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Investing in rural people

Economic Activities of Persons with Disabilities in Rural Areas: New Evidence and Opportunities for IFAD Engagement

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Contents

Abbreviations and acronyms

CDPF	China Disabled Persons' Federation
IFAD11	Eleventh Replenishment of IFAD's Resources
PwD	persons with disabilities
LSMS-ISA	Living Standards Measurement Study – Integrated Surveys on Agriculture
PEA-Youth	Youth Agropastoral Entrepreneurship Promotion Programme
PMU	project management unit
RDP	Rural Development Project
WGDS	Washington Group on Disability Statistics

I. Rationale

1. The Convention on the Rights of Persons with Disabilities and its Optional Protocol recognize that persons with disabilities (PwD) are not objects of charity, medical treatment and social protection but subjects who are capable of exercising their rights, making decisions based on their free and informed consent and being active members of society.[1] In the same vein, the 2030 Agenda for Sustainable Development recognizes disability as a cross-cutting issue, calling for inclusion of PwD in their goals, targets and actions, including in the promotion of sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (Sustainable Development Goal 8).

2. In 2018, the United Nations Secretary-General's Executive Committee established a system-wide policy, action plan and accountability framework to improve performance on disability inclusion[2] and support efforts to leave no one behind.[3] This framework is a call to action to move from combatting discrimination to integrating the rights of PwD[4] into all aspects of United Nations operations. Accordingly, the recently approved United Nations Disability Inclusion Strategy indicates that all United Nations agencies should commit to embed the rights of PwD in their work, both externally through programming and internally (United Nations, 2019).

3. In line with broader United Nations efforts and the above-mentioned Convention, IFAD has committed to analysing if and how to include PwD in its interventions.[5] The challenge faced in this regard is the lack of information on the economic activities of PwD living in rural areas and the limited data available on the current level of inclusion of PwD in IFAD operations.

4. Given this challenge, during the Eleventh Replenishment of IFAD's Resources (IFAD11), IFAD has committed to produce: (i) a report that analyses the link between PwD and IFAD interventions; and (ii) a proposal for collecting data on PwD, piloted in at least five projects (commitment 2.2 – monitorable actions 10 and 11, respectively). For these tasks, IFAD agreed to draw on the work of the United Nations Washington Group on Disability Statistics (WGDS). The purpose is to establish a base for a decision on whether and how to include PwD in IFAD operations.

5. This report focuses on the first of these actions. A brief update on the second is provided later in the paper. The objective of this report is to present evidence on the links between PwD and employment in rural areas, including the characteristics of PwD, their involvement in the agricultural workforce and the types of rural productive activities in which they engage. This evidence will help determine whether IFAD's interventions can serve as a pathway out of poverty for PwD.

6. Section II of the report therefore reviews evidence on the links between disability and rural poverty and section III presents the findings of a study conducted in Ethiopia, Nigeria and the United Republic of Tanzania based on nationally representative data, best practice indicators of self-reported disability, and detailed information on the economic activities of rural households tracked over time. These countries are selected since they are among the few with adequate data to assess

[1] United Nations, Convention on the Rights of Persons with Disabilities and Optional Protocol (Document A/RES/61/106, United Nations, 2007).
[2] The term "disability inclusion" refers to the: (i) meaningful participation of a diverse range of PwD; (ii) promotion of their rights across the organization's work; (iii) development of disability-specific programmes; and (iv) consideration of disability-related perspectives in compliance with the Convention on the Rights of Persons with Disabilities.
[3] United Nations, *United Nations Disability Inclusion Strategy* (United Nations: New York, 2019): https://www.un.org/development/desa/disabilities/wp-content/uploads/sites/15/2019/03/UNDIS_20-March-2019_for-HLCM.P.pdf.
[4] Persons with disabilities include those with long-term physical, mental, intellectual or sensory impairments that, in interaction with various barriers, may hinder their full and effective participation in society on an equal basis with others (Convention on the Rights of Persons with Disabilities, art. 1).
[5] Report of the Consultation on the Eleventh Replenishment of IFAD's Resources – Leaving no one behind: IFAD's role in the 2030 Agenda (Rome, 2018).

the economic activities of PwD. Section IV describes the implications of the existing evidence and new findings for IFAD's operations. Section V presents the next steps for IFAD to move forward in a manner that is in line with the United Nations Disability Inclusion Strategy.

II. Background and focus of the analysis

7. At present there are approximately 1 billion PwD in the world (about 15 per cent of the global population), of whom 80 per cent (800 million) live in developing countries (Grech, 2011; Mitra et al., 2013). Census-based estimates suggest that this already high number is on the rise. However, despite the large number of PwD and the fact that data collection has improved in recent years, little analysis has been conducted on the economic activities of PwD, particularly in rural areas.[6] To date, analytical work has focused on case studies and qualitative surveys limited to specific locations and types of disability.

8. Based on the first United Nations flagship Disability and Development Report (United Nations, 2018), PwD in rural areas tend to be at a disadvantage. Data from a limited number of countries indicate that, compared to persons without disabilities from urban areas and persons without disabilities in rural areas, PwD in rural areas are the least likely to have attended school (65 per cent) and the least likely to be employed (13 per cent). Births of mothers with disabilities who live in rural areas are the least likely to be attended by a skilled health worker (58 per cent). Households in rural areas that have a family member with disabilities are the least likely to own a mobile phone (46 per cent).[7]

9. While analysis of the incidence, distribution and trends in disability is limited by a lack of high-quality data, the available studies indicate that there is a positive correlation between poverty and disability, at both the individual and the household level, and that disability is generally associated with multidimensional poverty.[8] PwD and their families face greater barriers in accessing education, health services and jobs,[9] with stigma and discrimination as well as physical impairments playing a role.[10] In addition, since they are more likely to be poor, PwD are more vulnerable to health shocks and have fewer resources to cope with those shocks. These multiple impacts result in a vicious cycle,[11] with poverty hindering the capacity of PwD and their families to cope with the adverse consequences of disability. This

[6] This emphasis on data is aligned with the United Nations Disability Inclusion Strategy, which states that, "the lack of disability-related data, including qualitative and disaggregated data, is one of the major barriers to the accurate assessment of disability inclusion across both development and humanitarian contexts" (§26).

[7] United Nations, *United Nations flagship report on disability and development: Realizing the Sustainable Development Goals by, for and with persons with disabilities* (United Nations Department of Economic and Social Affairs: New York, 2019).

[8] Hanass-Hancock, J., & Mitra, S., Livelihoods and Disability: The Complexities of Work in the Global South. In S. Grech & K. Soldatic (Eds.) *Disability in the Global South: The Critical Handbook* (2016), 133–149, offer a global perspective, corroborated by in-depth country studies by Parodi and Sciulli, Disability in Italian households: Income, poverty and labour market participation, in *Applied Economics*, *40* (20), (2008) 2615–2630 for Italy; She, P. and Livermore, G.A., Material Hardship, Poverty, and Disability Among Working-Age Adults in *Social Science Quarterly*, 88(4), (2007) 970–989 for the United States; and Mont and Cuon, N.V., Disability and poverty in Vietnam. *World Bank Economic Review*, *25*(2), (2011) 323–359 for Viet Nam.

[9] World Report on Disability, WHO guidelines approved by the Guidelines Review Committee (2011); Mitra (2013); Loeb, M., Eide, A. H., Jelsma, J., Toni, M. ka and Maart, S., Poverty and disability in Eastern and Western Cape Provinces, South Africa in *Disability & Society*, 23(4), (2008), 311–321.; Mont and Cuon (2011); and Filmer, D., Disability, poverty, and schooling in developing countries : Results from 14 household surveys in *The World Bank Economic Review*, 22(1) (2008), 33–61.

[10] For more information on stigma and discrimination, see Foley, D. and Chowdhury, J., Poverty, Social Exclusion and the Politics of Disability: Care as a Social Good and the Expenditure of Social Capital in *Chuadanga, Bangladesh in Social Policy & Administration*, 41(4) (2007), 372–385; Mitra, S., & Sambamoorthi, U., Disability and the Rural Labor Market in India: Evidence for Males in Tamil Nadu in *World Development*, 36, (2008) 934–952; and Mitra, S., & Sambamoorthi, U., Wage differential by disability status in an agrarian labour market in India in *Applied Economics Letters*, 16(14), (2009), 1393–1398.

[11] Elwan, A., *Poverty and disability: A survey of the literature,* No. 21315, (1999), 1.; Lustig, D. C. and Strauser, D. R., Causal relationships between poverty and disability, in *Rehabilitation Counseling Bulletin*, *50*(4), (2007), 194–202; Trani, J-F. and Loeb, M. Poverty and disability: A vicious circle? Evidence from Afghanistan and Zambia in *Journal of International Development*, 24(S1), (2010), S19–S52; Graham, Moodley and Selipsky (2013); and Pinilla-Roncancio, M., Disability and poverty: Two related conditions. A review of the literature in *Revista de La Facultad de Medicina*, 63(3Sup), (2015), 113–123.

self-reinforcing dynamic is likely to be even more marked for rural families of PwD in developing countries, where health and social service coverage is often limited.

10. The evidence also shows the difficulties that PwD face in accessing jobs and earning a salary. Among PwD, those living in rural areas and women tend to receive the lowest salaries. In Peru in 2012, 61 per cent of PwD living in rural areas versus 36 per cent in urban areas received less than the minimum salary; and 46 per cent of women versus 37 per cent of men with disabilities received less than the minimum salary.[12] Adults with disabilities are significantly less likely to be employed than adults without disabilities,[13] and those who work are engaged in lower-productivity activities and lower-wage jobs.[14] In one of the few studies that focused on rural areas, it was found that when PwD did not work at all, it was only because their disability was extremely debilitating.[15]

11. In addition, studies show that there are significant unexplained wage differences when comparing the earnings of PwD and persons without disabilities with similar characteristics and jobs. These differences could be based on the existence of stigma or discrimination. Yet in the studies, PwD earned less even in household businesses, in which such factors should not play a role.[16] Importantly from the perspective of enhancing household income and reducing poverty, disability can also impact the earning potential of family members of PwD[17] since having a household member with a work-limiting disability can reduce the work hours of other adult caretakers.

12. While providing useful insights, most of the literature on PwD suffers from data limitations. On the one hand, data on disability have traditionally been collected in censuses and surveys based on self-reporting in which respondents are required to classify themselves as having a disability without a clear set of questions to clarify the definition. This is likely to result in significant underreporting. To overcome these limitations, the WGDS has developed the Short Set of Disability Questions framework (see annex I), which aims to capture self-reported difficulties in hearing, seeing, walking or climbing, remembering or concentrating, self-care, understanding or being understood in respondents older than five years. The questions are specifically designed to avoid the traditional problems faced by disability-related questionnaires by not requiring respondents to label themselves or others as having a disability.[18]

13. Even when data on PwD have been adequately collected, the data collection efforts rarely incorporate questions on economic activities in rural areas. Without such data, it is difficult to ascertain whether PwD are engaged in similar activities and to the same degree as the rest of the rural population or if there are differences. Similarly, it is not possible to understand how the presence of PwD may affect the economic activities of the households in which they live.

[12] United Nations, *United Nations flagship report on disability and development: Realization of the Sustainable Development Goals by, for and with persons with disabilities* (United Nations Department of Economic and Social Affairs: New York, 2019).
[13] Mactaggart, I., Banks, L. M., Kuper, H., Murthy, G. V. S., Sagar, J., Oye, J. and Polack, S., Livelihood opportunities amongst adults with and without disabilities in Cameroon and India: A case control study in *PLOS ONE,* 13(4), (2018), using age-sex-matched controls in India and Cameroon.
[14] Mont and Cuon (2011)
[15] Erb, S., & Harriss-White, B., *Outcast from social welfare: adult disability, incapacity, and development in rural South India,* (2002); Huang, J., Guo, B. and Kim, Y., Food insecurity and disability: Do economic resources matter? *Social Science Research*, *39*(1), (2010), 111–124; Nord, M., *Characteristics of low-income households with very low food security: An analysis of the USDA GPRA Food Security Indicator* (2007) and She and Livermore (2007) all found that work-limiting disability substantially increases the risk of food insecurity. Simeu, N. and Mitra, S., Disability and household economic wellbeing: Evidence from Indonesian longitudinal data in *Oxford Development Studies*, 0(0), (2019), 1–14 found that the poorest households with PwD cope by reducing food expenditures.
[16] Mont and Cuon (2011)
[17] Nord (2007)
[18] The WGDS is the preferred method for Sustainable Development Goal monitoring used by United Nations agencies, civil society and independent experts to measure the global PwD population. It is also the recommended tool for collecting disability information for the upcoming 2020 round of censuses (Groce and Mont, 2017).

14. Finally, many previous studies have relied on data collected by observing several PwD at the same point in time or without regard to differences in time. Data from just one point in time make it difficult to identify casual links between having a disability and life outcomes. Panel data, which is collected in the same households and from the same individuals over time, can address these shortfalls.

III. Livelihoods of rural persons with disabilities

15. The evidence presented below is derived from a study commissioned by IFAD on PwD and rural economic activities (see full report in the appendix).[19] The study focused on rural livelihoods using the WGDS definitions of disability[20] and relying on panel data. The research team took particular advantage of available panel data sets derived from comparable questionnaires in three African countries: Ethiopia, Nigeria and the United Republic of Tanzania (box 1). These data sets are unique in that they overcome all three of the limitations of other data sets: they apply the WGDS framework; they contain details of the economic activities of rural households and individuals; and they entailed multiple rounds of data collection.

Box 1
Data used for the PwD and rural economic activities in sub-Saharan Africa study

This IFAD-commissioned study used panel data from the Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS-ISA) for Ethiopia, Nigeria and the United Republic of Tanzania. Three "waves" of data were compiled for each country. LSMS-ISA surveys collect information on all economic activities for samples that are nationally representative as well as representative of the country's rural population.

Following the WGDS framework for individuals older than five years, the LSMS-ISA questionnaire captures disability status through six questions that assess self-reported difficulties in hearing, seeing, walking or climbing, remembering or concentrating, self-care, understanding or being understood. Because these survey questions are very similar across countries and years, they provide a unique opportunity for cross-country panel analysis.

Country	Wave 1	Wave 2	Wave 3
Ethiopia	2011/2012	2013/2014	2015/2016
Nigeria	2010/2011	2012/2013	2015/2016
United Republic of Tanzania	2008/2009	2010/2011	2012/2013

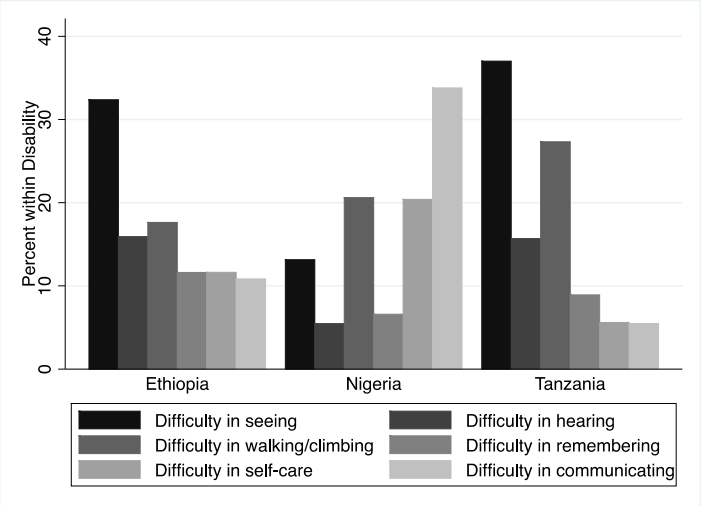
16. IFAD's analysis explored the relationship between disability and different outcome variables related to economic activities and poverty. Disability status was disaggregated by: (i) all types of disability; (ii) physical disability; and (iii) severe disability, and outcome variables were grouped by: (i) poverty; (ii) food security; (iii) economic activities; and (iv) time use variables measured at the individual level. Outcome variables on poverty and food security were measured through objective and subjective data provided by heads of household. Economic activities were reported by the household head and encompass both participation in different types of economic activities and income.

17. In terms of demographics and type of disability, figures 1 and 2 respectively present by country the proportion of PwD with different kinds of disabilities and the severity of the disability. An average of 8 per cent of the rural population in Ethiopia, 6 per cent in Nigeria and 7 per cent in the United Republic of Tanzania have some kind of disability. The proportion of individuals with physical disabilities is higher in Ethiopia and the United Republic of Tanzania than that of persons with cognitive disabilities, and the occurrence of cognitive disabilities is higher in Nigeria than in the other two countries. In terms of severity, most PwD reported only "some difficulty" (around 80 per cent in Ethiopia and 65 per cent in Nigeria and the United Republic of Tanzania). Although it is not clear why differences exist between

[19] Tiwari, W., Savastano, S., Improta, M. and Winters, P., *Rural economic activities and persons with disabilities in Sub-Saharan Africa* (2019, forthcoming).
[20] According to the WGDS, disability is defined as anyone having "a lot of difficulty" with at least one of the following: (i) difficulty seeing, even if wearing glasses; (ii) difficulty hearing, even if using a hearing aid; (iii) difficulty walking or climbing steps; (iv) difficulty remembering or concentrating; (v) difficulty with self-care such as washing all over or dressing; or (vi) difficulty communicating (for example, understanding or being understood by others).

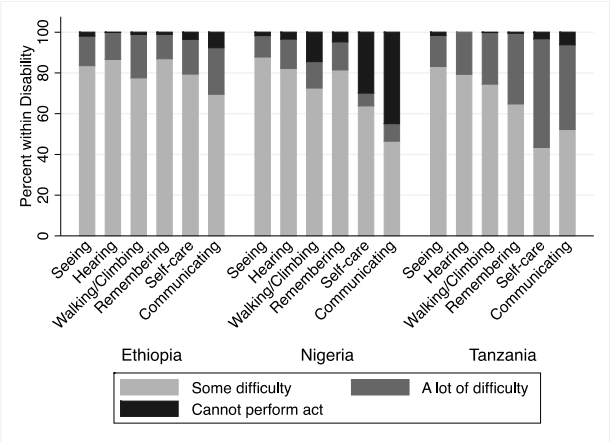
countries or types of disability, it should be noted that unlike sight or hearing impairments for which there are different levels of disability, communicating and self-care may be more binary (either a person has difficulty communicating or does not).

Figure 1
Proportion of PwD with different types of disability



Source: Tiwari, W., Savastano, S., Improta, M. and Winters, P., *Rural economic activities and PwD in sub-Saharan Africa* (see appendix).

Figure 2
Severity distribution by disability type



Source: Ibid.

18. In line with other descriptive analyses, the study showed that having a disability is associated with a greater likelihood of living in a low-income household; however this is captured by different indicators across the three countries. In Ethiopia for example, PwD households have lower levels of both income and expenditure than households without PwD. Yet in Nigeria, PwD households have lower incomes but similar levels of expenditures. Agriculture appears to provide similar shares of income to households with PwD across the three countries. However, other elements of PwD livelihoods – such as reliance on transfers and ability to engage in different types of non-agricultural activities – vary across countries. This may also be the case for the characteristics of programmes that PwD can access in different countries.

19. In-depth analysis of the determinants of the poverty and food security, types of economic activities engaged in and individual time use revealed significant differences across countries, but also highlighted common themes (see table 1).

20. First, while households with at least one PwD tend to be associated with at least some indicator of poverty – such as low income or low expenditure – the effects of disability on most poverty measures disappear when examining the characteristics of the household and household head. In other words, the link between disability and poverty is not a direct one, but rather is mediated by a variety of factors. It is therefore possible to identify entry points for de-linking disability from poverty.

21. Second, the data show that there are significant country-level differences in the opportunities open to PwD and their family members. When examining the income shares that constitute household livelihoods and time use data, the evidence indicates that when participation in farm activities is high (e.g. in Ethiopia and the United Republic of Tanzania), households with a PwD are more likely to be food-insecure. This could suggest that the efforts family members make to care for a relative with a disability divert resources from ensuring household food security.

Table 1
Summary of key findings of the panel regressions by country

Country	*Poverty and food insecurity*	*Livelihood source*	*Time use data*
Ethiopia	The difference between households with and without PwD in terms of income or consumption expenditure disappears. Households with PwD are more likely to be food-insecure.	Households with PwD receive a higher share of income from agricultural wages and transfers. The latter is particularly the case for households in which a PwD has a severe disability.	Disability reduces the likelihood of engaging in agricultural activities, while it does not alter the likelihood of engaging in non-agricultural activities.
Nigeria	Households with PwD are more likely to be in the two bottom quintiles, but overall income levels do not differ from other households.	Households with PwD are less likely to engage in non-agricultural activities and more likely to receive transfers.	PwD are less likely to work overall: they are less likely to engage in agricultural, non-agricultural or other paid work.
United Republic of Tanzania	Households with PwD are more likely to be in the two bottom quintiles of non-food and education spending, and more likely to be food-insecure.	Households with a PwD do not have different livelihood sources than households without a PwD.	There are no time use differences – either overall or by gender – between PwD and persons without disabilities.

Source: Ibid.

22. In addition, evidence shows that PwD engage in a variety of activities that offer avenues to complement their family incomes. The nature of these activities varies by country: in Ethiopia and Nigeria, PwD are less likely to work in agriculture than in non-agricultural activities; this pattern is strongly gendered in Nigeria. In Ethiopia, where PwD are just as likely as those without disabilities to work in non-agricultural activities, women are less likely to do so.

23. In table 2 below, disability is analysed by: (i) any kind of disability; (ii) severe disability; and (iii) physical ("motor") disability.[21] The data show that except for Nigeria, PwD are more likely than others to be poor and food-insecure irrespective of disability type. As presented in table 2, disability is positively correlated with livelihood source. Both having a physical disability and the intensity of the disability appear to be detrimental to economic activity in Ethiopia and Nigeria. Finally, there appears to be a consistent indirect correlation between time use and disability, especially for severe disabilities. However, as long as it is not severe, a physical disability does not appear to prevent individuals from participating in agricultural activities ("time use in agriculture").

[21] Motor or physical disability is defined by having any problem seeing, hearing, walking or climbing.

Table 2
Relationship between disability and rural livelihood

	Ethiopia			*Nigeria*			*United Republic of Tanzania*		
Type of disability/outcomes	*Any*	*Severe*	*Motor*	*Any*	*Severe*	*Motor*	*Any*	*Severe*	*Motor*
Poverty and food insecurity	**+**	**+**	**+**	**+**	**NS**	**+**	**+**	**+**	**+**
Livelihood source	**+**	**-**	**+**	**+**	**-**	**-**	**NS**	**NS**	**-**
Time use in agriculture	**-**	**-**	**+**	**-**	**-**	**+**	**NS**	**NS**	**NS**

Note: **+** indicates a direct significant relationship between type of disability and the outcome indicator; **-** indicates an indirect relationship; **NS** indicates no statistically significant relationship.

Source: Ibid.

IV. Implications for IFAD's operations

24. The results of the analysis have two main implications for IFAD's operations. First, both the income source data and the individual time use data indicate that PwD and their households are economically active in rural areas. PwD can therefore be active participants in development projects that are tailored to fit the specific profiles of their disabilities.

25. Second, while there is an association between disability and low income, the evidence shows that this link is not direct and that there are entry points for breaking this association. Indeed, the analysis of panel data suggests that there are individual drivers of this association and that project interventions can focus on addressing them. For example, PwD might face prohibitive costs in terms of mobility to get to work: directly addressing these would help PwD to join the labour market.

26. IFAD is starting to integrate disability into its operations as well as into its analytical work. While this is still an ad hoc approach in which specific interventions for PwD are developed and monitored, it is possible to highlight IFAD's experience in different countries from different regions (see box 2). These projects have targeted directly and/or indirectly PwD and have developed specific actions or adjusted activities accordingly. These projects, among others, will inform IFAD's future interventions and its corporate approach on PwD.

Box 2
IFAD operations and PwD

Cameroon
In 2014, the Youth Agropastoral Entrepreneurship Promotion Programme (PEA-Youth) was implemented in four regions that are home to some 40 per cent of the rural youth population of the country. PEA-Youth is not only youth-sensitive, but has also a strong social inclusion component. With the aim of contributing to a more inclusive economy, PEA-Youth has been reaching out to one of the most marginalized groups in Cameroon, i.e. PwD. A social targeting process is used to identify and select young people living with disabilities and involve them in programme activities. The process builds on the principle of fairness and accessibility of information for all, with opportunity-related information being communicated to the most remote areas through various channels and by conveying messages in French, English and local languages. Once the potential beneficiaries are identified, the selection is conducted based on the readiness and the willingness demonstrated to embark on an incubation process. Priority is given to young people between 18 and 35 years of age coming from particularly disadvantaged socioeconomic backgrounds, having proven experience in conducting agropastoral trade, and having motor disabilities. The programme will ensure the integration of at least 150 young PwD through agropastoral entrepreneurships.

China
IFAD has successfully developed a partnership with the China Disabled Persons' Federation (CDPF), with the objective of enhancing the skills of rural women and economically capable disabled persons for employment and income generation. This partnership has been developed in the context of the Qinghai Liupan Mountain Area Poverty Reduction Project, which has a specific component on off-farm livelihood support for women and economically capable PwD. The CDPF and the county employment bureaux are the coordinators of the component. In five counties, 720 PwD from rural villages have been trained, fully achieving the targets. The project will continue to implement training activities in three other counties in 2019 and 2020. The component generated good initiatives and strong partnerships among the implementing agencies, training institutions, government employment enhancement bureaux and hiring companies.

Honduras
As part of the Project for Competitiveness and Sustainable Development in the South-Western Border Region in Honduras, traditional weavers and other artisans, including PwD, are receiving support to develop their microenterprises and access markets. IFAD is working with Centro Integral Misión de Amor, whose purpose is to create livelihood opportunities for young persons with disabilities. Under the project, 18 young people, who are deaf or have other disabilities, have learned to weave on traditional looms and sew the cloth into clothes and accessories. They have received specialist training in sewing, management, marketing and procurement. The project has also provided grants for improved facilities and machinery. As the cost and supply of thread are a problem for several of the artisan enterprises involved, the project is seeking to help them collectively source raw materials from Guatemala. Discussions are also under way with local authorities about the possibility of setting up an artisans' market where the groups can sell their products to tourists.

27. Finally, in terms of data collection on PwD, IFAD committed to developing a proposal for disaggregating data on PwD in IFAD operations and piloting this in at least five projects following the methods used by the WGDS (IFAD11, monitorable action 11). The initial selection of the projects is complete and the WGDS Short Set of Disability Questions will be piloted for the projects listed in table 3.

Table 3
Projects selected for pilot exercise

Asia and the Pacific	Nepal: Adaptation for Smallholders in Hilly Areas Project
East and Southern Africa	Malawi: Programme for Rural Irrigation Development
Latin America and the Caribbean	Brazil: Carirí and Seridó Sustainable Development Project
Near East, North Africa and Europe	Georgia: Dairy Modernization and Market Access Project
West and Central Africa	Liberia: Tree Crops Extension Project II

28. In addition to this pilot, the Rural Development Programme – Phase II in the Solomon Islands has generated significant data on PwD, which is being collected through the World Bank's reporting system (one of the cofinanciers). Data include information on PwD in 1,570 villages in the nine project provinces. This data collection combined with the pilot exercise should provide the basis for a future IFAD data collection system on PwD.

V. Moving forward

29. The existing evidence and the literature indicate that rural PwD are economically active, have the potential to generate income and therefore have the possibility of a productive pathway out of poverty. Further, the households in which they live are shown to be affected by their presence. These conclusions, together with experiences and lessons learned by other international organizations, can inform IFAD’s agenda on PwD and facilitate identification of the best approach for their potential inclusion in IFAD interventions.

30. IFAD will continue working on developing its knowledge base in this area and identifying entry points for supporting PwD in its operations. This work will contribute to broader efforts within the United Nations system to make sustainable and transformative progress on disability inclusion in all aspects of its work.

The indicators of the Washington Group on Disability Statistics

The analysis presented in this report draws on data collected by the WGDS.

The WGDS developed, tested and adopted a short set of questions for use in national censuses and surveys. The questions reflect advances in the conceptualization of disability and use the World Health Organization's International Classification of Functioning, Disability and Health as a conceptual framework.

The short set is composed of six questions:

1. Do you have difficulty seeing, even if wearing glasses?
2. Do you have difficulty hearing, even if using a hearing aid?
3. Do you have difficulty walking or climbing steps?
4. Do you have difficulty remembering or concentrating?
5. Do you have difficulty with self-care, such as washing all over or dressing?
6. Using your usual language, do you have difficulty communicating; for example, understanding or being understood by others?

Each question has four response categories:

1. No, no difficulty
2. Yes, some difficulty
3. Yes, a lot of difficulty
4. Cannot do it at all

Rural Economic Activities and Persons with Disabilities in Sub-Saharan Africa

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Highlights[22]

1. The paper studies the effect of disability on poverty and economic activities in rural areas of three sub-Saharan countries using panel data and fixed effect model.
2. When time varying observable and unobservable characteristics are controlled, the positive association between disability and poverty – commonly established in the literature – does not exist.
3. In rural areas where there is a higher reliance on on-farm activities, having a persons with disability in the household increases the likelihood of food insecurity.
4. Households with persons with persons with disabilities have statistically higher or equal participation in certain income generating activities.

Abstract

While analysis on the incidence, distribution and trends in disability are limited due to the lack of appropriate data, the available studies have found a positive correlation between poverty and disability both at individual and household level, and that disability is generally associated with multidimensional poverty. The goal of this study is to not only re-evaluate the disability and poverty relationship using panel data and fixed effect model but also to study the role of disability status in affecting economic activities of persons with disabilities and their families in the rural contexts of three sub-Saharan African countries – Ethiopia, Nigeria and The United Republic of Tanzania. Households with persons with disabilities are not more likely to be poorer when observable and unobservable characteristics are controlled. This is potentially because households with persons with disabilities are either equally or more active in certain income generating activities as households without persons with disabilities. Individual time-use analysis demonstrates that even persons with disabilities are equally likely to participate in income generating activities as person without disabilities. The results on economic activities show that there are variations by the type of economic activity, gender, severity, and type of disability. This elevates the current knowledge, which has only established that persons with disabilities are on average more likely to reduce their participation in the labor market. Consistent with the current knowledge, households with persons with disabilities in areas where there is a higher reliance on on-farm activities for income are significantly more likely to be food insecure.

Keywords: persons with disabilities; rural economic activities; panel data; fixed effect models

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With few censuses, surveys, and sources of information on disability, especially in developing countries, it is challenging to quantify its prevalence precisely (*New UN Report on Disability and Sustainable Development Goals | United Nations Enable*, 2018). While acknowledging the difficulty of such an estimation, the World Health Organization retained a consistent estimate of roughly 10 percent of the world population to have some kind of disability throughout the latter part of 20th century. By this estimate, the number of persons with disabilities (PwD) would be around 370 million in 1970 and 600 million towards the end of the century (World Report on Disability 2011, 2011). By 2011, this prevalence estimate was revised to 15 percent of the world population – around a billion person worldwide (Grech, 2013; Mitra, Posarac, & Vick, 2013; World Report on Disability 2011, 2011).

A significant proportion of the disabled population resides in developing countries. According to the World Health Organization, around 82% of the disabled (800 million) were in developing countries in 2011 (Grech, 2011; Mitra et al., 2013). The available estimates, although still not precise, suggests that the number of PwD is significantly high and on the rise. However, despite the large number, little is known about the economic lives of PwD, especially in the context of rural areas in developing countries.

Current literature on disability predominantly constitutes studies that establish the positive correlation between disability and poverty. (Hanass-Hancock & Mitra, 2016) give a general worldwide perspective positing that PwD are significantly more likely to be poor. There are some country-specific studies that explore this relationship in the context of developed countries and find consistent results. Parodi & Sciulli (2008) and She & Livermore (2007) present evidence of higher poverty rates among disabled person in the context of Italy and the United States respectively. In the context of developing countries, positive correlation between disability and specifically poverty rate is evident in Vietnam (Mont & Cuon, 2011).

A significant portion of the literature explores the relationship between disability and multidimensional aspects of poverty. World Report on Disability 2011 (2011) reports that PwD have lower education achievements, poorer health, and fewer economic opportunities and activities. In a cross-country study done by Mitra et al. (2013) using data from Burkina Faso, Ghana, Kenya, Malawi, Mauritius, Zambia, Zimbabwe, Bangladesh, Lao PDR, Pakistan, Philippines, Brazil, Mexico, and Paraguay, disability is found to be significantly associated with higher multidimensional poverty. PwD had lower educational attainment, lower employment rates, and higher medical expenditures. The positive correlation between disability and educational attainment is evident in other contexts such as South Africa (Loeb, Eide, Jelsma, Toni, & Maart, 2008) and Vietnam (Mont & Cuon, 2011). In a cross-country study using data from Bolivia, Cambodia, Chad, Colombia, India, Jamaica, Romania, Burundi, Mongolia, Indonesia, Mozambique, South Africa, Zambia, Filmer (2008) finds that individuals between the ages of six and 17 with disabilities are significantly less likely to start school or to be enrolled at the time of the survey. Additionally, the study finds that the school participation deficit associated with disability is found to be larger than deficits related to other characteristics, such as gender, rural residence, or economic status differentials.

A synthesis of the available evidence reveals a vicious cycle between disability and multidimensional poverty as is discussed in the existing literature (Elwan, 1999; Lustig & Strauser, 2007; Trani & Loeb, 2010; Graham, Moodley, & Selipsky, 2013; Pinilla-Roncancio, 2015). In summary, being excluded from basic opportunities and amenities related to education, health, and employment, PwD are likely to be poorest of the poor. Poverty further marginalizes PwD. With limited access to basic necessities, person will be less likely to prevent and/or cure illnesses, injuries or impairments (Pinilla-Roncancio, 2015). The compound effect of poverty and disability is likely to make PwD and their families even more marginalized. Marginalization of PwD and their families may also come from their geographical location. Rural areas are home to 80 percent of the extreme poor and 75 percent of the moderately poor (Castaneda Aguilar et al., 2016) The focus on rural areas is

also important because access to health care can be differentially lower making PwD residing in rural areas even more vulnerable.

Furthermore, among PwD, Emmett & Alant (2006), Fine (2009) and Kiani (2009) find that women with disabilities may be more marginalized than men with disabilities. In a qualitative study in Cameroon, Kiani (2009) finds women with disabilities face "three-fold discrimination as a result of their sex, perceived inability, and low socio-economic status". Although there exists a handful of policies put in place for poverty reduction specifically catered to women, development policies that cater to the specificities of the needs of PwD and those of their families are largely absent and less informed by analyses based on suitable data.

While analyzing the link between measures of poverty and disabilities is critical, there is a need to understand the economic activities of PwD and their families using adequate data in order to better cater policies to their needs. However, quantitative studies on the economic activities of PwD and their families in the context of developing countries have been limited and predominantly use cross-sectional data, which can create issues. As a result, the policies that have been recommended may be misleading. Even though cross-sectional data can be useful in describing the correlation between disability and economic outcomes, panel data is preferred to establish causal links.

Additionally, given the challenges faced by PwD and their families, policies are often proposed to provide support. Many of the policies are justifiably linked to social programs, but some also seek to provide economic opportunities for PwD. The objective of providing economic opportunities would be to provide a means for PwD to overcome the constraints they face, improve their livelihoods and potentially escape poverty. Since the number of rigorous empirical studies on disabilities, particularly on economic activities of PwD in developing countries, are limited, the policy recommendations based on the available analysis may not be adequate.

Quantitative studies using panel data and appropriate econometric models have only started to emerge recently in the literature. Although the results from the cross-country study by Mitra (2018) confirms the positive correlation between disability and deprivation, it does not find a consistent positive link between disability and poverty. Mitra (2018c) concludes that although PwD and their households make a significantly higher share of the poor, not all PwD and their households are poor. Mitra (2018c) also notes that there are no differences between person with and without disabilities when fixed effect model is used and other characteristics are controlled.

With regards to economic activities, PwD have a higher chance of leaving work in Ethiopia (one of the countries in our study) (Mitra, 2018c) and in Indonesia (Mani, Mitra, & Sambamoorthi, 2018). However, because data that incorporates disability status as well as labor activities are not easily available, the literature lacks a thorough and rigorous research on what economic activities of PwD and their households are (Hanass-Hancock & Mitra, 2016). The contribution of this paper is to take steps to fill this gap. If it is evident from our data analysis that disability does negatively affect economic activities among rural PwD and households with PwD, poverty reduction policies can be better catered to benefit PwD and their families. This is done by using data from three countries in in Sub-Saharan Africa (Ethiopia, Nigeria and Tanzania) that have LSMS data that includes detailed information on economic activities as well as questions on disability following the Washington Group short questions. The data is panel in nature allowing to address some of the issues of causality although not all.

Rural economic activities and disability: a conceptual framework

Prior to analyzing the available data, the conceptual link between disability and economic activities needs to be considered. As pointed out in the previous section, a significant portion of the current literature on disability explores the link between disability and poverty

using cross-sectional data and concludes that disability and poverty and multidimensional poverty are negatively correlated.

As a first step, we test this link using panel data and fixed effect model. One pathway through which disability could potentially cause poverty is by deterring economic opportunities and activities. Mitra & Sambamoorthi (2008) provides a mainstream perspective on how PwD may be excluded from labor markets. PwD are likely to have a higher reservation wage given that they face higher cost of working (getting to workplace and do the work). PwD are likely to have lower marginal product of labor because disability can make a person less productive. Further, labor theory of discrimination points to the fact that employers may prefer person without disabilities to PwD.

The social and economic marginalization of PwD is well-documented. There is ample evidence in the literature that suggests that the lower educational attainment, poorer health outcomes, and higher medical expenses among PwD could be due to lower or no access to proper education system and health care. Trani & Loeb (2010) find evidence of lower access to health care and education for PwD in Afghanistan and Zambia. Eide & Ingstad (2013) confirms substantial gaps in access to services in South Africa. Disability in developing countries stems largely from preventable impairments associated with communicable, maternal and perinatal disease and injuries (Elwan, 1999). Even though they are preventable and curable, many disabled person are unable to seek medical attention because many live in rural areas that have little or no access to healthcare and rehabilitation centers (Elwan, 1999; *World Report on Disability 2011*, 2011; *New UN Report on Disability and Sustainable Development Goals | United Nations Enable*, 2018).

With limited access to education and employment, disability can lead to economic and social exclusion. Foley & Chowdhury (2007) find that PwD and their families are more likely to face social exclusion and stigma of disability, which makes it less likely for them to access formal services in Chuadanga, Bangladesh. Mitra & Sambamoorthi (2008) finds that differences in human capital and productivity could not explain the employment gap between men with and without disability. They attribute the gap to differential returns to characteristics and from discrimination in access to employment. In another similar study, even after controlling for selection bias, Mitra & Sambamoorthi (2009) find an eight percent wage gap that cannot be explained between individuals with and without disabilities in the context of an agrarian labor market in rural Uttar Pradesh in India.

Given these challenges, it is not surprising that PwD have less economic opportunities and activities (Loeb et al., 2008; Mitra, 2006). Mactaggart et al. (2018) find that adults with disabilities were five times less likely to be working compared to age-sex matched controls in India and Cameroon. Mont & Cuon (2011) find that PwD have lower productive economic activity in general and lower wage employment. With lower access to the labor market, PwD could be limited to working at the household business. But even then, their economic activity in household businesses is found to be lower (Mont & Cuon, 2011). Additionally, Nord (2007) argues that having a household member with work-limiting disability can reduce work hours of other adult caretakers. Huang et al. (2010), Nord (2007) and She & Livermore (2007) find that work-limiting disability substantially increases the risk of food insecurity. Simeu & Mitra (2019) find that poorest households with PwD cope by reducing food expenditures.

There is limited research on the economic activities of PwD in rural areas, where access to education, health care, and employment is even sparser. As such, PwD in rural areas can be further marginalized due to their location. An anthropological study done by Erb & Harriss-White (2002) in agrarian context finds that majority of PwD were economically active in wage or domestic work leading them to conclude that perhaps only the most severe cases of disability and/or extreme old age that disabled village adults do not work. Given the constraints and disadvantages faced by households with PwD, especially in rural areas, are their decisions and outcomes regarding agricultural and non-agricultural activities and outcomes different?

The adverse effects of disability are also shouldered by the families of PwD as they may have to compensate for having an additional dependent if a disabled person cannot work or cannot to a full extent. Some members may also have to spend more time in caregiving and less on wage labor. How does this affect the economic activities of households with PwD in general? On the one hand, members of the households with PwD could spend more time taking care of the PwD and other household chores, leaving them fewer hours for wage labor. On the other hand, members of households with PwD could work for wage more to compensate for the lost wages.

It should also be noted that the relationship between disability and poverty related outcomes as well as economic activities is endogenous. Disability and poverty can cause each other but they can also be jointly determined. Additionally, disability is not randomly assigned to individuals, which makes establishing causality difficult. As such, analyses that solely look at the differences in outcomes by disability status or those that use cross-sectional data are gravely biased. This study fills the gap in the literature on disability by using appropriate data an econometric strategy to provide a more rigorous and nuanced analysis.

Data

The study uses the Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA) panel data from Ethiopia, Nigeria and Tanzania, all of which have three waves in the following years: Ethiopia's waves are collected in 2011/12, 2013/14 and 2015/16; Nigeria's waves are collected in 2010/11, 2012/13 and 2015/16; Tanzania's waves are collected in 2008/09, 2010/11 and 2012/13. These countries were chosen because their respective three waves are collected within similar time frames and the variables are relatively comparable across countries. The LSMS-ISA surveys collect information on all economic activities for samples that are nationally representative in general as well as representative of the rural population. Because the surveys are very similar across countries and years, it provides a unique opportunity for a cross-country and panel analysis.

Most importantly, following the framework of the Washington Group on Disability Statistics, for individuals older than five, the LSMS questionnaire[23] captures disability through six questions that aim to detail self-reported difficulties of hearing, seeing, walking or climbing, remembering or concentrating, self-care, understanding or being understood[24]. The motivation for including only the short set of questions is that it is not possible to do so in censuses or surveys not dedicated specifically to disability. Because we rely on a multipurpose questionnaire that collects information on a large variety of modules on social, health and economic aspects, we are restricted by a shorter and less detailed set of questions on disability. However, having a panel and nationally representative data allows a study that captures the trends in disability, a progressive condition that is likely to get worse with time and without proper care, but also one whose results can be extrapolated to discuss the impacts of it for the entire nation. This external validity is crucial when designing protection policies to assist disabled individuals in the longer term.

Figure 1 here

For the purpose of this study, an individual is considered to have a disability if they report some or a lot of difficulty in at least one of the activities of seeing, hearing, walking or climbing, remembering or concentrating, self-care or communicating. Mitra (2018a) motivates the importance of analyzing the disaggregated effects of disability by severity to capture the significantly higher effects on severely disabled individuals in comparison to less severely disabled individuals. Because the proportions of PwD in the samples are relatively

[23] Altman, B. M. (Ed.), *International Measurement of Disability: Purpose, Method and Application (2016*) discusses the disability measure in detail.

[24] In Ethiopia's second and third waves and Tanzania's second wave, the disability questionnaire is asked to individuals who are five and older. But these questions are answered by all individuals in Nigeria, Ethiopia's first wave and Tanzania's first and third wave.

small, doing disaggregated analyses by type and severity of disability is challenging since it will further reduce the proportion of PwD. However, we are able to analyse effects by severity and type of disability (cognitive and physical) within the subsample of just PwD and their households. For simplicity and without loss of generality, we distinguish between physical (seeing, hearing, walking or climbing) and cognitive (remembering or concentrating, self-care, and communicating) disability.

Figure 2 here

Figures 1, 2 and 3 respectively present the proportion of PwD by waves and country, proportion of PwD with different kinds of disability by country, and proportion of PwD with different kinds of disability by severity. An average of around eight percent in Ethiopia, around six percent in Nigeria, and seven percent in Tanzania have some kind of disability[25]. The proportion of individuals with physical disabilities is higher in Ethiopia and Tanzania than those with cognitive disabilities. Although not as stark a difference as in Ethiopia and Tanzania, the occurrence of cognitive disability is higher in Nigeria. In terms of severity, most PwD report they have some difficulty (around 80 percent in Ethiopia and around 65 percent in Nigeria and Tanzania). A very small proportion of PwD report that their disability is so severe that they cannot perform the act in Ethiopia and Tanzania. Same is true in Nigeria except for walking/climbing, self-care and communicating. Although it is not clear why differences exist between countries or between disabilities, it should be noted that unlike disabilities like seeing and hearing, communicating and self-care may be more binary (either you have difficulty communicating or you do not but the difficulty in seeing may have different levels).

Figure 3 here

The descriptive statistics and the results for the test of differences in means of individual, household and household head characteristics by disability status and by country are presented in Tables 1 and 2. PwD are older in all three countries. They are less likely to be male in Ethiopia whereas there is no gender difference in Nigeria and Tanzania. They are more likely to be married in Ethiopia and Tanzania while less likely to be married in Nigeria. Among those married, PwD are more likely to be in a polygamous marriage in Ethiopia whereas they are less likely to be in such a union in Nigeria. It could be the case that in more rural and agricultural setting like in Ethiopia, polygamous marriages are a safety net strategy. Because the average age of individuals in Nigeria is lower than in Ethiopia and Nigeria, the difference in proportion of married and polygamous individuals makes sense. PwD are less likely to be literate or have any schooling in all three countries. If they had schooling, PwD are less likely to have finished the lower secondary level in Ethiopia. Apart from that, there are no significant differences at different levels of schooling. This may be because the PwD in Ethiopia develop their disability later in life and as such, there are no differences in their educational attainment. Even though PwD are more likely to have completed primary levels in Nigeria and Tanzania, the opposite is true at secondary levels of education in Nigeria whereas there are no differences in Tanzania. PwD are more likely to have vocational training in Nigeria. There are no significant differences in the proportion that finish some college or more in both Nigeria and Tanzania. PwD in Ethiopia are less likely to have agriculture as their main occupation whereas those in Tanzania are more likely to work in agriculture.

Table 1 here

There are also significant differences in household and household head's characteristics between households with and without PwD. Households head in households with PwD are older in all three countries. Heads are less likely to be male and married in households with PwD in Ethiopia and Tanzania but more likely to be male and married in Nigeria. Heads in households with PwD are less likely to be literate in Ethiopia and Tanzania. In all three

[25] Note: Wave 3 of Nigeria only asks about difficulty in seeing. Tanzania also has incomplete disability questionnaire in wave 3. As such, the variable is imputed using previous waves in the respective countries with the assumption that if an individual had a disability in wave, *t-1*, they are likely to have in wave, *t*.

countries, they are more likely to have no education. