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Parental Disability and Children's Educational Outcomes: Evidence from Tanzania

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Abstract

This paper examines the relationship between parental disability and children's educational outcomes in Tanzania. This paper uses data from the 2010–2011 and 2014–2015 waves of the Tanzania National Panel Survey (TNPS) and a fixed effects estimation approach. The findings of this paper show that parental disability is associated with children being less likely to enrol in school and pass examinations. Also, we find a negative association between parental disability and the hours that children spend on their studies. However, we find no statistically significant association between parental disability and grades completed by children. We identify higher medical expenditures, lower educational expenditures and higher hours spent collecting firewood and fetching water as the potential mechanisms through which parental disability is negatively associated with children's educational outcomes.

Keywords: Parental disability, children's educational outcomes, Tanzania

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1 Introduction

The education of children is often referred to as a means to end intergenerational inequality (UNICEF, 2016). Despite the paramount importance of education in a child's development, many children around the world are denied the right to education for multiple reasons, including poverty, disability and gender (UNICEF, 2016). In drawing out disability as one of the reasons for children being denied education, statistics from around the world infer that children with disabilities are less likely to be enrolled in schooling than children without disabilities, and adults with disabilities have a lower educational attainment (Mitra, 2018; Mizunoya, Mitra, & Yamasaki, 2018; Mont & Nguyen, 2013; Moodley, 2017; World Health Organization – World Bank, 2011).

It is documented that deprivations in education have detrimental effects on human development, as low levels of education result in decreased levels of employability and earning potential later in life (Awan, Malik, Sarwar, & Waqas, 2011; Grech, 2016). Access to quality education is part of the Sustainable Development Goals (SDG 4) wherein disability is recognised as one of the factors that hinders education.

However, in low- and middle-income countries, experiences of poverty further compound the difficulties in accessing education. These experiences include shortages of water, sanitation and nutrition that result in poorer educational outcomes for children (UNICEF, 2016). What is less prevalent in the literature is the potential impact of parental disability on children's education. To the best of our knowledge, other than the research conducted by Mont and Nguyen (2013) in Vietnam, the relationship between parental disability and children's educational outcomes has been understudied. It is for this reason that we undertake such an investigation in Tanzania. The aim of this study is to examine the association between parental disability and children's educational outcomes. In addition, the study aims to unpack the potential channels through which parental disability affect children's educational outcomes.

In the analysis of the relationship between parental disability and children's educational outcomes, it has been shown that a parent's disability could limit their ability to generate livelihoods (Mont & Nguyen, 2013). In instances where parents are not able to provide financially, households in the developing world are likely to sustain themselves by foregoing children's education, since children are relied on to earn additional income (Beegle, Dehejia, & Gatti, 2004). In Tanzania, approximately 25% of the school aged child population was out-of-school in 2015 (UNICEF & UNESCO, 2018). The reasons for this high rate of out-of-school children included, amongst others, child labour, finding school uninteresting and failing grades. Other important elements that affect children's educational achievements are the educational levels of parents and the child's gender (Glick & Sahn, 2000). In Vietnam for instance, gender differences are evident where parents have a disability, as girls are more likely to take on care activities of their parents, while boys are more likely to be working (Mont & Nguyen, 2013).

With the SDGs highlighting the importance of ensuring inclusivity and equality in education (Jamieson & Richter, 2017; United Nations, 2018), aspects of a child's life that either deter or contribute to the goal of inclusive and equal education require attention. In this paper, the relationship between parental disability and children's educational outcomes is therefore considered. Before we explore this element further, we need to understand the context of disability in Tanzania.

2 Country Context and Related Literature

2.1 Disability in Tanzania

Policies to aid persons with disabilities were previously focused solely on employment opportunities (Mesaki, 2016) until the turn of the century, when the first large scale data pertaining to disability in Tanzania were collected in 2002. Questions on disability in the 2002 census aimed to seek whether individuals self-identified with a disability in the following categories: physically handicapped/leprosy, visually impaired, dumb, hearing/speech impaired, albino, mentally handicapped and multiple handicapped. The data relating to these questions yielded an initial prevalence of disability in Tanzania of 2% (Mesaki, 2016).

