour-market disruptions and multidimensional poverty among households raising children with developmental disabilities in Tanzania. Specifically, it examines how exit from work, reduced working hours and reduced labour productivity are associated with multidimensional deprivation. A cross-sectional quantitative design was employed, using survey data collected from 385 caregivers in Dar es Salaam, Kilimanjaro and Shinyanga regions between January and April 2026. A two-stage econometric approach was adopted, comprising a Probit and bounded Tobit model estimated using 382 observations. The findings indicate that male caregiver status, formal-sector employment, household size and household income are positively associated with access of services, whereas combined physical and intellectual impairments are negatively associated with access. Tobit results reveal that caregiver exit from work is positively and significantly associated with household multidimensional poverty ($\beta = 0.170$, $p = 0.004$). However, reduced working hours and labour productivity exhibit no statistically significant associations. Furthermore, intellectual impairment, particularly when combined with physical impairment, is associated with higher deprivation. Autism spectrum disorder and Down syndrome are also associated with higher deprivation relative to cerebral palsy. Male caregiver status is associated with lower deprivation, while larger household size demonstrates a weak negative association. The study recommends disability-responsive social protection, flexible employment arrangements, affordable inclusive services and community-based respite care to protect household welfare and sustain caregivers' economic participation.

Keywords: *Child Developmental disability, labour-market disruptions, multidimensional poverty, Household Production Theory*.

Introduction

Developmental disabilities in children encompassing impairment conditions that affect motor function, cognition, speech, and behaviour before adulthood often go unnoticed (Olusanya et al., 2022; WHO & UNICEF, 2023). The World Health Organization (2022) estimates, there are over 1.3 billion individuals with disabilities globally, accounting for nearly 16% of the total population. Among them 317 million being children and young people with health condition that contribute to developmental disability worldwide, which require additional assistance due to their disability (WHO & UNICEF, 2023). About 30 million children around the world face risks of developmental issues each year, mainly due to health problems at birth. Most of these children live in areas with limited access to diagnosis, treatment, and rehabilitation services (Katumba et al., 2023). In sub-Saharan Africa, the lack of strong rehabilitation systems, poor availability and uneven distribution of specialized education, and weak social support lead families to handle care within the home, often at great personal and financial cost, resulting in lost time, income, and well-being. The household welfare is greatly impacted by child developmental disability, which can cause family to experience severe financial, emotional and social stress (Goodman et al., 2019).

The economic burden of childhood disability has two components. Direct costs are expenditure on health care, therapy, assistive devices, transport and schooling (Katumba

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et al., 2023; Zhao et al., 2023). Indirect costs are foregone earning when caregivers leave work, cut their hours or work less effectively (Kosherbayeva et al., 2025; Liao & Li, 2020). Indirect costs are not recorded in expenditure surveys, and the studies that measure them are mostly from high-income setting with formal labour-markets. In Tanzania, where most livelihoods are informal or self-employed the loss of a caregiver's labour may directly translate into lower household income. A lower income may constrain spending on food and housing quality, which relates to the living-standards indicators; it may reduce ability to pay school-related costs, which relate to education indicators; and it may reduce ability to pay for health. Without stable income, these time losses can lead to lower wages and higher poverty levels (Kim, 2022).

Evidence from Tanzania on the household consequences of childhood disability is largely qualitative or descriptive (Castellani et al., 2022; Joel et al., 2018; Mfilinge, 2022; Swai et al., 2024). These studies document financial strain, lost income and strained family relationships, but they do not quantify how a caregiver's withdrawal from paid work relates to household deprivation. Studies of the economics burden of disability also tend to treat labour-market adjustment as a single outcome, and few distinguish a caregiver's complete exit from partial adjustments in hours or productivity. Thus, distinction matters for policy: measure that help caregivers stay in work are different from measures that compensate for work already lost. This study therefore asks whether the extensive and intensive margins of caregiver labour adjustment are differently associated with household multidimensional poverty among households of children with developmental disabilities in Tanzania. The child's disability profile and the caregiver's characteristics are examined as secondary correlates.

Drawing on household production theory (Becker, 1965), this study hypothesizes that different forms of caregiver employment disruption have varying associations with household multidimensional poverty. H_1 complete exit from work is associated with a higher household MPI score; H_2 reduced working hours are associated with a smaller increase in the MPI; H_3 reduced productivity is not clearly associated with the MPI. The study examines these relationships as statistical associations rather than causal effects.

Literature Review

Theoretical Framework

Household Production Theory, developed by Becker (1965), provides a theoretical foundation for understanding how caregiving responsibilities influence household resource allocation and welfare. The theory views households as production units that combine time, labour and purchased goods to maximise well-being under income and time constraints. Applied to households raising children with developmental disabilities, increased caregiving demands may require caregivers to reallocate time from income-generating activities to unpaid care, resulting in complete labour-market exit, reduced working hours or reduced productivity. These adjustments have different economic implications. Complete labour-market exit may eliminate the caregiver's individual employment earnings, while reduced working hours may lower earnings without terminating employment. Reduced productivity, on the other hand, may decrease output or income despite continued participation in economic activities. However, the resulting multidimensional poverty effects depend on other income sources, including earnings from other household members, self-employment, agricultural activities and social transfers. These employment adjustments, combined with additional disability-related expenditures on healthcare, therapy and education, may constrain household resources and increase multidimensional deprivation. Therefore, Household Production Theory provides an analytical basis for examining how caregiving demands influence labour-market disruptions and the Multidimensional Poverty.

Empirical Studies

Empirical studies from various institutional settings show that having a child with a disability significantly affects how parents, especially mothers, are able to work. Caring for a child with a developmental disability involves extra work like providing care, watching over them, getting them around, giving treatment, and managing these needs. This extra work can make it hard for parents to work in paid jobs, and mothers are more likely to take on these responsibilities compared to men. In many families, responsibilities of caregiving are not added to existing domestic work but rather substitute for market employment, reducing mother's employment probabilities, working hours, occupational opportunities and long-term earning. This pattern is particularly evident were formal childcare, disability-support services support, or flexible work options (Brekke & Nadim, 2017; Bumbalo et al., 2005; Wondemu et al., 2022). Studies have shown that mothers who have children with significant care needs are more likely to stop working, reduce their working hours, or take more time off due to illness. For example, study Vinck & Brekke, (2020) found that in Belgium, mothers of children with more care needs had a 17-percentage point lower chance of being employed than fathers, and in Norway, it was a 13-percentage point difference. Similar findings are seen in Poland, where only 40.2% of mothers caring for a child with a disability were employed, compared to 70.9% of mothers who didn't have such care needs (Komorowska & Kozłowski, 2023). These differences are important economically because losing work means not only losing income but also missing out on benefits like social insurance, job experience, career chances, pensions, and future earning potential. The cost of caregiving builds up over time and can affect both current spending and the family's long-term financial stability.

However, the impact isn't only on mothers. Fathers usually keep working more, but they may also work longer hours, change their schedules, switch jobs, or look for more secure jobs when the financial pressure increases (Kosherbayeva et al., 2025; Liao & Li, 2020; Lindsay et al., 2024). This suggests that caregiving changes how time is used inside the family mothers are more likely to take on unpaid care work and reduce their market work, while fathers might work more to make up for it. From the family's perspective, this reallocation of time is important because it shows how childhood disability can cause economic challenges even when there are not high direct medical costs. The loss of a mother's working time is a big cost of caregiving, especially in countries where jobs are informal, income depends on how many hours are worked, and government help with care services is limited. So, to understand the total economic impact of childhood disability, there is a need to look at not just the costs of healthcare and rehabilitation, but also the opportunities that are lost when parents, especially mothers, cut back on paid work to care for their children. This pathway between caregiving and household well-being shows how reducing work and earnings can lead to more poverty, less investment in education and health, and less ability to handle future economic problems.

Moreover, several empirical studies have examined on the effect of intersectional modifiers on the welfare. The severity of the labour-market penalty is greatly influenced by socioeconomic status, and household structure. Studies have indicated lower levels of maternal education and skills often lead to greater disconnection from the workforce, while higher educational levels offer better access to flexible jobs, higher earnings, and positions that can support caregiving responsibilities, making education a key protective factor (Komorowska & Kozłowski, 2023; Vinck & Brekke, 2020). Single-parent households face more significant challenges because they must manage heavy caregiving duties while also being the sole provider for the household (Vinck & Van Lancker, 2020). In Norway, native-born mothers are more likely to stay connected to the labour-market through long-term sickness benefits, whereas immigrant mothers often have less stable employment history and less access to welfare support. As a result, when caregiving responsibilities increase, immigrant mothers may experience a higher risk of losing income or leaving the workforce entirely (Reisel et al., 2021). These findings suggest that the cost of caregiving is not the same for all households but varies based on mothers' skills, family structure, and access to social protection systems.

Furthermore, several empirical studies have discussed on productivity losses and care-work trade-offs in developing countries context those study discusses beyond the direct costs of care, research on the cost-of-illness shows that indirect costs, such as losses in parental productivity and missed earnings over a lifetime, play a major role in the economic impact of childhood developmental conditions like Autism Spectrum Disorder and Cerebral Palsy (Kosherbayeva et al., 2025; Liao & Li, 2020; Rogge & Janssen, 2019). These costs happen when parents cut back on work hours, quit their jobs, turn down opportunities, or stop advancing in their careers due to the heavy demands of caregiving. The effects of this go beyond a family's current income and include lost future earnings, fewer social protections, and reduced retirement benefits (Roos et al., 2024).

This burden is especially heavy in low- and middle-income countries, where there are few affordable options like formal respite care, childcare, disability support, or flexible work arrangements. In these areas, families often have to choose between earning money and providing care for a child (Asuman et al., 2021; Kamaralzaman et al., 2018). Evidence from rural Tanzania shows how this works: caregiving can limit parents' ability to work in agriculture and other income-generating jobs, leading to lower household earnings, less spending, and more poverty. This can get worse if caregiving causes family problems, like fathers leaving the home (Castellani et al., 2022, 2022; Mfilinge, 2022). Similar findings from Ghana show the size of this impact: when you include the costs of caring for someone with a disability along with reduced work participation, the percentage of households in poverty rises from 38.5% to 52.9% (Asuman et al., 2021). All this shows that the economic effects of childhood disability should not be measured only by medical costs. Time spent caregiving is a valuable resource for the household, and when it's taken away from paid or unpaid work, it leads to significant labour-market disruptions. This is especially true in Tanzania, where many families rely on informal or self-employment. Even small decreases in working time can mean big drops in income and household spending. Therefore, looking at the labour-market disruptions of caregiving is crucial to understanding how childhood disability affects household well-being and multidimensional poverty.

Methodology

Study Design and Approach

This study employed a cross-sectional survey design and quantitative approach because it enabled collection and estimation associations between caregivers' labour-market adjustments and household deprivation index at one point in time.

Study Area and Population

The study was conducted in Dar es Salaam, Kilimanjaro and Shinyanga in Tanzania, these regions represented varying levels of disability prevalence. The inclusion of regions with differing disability prevalence provided an opportunity to examine the caregiver labour-market adjustment when raising a child with developmental disabilities. Basing on Population and Housing Census URT, (2022) the total

estimated target population in three regions is 1,085,088 households; Kilimanjaro (283,876), Dar es Salaam (602,978) and Shinyanga (198,234). Caregivers, including both biological and non-biological caregivers, constituted the unit of analysis because they were considered the most appropriate respondents for providing information on the labour-market adjustments and welfare deprivation.

Sampling, Sampling Strategies and Data Collection

Using Cochran's (Cochran, 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, with households subsequently selected through simple random sampling. Allocation of sample size was proportionally across Dar es Salaam, Kilimanjaro and Shinyanga. The study included biological and non-biological primary caregivers of children aged 5–17 years with confirmed developmental disabilities, including cerebral palsy, autism, Down syndrome, and related impairments. Participants provided informed consent, while non-primary caregivers and ineligible individuals were excluded. Data were collected from January 2026 to April 2026 by enumerators using questionnaire installed in Kobo tool, administered in English and Swahili language, and pilot study was conducted in Kilimanjaro.

Table 1: Sample Size Proportion of Household 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**

Source: *Researcher 2026*

Analytical Justification for Sample Flow

The table 2 presents the sample selection procedure for the two-stage estimation framework, illustrating how the initial sample of 385 households for the probit model and subsequently were reduced to 144 observations for the second stage Tobit estimations, based on the reported services access.

Table 2: Sample Flow

Stage	N	Notes
Full survey sample	385	All caregivers interviewed across three regions
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 the second-stage bounded Tobit model

Source: Survey data (2026)

Measurement and Operationalisation of Research Variables

The multidimensional poverty index (MPI) was developed using the Alkire-Foster counting approach, which considers three equally weighted dimensions: education, health, and living standards (Alkire & Foster, 2011). Household deprivation was coded as 1 when deprivation occurred in a particular dimension and 0 otherwise. The composite MPI score was obtained by calculating the arithmetic mean of the three deprivation indicators. Consequently, the index ranged from 0 to 1, where 0 indicated no deprivation and 1 represented deprivation across all three dimensions.

Table 3: Study variables and their details

Variable	Definition and measurement	Initials
Multidimensional Poverty	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
Access to Service	Access was measured as a binary outcome (1 = access to all essential services; 0 = otherwise), based on caregiver responses to a structured set of questions	A
Exit from work	Measures whether the primary caregiver stopped engaging in paid employment or self-employment because of the additional caregiving responsibilities associated with the child's developmental disability. 1 = Yes; 0 = No	ExitWork
Reduced working hours	Measures whether the caregiver reduced the number of hours spent in paid employment or self-employment because of caregiving responsibilities. 1 = Yes; 0 = No	RedHours
Reduced labour productivity	Measures the extent to which caregiving responsibilities interfere with the caregiver's ability to perform work effectively, maintain concentration, meet work targets, or complete assigned tasks. 1 = Yes; 0 = No	RedProd
Gender of caregiver	Binary variable equal to 1 for male caregiver and 0 for female caregiver. Binary classification (1 = male-caregiver, 0 = female-caregiver)	Gender
Child's Age	Age of the child with a disability, measured in years	ChildAge
Household Size	Total number of household members	HHSize
Education	Caregiver education status captured via dummy variables (primary, secondary, tertiary), relative to no formal education (reference category)	Educ
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

Model Specification

Because access to disability-related services which caregivers provide for their children with developmental disability such as medical and educational was not universal among sampled households, using the entire sample to estimate the relationship between service-related costs and multidimensional poverty could produce biased estimates. Households that reported zero costs may not necessarily have incurred no costs; rather, they may have been unable to access the relevant services. To account for this potential selection problem, the study employed a two-stage modelling approach. In the first stage, a Probit model was estimated using the sample of 382 households to identify factors associated with access to disability-related services. In the second stage, separate bounded Tobit models were estimated for the 144 households, with the household Multidimensional Poverty Index (MPI), ranging from 0 to 1, specified as the dependent variable. The Tobit model was considered appropriate because the MPI is bounded at both limits, with observations concentrated at 0, representing no deprivation, and 1, representing complete deprivation. Under such bounded outcomes, ordinary least squares may produce inefficient or biased estimates because it does not adequately account for observations at the limiting values. The Probit model was therefore specified as follows;

The first stage model: Probit Model

$$\begin{aligned} \mathrm{P}(A_i = 1|\boldsymbol{Z_i}) = \ & \Phi(\gamma_0 + \gamma_1 Gender_i + \gamma_2 \mathrm{MarStatus}_i \\ & + \gamma_3 \mathrm{Employ}_i + \gamma_4 \mathrm{Education}_i \\ & + \gamma_5 \mathrm{HHSize}_i + \gamma_6 \ln(\mathrm{Income_i})_i \\ & + \gamma_7 \mathrm{DisabType}_i + \gamma_8 \mathrm{ChildAge_i}_i \\ & + \gamma_9 \mathrm{DisabBirth}_{i_i} \ldots\ldots (1) \end{aligned}$$

The vector $\boldsymbol{Z_i}$ contains all household and child-level determinants of perceived access, including caregiver gender, marital status, employment status, the natural logarithm of household income, household size, education level of the caregiver, child age, disability type, medical condition, and whether the disability has been present since birth.

The second stage model: Tobit Model

The model is captured through three binary indicator variables measuring the caregiver's labour-market adjustment: complete labour-market exit, reduced working hours (partial adjustment), and reduced labour productivity (self-reported decline in work performance while remaining employed).

$$\begin{aligned} MPI_i^* = \ & \beta_0 + \beta_1 Gender_i + \beta_2 ChildAge_i + \beta_3 HHSize_i \\ & + \beta_4 MarStatus_i + \beta_5 DisabType_i \\ & + \beta_6 MedCond_i + \delta_1 Exitwork_i \\ & + \delta_2 RedHours_i + \delta_3 RedProd_i \\ & + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2) \end{aligned}$$

where $\mathrm{ExitWork_i}$, $\mathrm{RedHours_i}$, and $\mathrm{RedProd_i}$ are binary variables equal to 1 if the caregiver reports having completely exited the labour-market, reduced working hours, or experienced reduced labour productivity due to caregiving responsibilities, and 0 otherwise. The coefficient δ_1 on exit from work is of primary theoretical interest, as complete labour-market exit represents a total elimination of the household's primary earned income stream, which the household production theory identifies as the most severe form of labour- market disruptions imposed by caregiving.

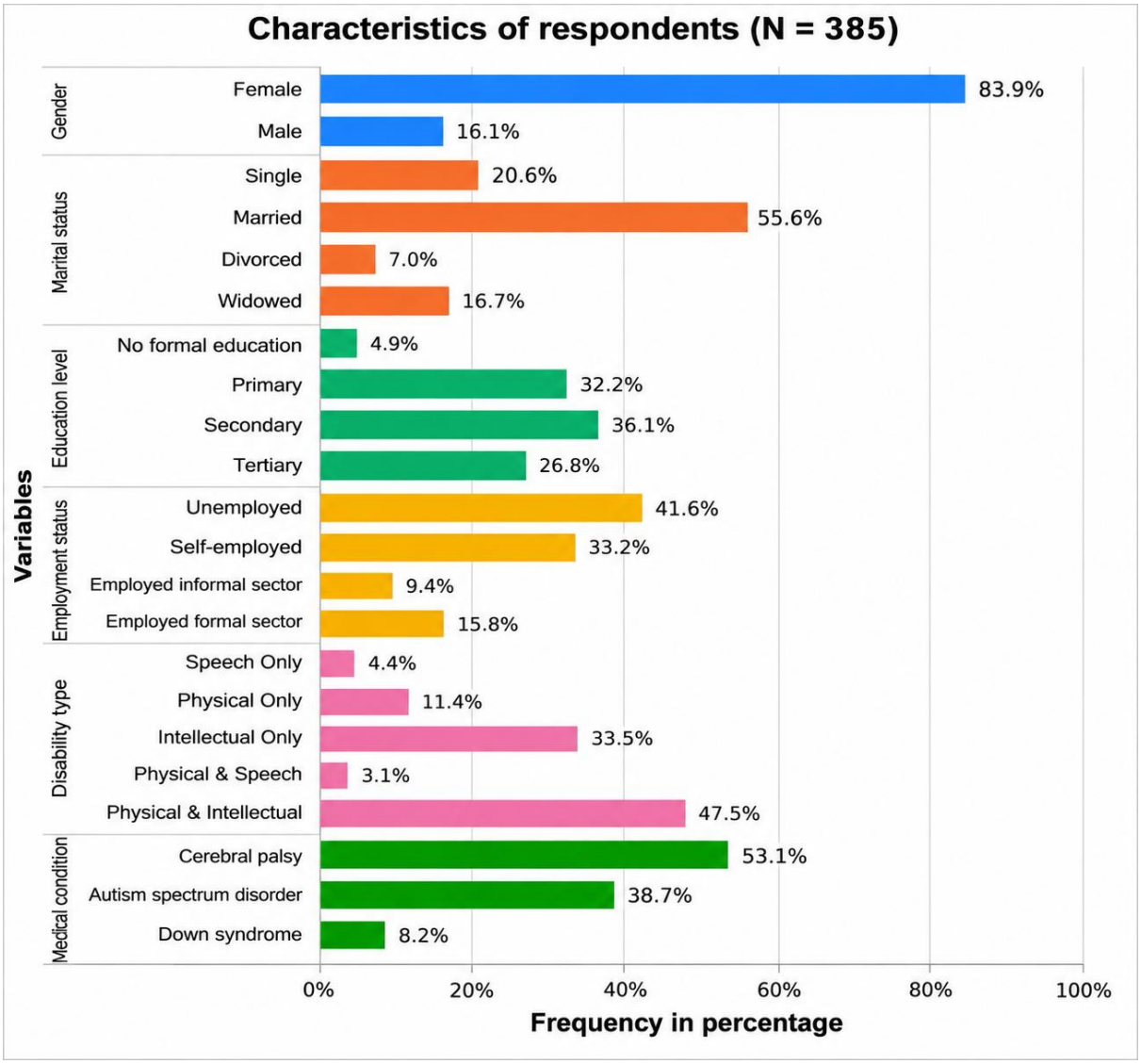
Findings

This section presents the study findings on the relationship between caregiving labour-market adjustments, and multidimensional poverty among families raising children with developmental disabilities in Tanzania. It begins with descriptive statistics, followed by Probit regression results on access to disability related services and bounded Tobit estimates examining the associations between labour-market disruptions and household multidimensional poverty.

Descriptive Results

The section of descriptive represents analysis summarises the socioeconomic characteristics of the respondents and the clinical profile of the children and caregiving characteristics of the 385 respondents. The descriptive results are in figure 1, these findings also provide the basis for interpreting the subsequent econometric analysis of the relationship between caregiving labour-market adjustment and multidimensional poverty.

Figure 1: Socio-Demographic Distribution of Respondents



The socioeconomic results from figure 1 shows that the sample is mostly composed of women, with 83.90% of respondents being female compared to 16.10% male, which reflects the key role women play as caregivers in families with children who have developmental disabilities. Over half of the participants, or 55.61%, were married, while 20.63% were single and 16.71% were widowed. In terms of education, the majority had at least primary schooling, with 36.10% having secondary education and 26.75% holding tertiary qualifications. Employment opportunities were limited, as 41.56% were unemployed, 33.25% were self-employed, and only 15.84% had formal employment. These findings point to possible economic challenges and a heavy dependence on informal sources of income. Furthermore, the results from data indicate that physical and intellectual disabilities combined were the most prevalent category (47.53%), followed by intellectual disability alone (33.51%). Regarding medical conditions, cerebral palsy was most common (53.05%), followed by autism spectrum disorder (38.73%) and down syndrome (8.22%). This indicates substantial variation in disability characteristics.

Diagnostic Test

To assess the reliability of the bounded Tobit regression results post-estimation diagnostic tests were performed. The analysis examined multicollinearity, heteroskedasticity, and model specification using the RESET test to evaluate potential violations of key model assumptions.

Ramsey Regression Specification Error Test (RESET)

The Ramsey RESET test was used to assess potential functional-form misspecification in the labour- market disruptions model. The test produced a p-value of 0.383, exceeding the 10% significance level. Therefore, the null hypothesis of correct specification cannot be rejected, suggesting no statistically significant evidence of functional-form misspecification. The linear-in-parameters specification was consequently retained without adding quadratic terms.

Table 4: Ramsey RESET Specification Test for Tobit Functional Form

Test Component	Coefficient	Robust Std. Err.	t-stat	p-value
Squared Fitted Values (hatsq)	-0.453	0.518	-0.87	0.383

Heteroskedasticity Test

The heteroskedasticity test was conducted because labour-market adjustments and multidimensional poverty index may vary considerably across households. For the labour-market disruptions model, the information matrix test yielded a p-value of 0.0018, rejecting the assumption of constant error variance. Consequently, Huber–White robust standard errors were applied to improve the reliability of standard errors, p-values, and statistical inference under heteroskedasticity. Note that robust standard errors address inference rather than correcting potentially biased coefficient estimates.

Table 5: Cameron & Trivedi's Decomposition of IM-Test for Heteroskedasticity

Source	Chi-square (χ^2)	df	p-value
Heteroskedasticity	97.02	60	0.0018
Skewness	12.84	10	0.2325
Kurtosis	0.03	1	0.8635
Total	109.89	71	0.0021

Multicollinearity Test

The VIF test was conducted because caregiving time and related labour-market disruptions may be correlated across households. However, all explanatory variables recorded VIF values below 5, indicating that multicollinearity was not a serious concern. Therefore, the variables were retained in the labour- market disruptions model, as the results suggest that collinearity was unlikely to substantially affect the stability of the estimated coefficients.

Table 6: Variance Inflation Factor

Variable	VIF	1/VIF
care_Exit_work	2.12	0.471953
care_reduced_hours	1.79	0.558799
cope_informal_credit	1.71	0.58571
care_reduced_productivity	1.63	0.615208
medical_condition_rec	1.49	0.671275
child_age_clean	1.39	0.717304
disability_type	1.33	0.751939
marital_status	1.2	0.830239
Gender	1.16	0.865046
Numberofhouseholdmembers	1.05	0.956516
Mean VIF	**1.49**	

Regression and Discussion of the Results

This section outlines a two-stage empirical framework examining the relationship between caregiving burdens, and household MPI in Tanzania. Drawing on Cragg, (1971), the framework combines a first-stage Probit model with four bounded Tobit models. This sequential approach distinguishes service-access decisions from welfare outcomes, recognizing that households must access relevant services before associated disability-related expenditures can influence welfare of the caregiver.

The First Stage Model Results

The first stage estimates the probability of households reporting joint access to disability related services for children with developmental disabilities. Using a Probit model with 382 observations, marginal effects identify socioeconomic and disability related factors associated with the likelihood of joint services access in Tanzania. The table 7 present the first stage model results of the probit model.

Table 7: Probit Model of Perceived access

Perceived Access (n=382)	**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%

Source: Authors' Compilation, (2026)

The probit model results (n=382) indicate that perceived access is significantly associated with caregivers' gender, employment status, household characteristics, and the child's disability type. Male caregivers were 13.1 percentage points more likely to report perceived access than female caregivers (p=0.031). Similarly, formal-sector employment increased the likelihood of perceived access by 17.3 percentage points relative to unemployment (p=0.033). Household size and log household income had positive and statistically significant effects (p=0.002), suggesting that larger and wealthier households were more likely to perceive access. Conversely, households caring for children with both physical and intellectual disabilities were 32.6 percentage points less likely to report perceived access than those with speech-only disabilities (p=0.004). Marital status, education, other disability categories, child age, and disability onset were not statistically significant. The findings collectively suggest that, perceived access appears strongly influenced by socioeconomic circumstances and disability complexity.

Second Stage: Tobit Model

The second stage examines multidimensional poverty index (MPI) among households' caregiving children with disability. The bounded Tobit models assess how labour-market disruptions affect the household's welfare. Since MPI ranges from 0 to 1, with higher values indicating greater deprivation, OLS may produce biased estimates and invalid predictions outside this range. The bounded Tobit model, estimated by maximum likelihood, accommodates the distributional limits and retains all 144 observations, including boundary cases, providing more appropriate estimates of the relationship between labour-market disruptions and multidimensional poverty.

Table 8: Second Stage Tobit Model: Labour– Market Disruptions and MPI

Variable	Coefficient	Robust Std. Error	p-value
Gender			
Male caregiver (Ref: Female)	-0.184**	0.07	0.01
Child Age	-0.001	0.01	0.946
Household Size	-0.033*	0.019	0.079
Marital Status (Ref: Single)			
Married	-0.007	0.089	0.936
Divorced	0.007	0.109	0.951
Widowed	0.061	0.088	0.491
Disability type (Ref: Speech Only)			
Physical Only	0.12	0.121	0.321
Intellectual Only	0.239**	0.094	0.013
Physical & Speech	0.206	0.158	0.194
Physical & Intellectual	0.403***	0.100	0.000
Medical Condition (Ref: Cerebral Palsy)			
Autism Spectrum Disorder	0.182**	0.071	0.011
Down Syndrome	0.169*	0.091	0.065
Labour-Market adjustments			
Exit Work	0.170***	0.058	0.004
Reduced Working Hours	0.016	0.064	0.806
Reduced Labour Productivity	0.059	0.058	0.313
Constant	-0.004	0.177	0.982
Number of Observations (n)	144		
F (16, 128)	3.60		
Prob > F	0.000		

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

Source: Authors' Compilation, (2026)

The main finding of the study is the behaviour of the three labour- market disruptions variables, and their differing impacts are crucial. Households where a caregiver stops exit from work participation experience is associated with a 0.170 unit increase in the latent household multidimensional poverty index, holding other factors constant, and this effect is statistically significant at the 1 percent level (p = 0.004). In contrast, reduced working hours (0.016; p = 0.806) and reduced labour productivity (0.059; p = 0.313) are not statistically different from zero. The cause of multidimensional poverty is not the level of work reduction but the extent of it: households that maintain some level of labour force participation seem better able to manage care demands within their existing budgets, while those that fully or nearly fully withdraw from work do not. This aligns with the idea that when care demands require full-time attention, the caregiver cannot convert human capital into income an absolute loss of primary income rather than a smaller reduction in discretionary income. This finding also supports previous evidence showing that health shocks lead to poverty mainly through non-participation in the labour force rather than through direct costs of illness, accounting for 9.9% of the total effect after two years (Kim, 2022). In these models, indirect costs are measured through indicators like labour income, working hours, number of working household members, and labour force participation, with non-participation defined as no household member engaging in labour-market activities.

The severity and type of the child's impairment are strong indicators of household deprivation. Compared to children with speech impairment only, households with children who have intellectual impairment alone score 0.239 points higher (p = 0.013), and those with children who have both physical and intellectual impairments score 0.403 points higher (p = 0.000) the largest coefficient in the model. Physical impairment alone (0.12; p = 0.321) and combined physical and speech impairment (0.206; p = 0.194) are not statistically significant at standard levels.

The pattern suggests that cognitive impairment, especially when combined with physical impairment, is most strongly linked to household poverty. This is likely because it implies lifetime supervision needs that are least likely to be replaced by formal services. This aligns with evidence from Uganda, which shows that severe impairments come with an average cost increase of USD 358 compared to mild or moderate impairments (Katumba et al., 2023). It also matches qualitative findings from Handeni, where children with profound physical and cognitive disabilities needed constant care and supervision, leading to reduced income for families and in some cases, the sale of assets such as a house to survive (Castellani et al., 2022).

There are also specific effects linked to the type of condition. Households with children who have autism spectrum disorder score 0.182 points higher on the poverty index than those with children who have cerebral palsy (p = 0.011), while households with children who have Down syndrome score 0.169 points higher (p = 0.065).This difference is significant because the costs associated with autism, such as rehabilitation, behavioural therapy, and specialized education, form the largest part of family expenses (Zhao et al., 2023).This suggests that conditions requiring frequent private service purchases create a unique burden on families, which is not captured in the same way by cerebral palsy.

The gender of the caregiver is strongly linked to household poverty. Households with a male caregiver have a 0.184-point lower score on the multidimensional poverty index compared to those with a female caregiver (p = 0.01). Given that the reference group is female, this highlights the greater economic burden faced by female caregivers, which is consistent with findings from Tanzania that show family relationships are most affected when mothers are abandoned by fathers. In Kilimanjaro, most of families reported income loss and noted weaker family relationships (Joel et al., 2018; Swai et al., 2024).

Larger household size is associated with lower poverty scores, with each additional family member reducing the score by 0.033 points (p = 0.079). This correlation, though only statistically significant at the 10% level, suggests that having more people in the household may lead to better consumption efficiency and more potential income sources, which can help offset the loss of a caregiver's income. However, child age (-0.001; p = 0.946) is not statistically significant, indicating that the poverty impact is not driven by the child's stage in life but rather by the caregiving demands and the household's ability to manage them.

Marital status does not show a significant association with multidimensional poverty compared to single caregivers. Married (-0.007; p = 0.936), divorced (0.007; p = 0.951), and widowed (0.061; p = 0.491) households all fall within normal confidence intervals. This null result is important because it implies that poverty is more likely linked to the labour loss from caregiving rather than the status of the caregiver's relationship. It also suggests that marriage alone does not protect households from the poverty effects of caregiving demands.

Overall, the results show that multidimensional poverty in Tanzanian households with children who have developmental disabilities is primarily driven by three factors: the complete or extensive withdrawal of a caregiver from work, the presence of intellectual impairment, especially when combined with physical impairment, and the specific medical condition of the child. Caregiver gender and household size have secondary but detectable effects, whereas marital status, child age, informal credit use, and the intensive margin of work reduction do not. The model's explanatory power, statistical significance, and diagnostic performance support these findings, and the results clearly

position the poverty process at the point where caregiving demands lead to a caregiver entirely leaving the workforce.

This suggests that caregiver exit from the labour-market represents a serious breakdown in household financial stability. The results are aligned with those of (Rennane, 2020) who found that informal family assistance acts as critical safety net for people with disabilities, with disability benefits increasing family assistance by 7%. Similar (Van Goethem et al., 2023) found that family caregivers share care responsibilities, with some caring for up to 6 disabled household members, allowing other family members to pursue other economic opportunities

Conclusion and Recommendations

The study concludes that household multidimensional poverty among families raising children with developmental disabilities in Tanzania is associated with caregivers' labour-market participation, the characteristics of the child's disability and household socioeconomic circumstances. The first-stage Probit results demonstrate that male caregiver status, formal-sector employment, larger household size and higher household income are positively associated with the likelihood of accessing disability-related medical and educational services. Conversely, households raising children with combined physical and intellectual impairments are significantly less likely to report joint access to these services, highlighting potential inequalities in service accessibility. The second-stage bounded Tobit results establish that complete caregiver withdrawal from employment is positively and significantly associated with household multidimensional deprivation, while reduced working hours and reduced labour productivity show no statistically significant relationships. This suggests that complete exit from work from income-generating activities represents a particularly important economic vulnerability for households managing intensive caregiving responsibilities. Furthermore, intellectual impairment, especially when combined with physical impairment, is associated with substantially higher household deprivation. Autism spectrum disorder and down syndrome are also associated with higher deprivation relative to cerebral palsy, although the association for down syndrome is statistically significant only at the 10% level. Male caregiver status is associated with lower multidimensional poverty, while larger household size demonstrates a weak negative association with deprivation. In contrast, child age and caregiver marital status do not exhibit statistically significant relationships with household MPI. General, the findings demonstrate that the economic burden of childhood developmental disability extends beyond direct disability-related expenditures to include caregivers' lost opportunities for labour-market participation and unequal access to essential services. The study therefore suggests the need for integrated disability-responsive policies that strengthen access to affordable services, promote flexible employment arrangements, expand community-based respite care and provide targeted social protection and livelihood support, particularly for female caregivers and households raising children with more complex impairments. Such interventions are important for protecting household income, sustaining caregivers' economic participation and reducing multidimensional deprivation among vulnerable households in Tanzania.

Limitation and suggestions for Future Research

This study has several limitations that should be considered when interpreting its findings. First, the cross-sectional design limits causal interpretation, as the relationship between household poverty and caregivers' labour-market adjustments may involve reverse causality. Second, self-reported binary measures of employment adjustments may be affected by recall and social-desirability bias and fail to capture their duration and intensity. Third, disability classifications are relatively broad, while small subgroups may reduce the precision of estimates. Lastly, the study covers only three regions of Tanzania, limiting the generalisability of its findings to other settings. Future research should employ longitudinal designs to establish causal relationships between caregiving responsibilities, labour-market participation and household welfare. Further studies could incorporate time-use data to quantify unpaid caregiving and productivity losses, expand geographical coverage, and include larger samples across different disability categories.

Ethical Consideration

The study obtained ethical clearance from the Tanzania Commission for Science and Technology (COSTECH) before data collection, authorising research activities in Dar es Salaam, Shinyanga, and Kilimanjaro regions (Permit No. CST00001636-2025-2026-00083). Ethical considerations were observed throughout the research process. Participants, comprising parents and primary caregivers of children with developmental disabilities, were informed about the study's objectives, procedures, voluntary participation, and their right to withdraw at any time without consequences. Oral informed consent was obtained from all participants before data collection. Confidentiality and privacy were ensured by excluding personal identifiers from research records, securely storing questionnaires and electronic data, and restricting access to authorised research team members. Furthermore, findings were reported in aggregated form to prevent the identification of individual participants, households, or children. Although the study focused on households raising children with developmental disabilities, data were collected exclusively from parents and primary caregivers, with no direct interviews or research procedures involving the children.

Author Contribution and AI-use Disclosure

All authors contributed to the study, authors conceptualised the study, creating the research methods, gathering the data, analysing the results, and writing the initial draft of the paper. Both authors approved the final version of the manuscript and agreed to take responsibility for all parts of the work. AI tools were used for language editing, grammatical improvement, and enhancing manuscript clarity. It was not used for data analysis, coding, or preparation of figures and tables. The authors reviewed all AI-assisted contributions and take full responsibility for the accuracy and integrity of the final manuscript.

Data Availability

The data are not publicly available because they contain sensitive information about households; they are available from the corresponding author on reasonable request, subject to ethical approval.

Conflict of Interest

Authors declare no conflict of interest.

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