Subsequently, and in line with global developments, Tanzania adopted the view of disability outlined in the *United Nations Convention on the Rights of Persons with Disabilities* (United Nations, 2006). The *Persons with Disabilities Act of 2010* (United Republic of Tanzania, 2010) incorporated an updated definition of disability to identify disability as “impairments, activity limitations and participation restrictions” (World Health Organization – World Bank, 2011, p.4). In addition to adequately defining disability, the *Persons with Disabilities Act* moved away from a focus on employment alone for persons with disabilities to include the many areas in which the rights of persons with disabilities were compromised. These included education, health, employment, respect and accessibility, to name a few (United Republic of Tanzania, 2010). The Act also entitled persons with disabilities to social protection in the form of affordable services, poverty reduction strategies, grants and public housing (Mesaki, 2016). These rights are encompassed in the SDGs. Furthermore, with improved measures of disability being used in Tanzania, Mitra (2018) estimated that the prevalence of disability amongst adults was 15%.

In terms of social protection for persons with disabilities in Tanzania, the National Social Security Fund (NSSF) is a contributory programme that covers workers and is the only formal entitlement for persons with disabilities in the country (Myamba, Mesaki, Walsham, & Blanchet, 2015). Through the “invalidity pension”, persons with disabilities get 30% of their average monthly income, in addition to “1% of the average earnings for every 12 months of members' contributions” (Myamba et al., 2015, p.11; “National Social Security Fund - Invalidity Pension,” 2017). However, this formal fund is only available to a small percentage of the working population in Tanzania and so informal and traditional social security mechanisms are also important.

The Tanzania Social Action Fund (TASAF), largely funded by the World Bank, is a means-tested conditional cash transfer available to all citizens in Tanzania that are identified as poor (United Nations, 2015). Myamba et al. (2015) indicated that the fund has always striven to include households of persons with disabilities, exempting them from the condition of having to attend school if the disability experienced prevents school attendance. However, the limited data on school enrolment of persons with disabilities and a limited focus on reasons for children's exclusion from schooling make it difficult to determine whether the TASAF is indeed making a positive impact on persons with disabilities.

In addition to the TASAF, the Community Health Fund (CHF), also supported by the World Bank, is an insurance scheme that stands to provide affordable health care to those living in rural areas (Myamba et al., 2015). Two shortcomings of the CHF are, first, unlike the TASAF, there is limited attention placed on the inclusion of persons with disabilities. Second, the CHF only covers between 5%–15% of the population while the TASAF sought to reach all households with high poverty levels.

It is one approach to focus on the direct effects on persons with disabilities and the limited social protection available in Tanzania. But it is also important to remember that persons with disabilities are part of families and communities. If a person with a disability is unable to work, often this responsibility falls on other members of the family (Grech, 2016; Mont & Nguyen, 2013). Therefore, this paper focuses on the association between parental disability and educational outcomes in Tanzania.

2.2 *Parental Disability and Children's Educational Outcomes*

Limited evidence exists on the relationship between parental disability and children's educational outcomes. Mont and Nguyen (2013) show that children are less likely to attend school if their parents have a disability. Their findings in Vietnam revealed that the impact of a parent's disability was dependent on the gender of both the parent and the child. The authors found that children had poorer educational outcomes if a mother had a disability and if the child was a boy. Largely, this was because boys were likely to take on the role of providing for the livelihood of the family.

A study in Guatemala by Grech (2016) reveals that children were forced to leave school if they resided in households where any of the parents experienced a disability. Moreover, gender differences in the education of girls and boys in Guatemala were reinforced since girls often married at a young age. Yet, as a result of extreme poverty, boys were also found to stop schooling prematurely. In households where a parent had a disability, children abandoned schooling due to the inability to afford education and the need for children to start working to support and feed their families.

In Brazil, Duryea, Lam, and Levison (2007) revealed that economic shocks arising from illness have consequences on the household's ability to afford education for children. A study in China also demonstrated that parental illness was found to have a negative impact on children's education. In total, 82% of children who had parents with illnesses were enrolled in school, compared to 88% of children

with healthy parents (Hannum, Sargent, & Yu, 2009). In South Africa too, links have been made between parent mortality and educational outcomes for children, where maternal deaths resulted in poorer educational outcomes for children and paternal deaths resulted in poorer socio-economic outcomes in households where children reside (Ardington & Little, 2016). Yet, despite the clear links between parental impairments and children's education, evidence is limited in developing countries on the relationship between parental disability and children's educational outcomes.

In Tanzania, Alam (2015) investigated the effects of parental shocks on child labour and educational outcomes. The author found that for children in Tanzania, a father's illness was associated with decreased school attendance. However, there was no association between a father's illness and child labour. Furthermore, a mother's illness did not affect child education and labour in Tanzania. Also, absent in Tanzania was the child gender differentiation in relation to educational outcomes.

Finally, the construct of disability itself is also contentious in the African context and is known to have a bearing on the educational achievements of children who have parents with disabilities. Stone-MacDonald (2012) highlights the belief in Tanzania that disability results from witchcraft and, in these instances, persons with disabilities and their households are ostracised from communities. Groce and McGeown (2013) demonstrated that these witchcraft beliefs keep some children from attending school and members of households within which a person with a disability resides are often isolated, rather than participating freely in society.

2.3 *The Human Development Model of Disability*

Globally, disability is a complex and contested phenomenon that is sometimes described as conceptually illusive (Mitra, 2018; World Health Organization – World Bank, 2011). Over time, the experience of disability has become disassociated from medical conditions and it is known, rather, to arise from an interaction between the environment and an individual that prevents full participation in society (Mont & Nguyen, 2013; World Health Organization – World Bank, 2011).

The human development model of disability, health and wellbeing (Mitra, 2018) is based on the capability framework pioneered by Amartya Sen (Sen, 1999). The unique language to the capability framework includes notions of functionings and capabilities. Robeyns (2003, 2017) clearly summarises the distinction between functionings and capabilities as being similar to the difference between an actual achievement and having the freedom to achieve something. While this framework can be applied solely to individuals, it also provides a useful lens that enables us to understand how the functionings and capabilities of family members (children in this study) are affected by the health deprivations of adults.

Thus, disability, drawing on the human development model, is defined as a “deprivation in terms of functioning amongst persons who experience health deprivations” (Mitra, 2018, p.13). Further, disability results from the interactions between resources, personal and structural factors and health deprivations (Mitra, 2018). Resources in this context may refer to goods and services while personal factors include age and sex. In addition, structural factors include social attitudes and the physical

environment, and, lastly, health deprivations refer to impairments (e.g., a deviation or loss of bodily functions in relation to sight) or health conditions (e.g., diseases and injuries). Since we acknowledge that disability is linked to limited opportunities, we argue in this paper that the limited opportunities are not solely experienced by persons with disabilities themselves. Therefore, the hypothesis we aim to test in Tanzania is that the educational achievements of children are also limited as a result of parental disability.

3 Data Source

Data used in this study are from the 2010–2011 (wave 2) and 2014–2015 (wave 4) of the Tanzania’s National Panel Survey (TNPS) which was conducted by the Tanzania’s National Bureau of Statistics in collaboration with the World Bank Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS-ISA) Project⁴. The TNPS is a nationally representative survey that collects detailed information on children and adult populations in relation to the characteristics of individuals, households and communities. Individual and household data include socio-economic characteristics, employment, education and labour market participation, health, income, consumption expenditure, assets, health status and income shocks (e.g., flood, drought, loss of employment, price increase, etc.). The primary reason for collecting such data was to be able to analyse poverty and quality of life of households in Tanzania.

3.1 Sampling

The sampling methods used in the 2010–2011 and 2014–2015 TNPS include a two-stage stratified sampling design (National Bureau of Statistics, 2017). In total, 26 regions across Tanzania were covered, ensuring that both rural and urban areas were adequately sampled. The sample used in our analysis was restricted to children between age 6 to 17 years since this age bracket corresponds to children in primary and secondary schools in Tanzania.

3.2 Outcome Variables

This study focuses on the following children’s outcome variables: school enrolment, highest grade completed, hours of study per week, and passed exams (for various ages and grades that sat for either Primary School Leaving Exam (PSLE) or form 4/form 6 exam (FIVE)). School enrolment is a binary variable that captures whether a child was enrolled in school or not. We identified children’s grade attainment under three groupings: (1) primary education, (2) secondary education, and (3) above secondary education. These variables are categorical and were used in the analysis to examine the relationship between parental disability and grade attainment. The “passed exam” variables were

⁴ We were unable to use wave 1 and wave 3 of the TNPS because information on disability status of household members was not provided in those waves.

aggregated from PSLE or FIVE. The exam scores are binary variables, indicating a pass or fail. The variable hours of study per week is a continuous variable denoting the number of hours that a child spends on studying in a week. The hours of study are recorded as zero when the child did not commit any time to studying in the past week.

3.3 *Disability Measure*

The 2010–2011 and 2014–2015 waves of the TNPS provide information on difficulties in six functional domains: hearing, seeing, walking, concentrating (cognition), communicating (understanding or being understood) and self-care (e.g., washing, dressing, feeding, toileting, etc.). The disability module is a short set questionnaire recommended by the United Nation’s Statistical Commission’s Washington Group on Disability Statistics (Madans, Loeb, & Altman, 2011), which is used in global and regional studies in order to move towards a more standardised and comparable way of estimating disability (Groce & Mont, 2017).

To elaborate, the Washington Group on Disability Statistics measure includes the following six related questions: difficulty in seeing (even if wearing glasses/lenses); difficulty in hearing (even if wearing hearing aid); difficulty in walking or moving around; difficulty in concentrating or remembering; difficulty in communicating; and difficulty in self-care. In the TNPS, for each activity limitation or difficulty, individuals could respond on a scale of 1–5 as follows: 1 – no, not at all, 2 – no, no difficulty with assistive device, 3 – yes, some difficulty, 4 – yes, a lot of difficulty, 5 – cannot perform. In this study, we consider a person to have a disability if he or she reports yes, a lot of difficulty or cannot perform, for any of the six questions above.

3.4 *Summary Statistics*

The mean difference in Table 1 presents the descriptive statistics of children’s outcomes and household’s characteristics by parental disability status (i.e., parents with and without disabilities). The descriptive statistics shows that 72% of children whose parents do not have a disability are enrolled in school, while 70% of children whose parents have a disability are enrolled in school. For the grade completion variable, children of parents without a disability are likely to complete more grades than children whose parents have any form of disability. Specifically, on average, children whose parents do not have a disability were reported to have completed an above secondary education grade, while children of parents with disabilities completed, on average, a secondary education grade.

Table 1: Mean differences of children's and household characteristics by parental disability status

Variables	Parent without disability	Parent with disability	Test $b_0-b_1=0$
Child characteristics			
School enrolment	0.723 (0.004)	0.703 (0.024)	0.019 (0.024)
Highest grade completed	2.520 (0.048)	2.225 (0.009)	0.295*** (0.055)
Passed exams	0.108 (0.002)	0.102 (0.016)	0.006 (0.016)
Hours of study per week	2.107 (0.292)	1.810 (0.044)	0.297 (0.263)
Hours spent collecting firewood	0.083 (0.004)	0.160 (0.038)	-0.078*** (0.027)
Hours spent fetching water	0.108 (0.004)	0.125 (0.022)	-0.018 (0.024)
Engaged in agric. activities	0.224 (0.005)	0.294 (0.029)	0.071*** (0.027)
Average age of child	11.197 (0.032)	11.317 (0.186)	0.119 (0.188)
Child disability	0.007 (0.001)	0.023 (0.008)	-0.015*** (0.004)
Boys-child	0.500 (0.004)	0.541 (0.026)	-0.041* (0.027)
Girls-child	0.499 (0.004)	0.459 (0.026)	0.040 (0.027)
Household characteristics			
Education expenditures	338465.4 (8635.858)	198169.5 (21549.44)	140295.9*** (49133.52)
Health expenditures	25204.64 (2706.446)	36416.25 (7887.386)	-11211.61 (15414.96)
Male head household	0.756 (0.004)	0.991 (0.005)	-0.234*** (0.023)
Household size	7.476 (0.036)	8.290 (0.221)	-0.814*** (0.208)
No. of children below 17 yrs	4.038 (0.023)	4.107 (0.153)	-0.069 (0.137)
No. of children above 17 yrs	3.191 (0.018)	3.950 (0.104)	-0.759*** (0.104)
Any household member hospitalised	0.256 (0.004)	0.313 (0.025)	-0.057** (0.023)

Note: *, **, and *** represent significance at 10%, 5% and 1% levels respectively.

Source: Authors' calculations based on 2010/11 and 2014/15 TNPS. We unable to use survey weight for the test of mean difference.

Further, about 11% of children whose parents do not have a disability were reported to have passed either PSLE or FIVE, while this statistic was lower (10%) for children whose parents had a disability. On the hours of study per week/homework, children of parents without disabilities committed more time to studying than their counterparts whose parents had a disability. Children of parents without a disability spent an average of 2.107 hours studying in the past week before the survey, while children

of parents with disabilities spent 1.810 hours studying during the past week. However, the difference in the hours of study is not statistically significant.

For some of the activities outside of school which children are likely to engage in, we identified hours spent collecting firewood or cooking fuels, fetching water, and other agricultural related activities. The descriptive statistics show that children whose parents have a disability spent more time or hours collecting cooking fuels, fetching water, and are more engaged in agricultural related activities compared to children of parents without a disability.

Table 2 presents the descriptive statistics of children’s educational outcomes and other activities by parental disability status and waves of the data (2010–2011 and 2014–2015). We found variations in the descriptive statistics of children’s outcomes by parental disability status and different waves of the data. From the 2010–2011 wave, the data showed that 76% of children whose parents do not have a disability were enrolled in school, while 73% of children whose parents have any form of disability were enrolled in school. Furthermore, where there is no parent with disability, the highest grade completed was above secondary education, and where parents do have a disability, children completed about a secondary level education. About 15% of children whose parents do not have a disability reported that they passed exams, while 11% of children whose parents have a disability passed exams. Children of parents without a disability spent more hours studying in the previous week compared to children of parents with a disability. But children of parents without a disability spent fewer hours collecting firewood and fetching water compared to children of parents with a disability.

From the 2014–2015 waves, the descriptive statistics revealed that 70% of children whose parents did not have a disability were enrolled in school, while 58% of children whose parents had a disability were enrolled in school.

Table 2: Children’s outcomes by parental disability status and survey waves

Variable	Wave 2010/11		Wave 2014/15	
	No parental disability	Parental disability	No parental disability	Parental disability
School enrolment	0.757 (0.005)	0.733 (0.027)	0.697 (0.006)	0.580 (0.048)
Highest grade completed	2.899 (0.006)	2.744 (0.027)	2.833 (0.005)	2.541 (0.035)
Passed exams	0.152 (0.020)	0.108 (0.003)	0.107 (0.004)	0.076 (0.026)
Hours of study per last week	1.801 (0.256)	1.341 (0.045)	3.311 (0.865)	2.427 (0.083)
Hours spent collecting firewood	0.082 (0.006)	0.168 (0.048)	0.083 (0.006)	0.142 (0.062)
Hours spent fetching water	0.091 (0.005)	0.117 (0.027)	0.127 (0.007)	0.142 (0.034)

Source: Authors’ calculations based on 2010/11 and 2014/15 TNPS. We unable to use survey weight for the test of mean difference.

For parents without disability, the highest grade completed by their children was above secondary education, and children of parents with a disability completed about a secondary level education. About 11% of children whose parents did not have a disability reported having passed exams, while 8% of children whose parents had a disability passed exams. Moreover, children of parents without a disability spent about three hours studying in the previous week, while children of parents with a disability spent two hours on their studies in the previous week. The descriptives also show that children of parents without a disability spend fewer hours collecting firewood and fetching water than children of parents with a disability.

From Table 3, without regard to the parents' disability status, the descriptive statistics showed that about 72% of children are enrolled in school and 11% passed either PSLE or FIVE. In addition, children spent an average of 1.8 hours per week studying and had completed secondary education, which is coded 2 in our data. The average age of children in our sample was 11 years, and about 50% of children are males.

Table 3: Summary statistics

Variables	Mean	Standard Deviation
School enrolment	0.722	0.447
Passed exams	0.107	0.310
Highest grade attainment	2.233	0.947
Hours of study per week	1.819	4.036
Average age of children	11.200	3.437
Gender of children (male=1)	0.501	0.500
Age of household head	47.914	13.071
Parental disability	0.030	0.170
Mother disability	0.010	0.104
Father disability	0.029	0.169
Male household head (=1)	0.764	0.424
Household size	7.500	3.815
Child disability	0.008	0.089
Number of children below 17 yrs	4.040	2.518
Number of children above 17 yrs	3.214	1.911
Household shocks (=1)	0.057	0.161
Household head formal education (=1)	0.760	0.427
Any household member hospitalised	0.258	0.437
Child age 6–10	0.443	0.496
Child age 11–14	0.317	0.465
Child age 15–17	0.240	0.427
Education expenditure	334236.3	897732.3
Health expenditure	25542.6	281557.1
Observations	11,412	

Source: Authors' calculations based on 2010/11 and 2014/15 TNPS. Survey weight used for the descriptives.

For other household's characteristics used in our analysis, the average age of household head was about 48 years old and 76% of household heads were males. In addition, 3% of parents reported

having at least one form of disability. About 1% of mothers in the households reported at least one form of disability, while 3% of fathers reported at least one form of disability.

4 Estimation Method

The estimation of the relationship between parental disability and children's educational outcomes using a simple linear regression model is likely to be fraught with endogeneity of parental disability due to unobserved variables that might affect both parental disability and children's educational outcomes, and hence could cause bias in the results. In order to address the endogeneity problem, this paper uses a fixed effects model to estimate the relationship between parental disability and children's schooling outcomes (school enrolment, grade completion, passed exams and hours of study).

The use of fixed effects estimation approach allows us to control for time invariant child unobserved heterogeneities and time-invariant unobserved characteristics or factors that might affect both parental disability and children's educational achievements.⁵ To investigate the relationship between parental disability and child education, we consider the fixed effects regression equation below:

$$Y_{it} = \alpha_i + X_{it}\beta + \varphi D_{it} + \delta_t + \varepsilon_{it} \quad (1)$$

where Y_{it} represents schooling outcomes for child i at time t , D_{it} is the dummy that indicates the disability status of the household head at time t .⁶ The parameter of interest D_{it} captures the association between parental disability and children's educational achievements. X_{it} is a vector of control variable, including both child's and household's characteristics that can affect children's schooling outcomes at time t . Moreover, α_i is child's fixed effects, δ_t is year fixed effect, and ε_{it} is an idiosyncratic individual error term. The model includes a set of control variables such as household size, number of children below 17 years in the household, household head age, household head attended formal education, child's age, child's gender, and household affected by shock (such as drought, flood, illness, livestock loss, business failure, etc.), and dummy for child's disability. **Standard errors are clustered at the household level in all the regressions which correct for within-cluster correlation or heterogeneity.**

In a fixed effects model, a causal interpretation is based on the assumption that the time-dependent error term is independent of changes in parental disability, conditional on the regressors included in the model and on the child fixed effect (Wooldridge, 2010). This assumption will be tenuous if there are unobserved yearly random shocks that affect parental disability and children's educational

⁵ We used the xtreg command in Stata.

⁶ We used disability information of household heads for each of the survey waves or rounds. Multiple responses of household head from each household are not common in the TNPS because each respondent provided information on relationship to the household head.

outcomes at the same time. Though we are able to control for such random shocks in our regressions using year fixed effects, the incidence of parental disability across households are self-reported, hence, the variables may be susceptible to either under-reporting or over-reporting (measurement error). The fixed effects model is not designed to mitigate problems that arise as a result of random measurement errors. Based on these limitations, we are unable to make a causal claim for the estimation of equation (1). Therefore, we interpret the results of the regression with caution, and we argue for an association in the relationship between parental disability and children's educational outcomes.

For the regression results using equation (1), we consider the following outcome variables: school enrolment, which equals 1 for children attending school, and 0 otherwise. In addition, we also investigate the association between parental disability and children's highest grade completed, examination passed, and hours of study per week. An examination passed is a binary variable, which equals 1 for children that passed PSLE or FIVE, and 0 otherwise. Highest grade completed is a categorical variable for completion of grades such as (1) primary education, (2) secondary education, and (3) above secondary education. Lastly, hours of study per week is a continuous variable.

We attempted to estimate equation (1) using an instrumental variable (IV) approach to correct the endogeneity of parental disability, but the variables we used as potential instruments failed to satisfy the conditions for good instruments. For instance, Mont and Nguyen (2013) used age of the father as an instrument for parental disability. The validity of this instrument is questionable because parental age can directly affect children's educational achievement. Therefore, we estimate equation (1) using fixed effects regression and we interpret the estimates as association between parental disability and children's educational outcomes.

5 Results

In Table 4, we find that children of parents with disabilities are 11 percentage points less likely to be enrolled in school compared to other children. In addition, children in households with a parental disability are 6 percentage points less likely to pass exams (either PSLE or FIVE) relative to children in households without a parental disability. Moreover, children in households with a parental disability experienced a decline in hours spent studying by 4% compared to children in households without a parental disability. These results are similar to results from Mont and Nguyen (2013) who investigated the effects of parental disability on child's education in Vietnam. However, contrary to Mont and Nguyen (2013), we find no statistically significant association between parental disability and children's highest grade completed⁷.

⁷ The low number of observations reported on grade completed compared to school enrolment might be responsible for the statistical insignificance of the coefficient of grade completed. From the two waves of the survey used, we had missing observations on grade completed due to non-response by households from the interview.

A possible explanation for the insignificance of the coefficient of grade completed may be due to the high levels of late enrolment in primary schools and drop-out in secondary schools in Tanzania (UNICEF & UNESCO, 2018). It is likely that the level of school drop-out is not exclusive to children whose parents have a disability, therefore, we are unable to establish a statistically significant association between grade completed and parental disability. In other words, the difference in grade completed between children of parents with and without disabilities may not differ in a significant manner due to the high incidence of school drop-out in Tanzania.

Table 4: Results of parental disability and children's educational outcomes (Fixed effects)

Variables	Enrolment	Grade completed	Passed exams	Hours of study
Parental disability	-0.106** (0.050)	-0.033 (0.073)	-0.060* (0.033)	-0.043** (0.020)
R-Squared	0.048	0.760	0.218	0.0988
Observations	11,408	9,868	11,408	8,232

Note: *, **, and *** represent significance at 10%, 5% and 1% levels respectively. The number of observations across the columns vary due to non-responses for some of the variables. Survey weight used for the regressions.

In Table 5, we disaggregated the results of the relationship between parental disability and children's schooling outcomes by the gender of children (boys and girls). Boys in households with a parental disability were 7 percentage point less likely to be enrolled in school compared to those in households without a parental disability. Also, girls in households with a parental disability were 14 percentage points less likely to be enrolled in school compared to girls in households without any form of parental disability.

Table 5: Parental disability and children's educational outcomes by gender (Fixed effects)

Variables	Enrolment	Grade completed	Passed exams	Hours of study
Panel A: Boys				
Parental disability	-0.066* (0.081)	-0.070 (0.110)	-0.044 (0.048)	-0.851 (0.950)
R-squared	0.036	0.765	0.210	0.082
Observations	5,722	4,906	5,722	4,066
Panel B: Girls				
Parental disability	-0.143** (0.094)	0.039 (0.104)	-0.090* (0.060)	-0.855 (1.062)
R-squared	0.055	0.751	0.220	0.100
Observations	5,686	4,962	5,686	4,166

Note: *, **, and *** represent significance at 10%, 5% and 1% levels respectively. The number of observations across the columns vary due to non-responses for some of the variables. Survey weight used for the regressions.

Moreover, from Table 5, girls in households with a parental disability were 9 percentage points less likely to pass exams relative to their counterparts in households without a parental disability. However, we found no statistically significant relationship between parental disability and the probability of exams passed for boys.

Table 6 presents the results of the relationship between parental disability and children's schooling outcomes disaggregated by the age of children. The categories of children's age used in the analysis were 6–10 years old, 11–14 years old, and 15–17 years old.

Table 6: Regression of parental disability and children's schooling outcomes by age (Fixed effects)

Variables	Enrolment	Grade completed	Passed exams	Hours of study
Panel A: 6–10 Years				
Parental disability	-0.112* (0.075)	-0.003 (0.023)	-0.005 (0.005)	-0.031 (0.589)
R-squared	0.158	0.247	0.0143	0.021
Observations	5,197	4,580	5,197	3,929
Panel B: 11–14 Years				
Parental disability	-0.027 (0.058)	-0.009 (0.020)	-0.049 (0.067)	-0.163 (0.348)
R-squared	0.058	0.850	0.092	0.038
Observations	3,674	3,304	3,674	3,007
Panel C: 15–17 Years				
Parental disability	-0.085*** (0.019)	-0.045 (0.162)	-0.163*** (0.037)	-3.197 (3.842)
R-squared	0.035	0.089	0.073	0.069
Observations	2,537	1,984	2,537	1,296

Note: *, **, and *** represent significance at 10%, 5% and 1% levels respectively. The number of observations across the columns vary due to non-responses for some of the variables. Survey weight used for the regressions.

The results show a negative and statistically significant association between parental disability and school enrolment for children aged 6–10 and 15–17 years old. For children aged 6–10 years old, parental disability in a household resulted in children being 11 percentage points less likely to enrol in school relative to children aged 6–10 years old in households where parents did not have a disability. In relation to children aged 11–14 years old, no statistical association was found between parental disability and educational outcomes.

One possible explanation for the negative association between school enrolment and parental disability for children aged 6–10 years old may be related to the incidence of out-of-school children in Tanzania (UNICEF & UNESCO, 2018; Joshi & Gaddis, 2015). Evidence shows that out-of-school children are mostly of primary school age of about 7 years and older. Factors such as shortage of quality teachers, far distances between children's residence and school, and high opportunity costs of schooling for poor households, have been identified as some of the drivers that negatively affect school enrolment among children of primary school age (UNICEF & UNESCO, 2018).

Furthermore, the results of this study showed that children aged 15–17 years old who had a parent with a disability were 9 percentage points less likely to be enrolled; and 16 percentage points less likely to pass exams compared to children aged 15–17 years old whose parents did not have a disability.

5.1 Mechanisms

Table 7 presents potential mechanisms through which parental disability could affect children's educational outcomes. We considered variables such as household's educational expenditures, medical expenditures, hours spent collecting firewood the previous day before the survey, hours spent fetching water, and children's engagement in unpaid work as some of the possible channels through which parental disability could impact on children's educational outcomes. We use log of the dependent variables from column (1) to column (4), but column (5) is a binary variable which is equal to 1 if a child engaged in wage work and 0 otherwise.

Table 7: Pathways of parental disability and children's educational outcomes (Fixed effects)

Variable	Education Expenditures	Medical Expenditures	Hrs spent collecting firewood	Hrs spent fetching water	Child engaged in wage work
Parental disability	-0.206** (0.100)	0.721*** (0.233)	0.103* (0.057)	0.026* (0.017)	-0.036 (0.043)
R-squared	0.069	0.401	0.008	0.015	0.049
Observations	11,408	11,408	11,345	11,344	5,301

Note: *, **, and *** represent significance at 10%, 5% and 1% levels respectively. The number of observations across the columns vary due to non-responses for some of the variables. Survey weight used for the regressions.

The results show that parental disability is negatively associated with children's educational expenditures, but positively associated with medical expenditures. Moreover, the results show that children in households with a parental disability spent more time fetching water and collecting firewood or cooking fuels.

5.2 Robustness Check

In Table 8, we conducted an analysis using a disability index instead of a dummy variable for parental disability as used in Tables 4–7. A disability index is an indicator that captures the severity of disability, which ranges from 0 for parents without disability to 6 for parents who have difficulties in all six dimensions (Mont & Nguyen, 2013). Hence, the disability index used in the robustness checks ranges from 0 to 6. From the results, the coefficients of disability index are qualitatively similar to the results obtained in Table 4. Statistically significant associations were found between parental disability and school enrolment, exams passed, and hours spent studying.

Table 8: Fixed effects estimates of parental disability index and children's educational outcomes

Variable	Enrolment	Grade completed	Passed exams	Hours of study
Parent disability index	-0.150** (0.066)	-0.092 (0.067)	-0.090* (0.050)	-0.156** (0.075)
R-Squared	0.056	0.680	0.326	0.120
Observations	11,408	9,868	11,408	8,232

Note: *, **, and *** represent significance at 10%, 5% and 1% levels respectively. The number of observations across the columns vary due to non-responses for some of the variables. Survey weight used for the regressions.

6 Discussions and Conclusions

Through the lens of the human development model of disability, health and wellbeing, it is recognised that the functionings (what people are able to achieve) and capabilities (what people could potentially achieve) of persons with disabilities may be negatively affected by the health deprivations that they experience (Mitra, 2018). Using the lens of the human development model of disability, health and wellbeing and related literature, we formulated the hypothesis that the limited opportunities and achievements associated with health conditions and impairment are not solely experienced by individuals and could in fact apply to family members (Grech, 2016). Our results revealed that in Tanzania, the educational achievements of children are limited when a parent has a health condition or impairment.

Our findings reveal statistically significant associations between parental disability and children's educational achievements. Specifically, using the 2010–2011 and 2014–2015 waves of the TNPS data, we investigated whether parental disability is related to children's school enrolment, grades completed, exams passed and hours of study. The results revealed that parental disability had a negative association with three of the four outcomes namely, children's school enrolment, grade completion and their success in examinations.

Moreover, there were heterogeneities in the findings across the gender and age of children in Tanzania. In terms of gender, we found that girls were less likely to have completed grades or passed examinations if they lived in a household with a parental disability. In contrast, boys were less likely to be enrolled in schooling if they resided in households where there was a parental disability. Pertaining to age, children between the age of six and 10 years old were less likely to be enrolled in schooling if they resided in a household with a parental disability. Also, children between the age of 15 and 17 years old were less likely to have been enrolled or passed exams if they resided in households with a parental disability.

From a theoretical standpoint, our findings expand literature to demonstrate that while disability may result in a deprivation of functionings for the individual with a disability alone, there may also be an intergenerational impact of disabilities. More specifically, we show that children who reside in households where a parental disability is present in Tanzania were less likely to progress through education. We note that lower levels of education have a negative effect on human development, such as decreased levels of employability and earning potential later in life (West, 2000; Duflo, 2001; Psacharopoulos et al. 1992). Where a parent disability is present, we found that instead of spending time on educational outcomes, children were more likely to engage in family care activities such as fetching water, collecting firewood or cooking fuels, and unpaid family labour. Grech (2016) found similar patterns in qualitative research in Guatemala pertaining to children's premature exit from education to work and care for their families. These results contribute to the literature on the extra costs of living with a disability by demonstrating that these households have an increased health expenditure. However, children too spend additional hours collecting firewood and fetching water in household

where parents have a disability. These increased engagements in family care activities are to the detriment of children as educational expenditures for these households are reduced.

There are a few limitations worth noting as the findings of this study are interpreted. For instance, this paper could not explore exogenous variation in parental disability across households in order to investigate the causal impact of parental disability on children's educational outcomes. Future research on parental disability on children's outcomes could consider the effects of conditional cash transfers and disability benefits on schooling conditions and household with disabilities.

Despite these limitations, the contribution of this study in identifying parental disability as a possible inhibitor of children's educational outcomes in Tanzania is significant. Thus, if progress is to be made in respect of SDG 4 on quality education, it is imperative that the Tanzanian government promote initiatives that might support schooling outcomes, especially for children whose parents have disabilities.

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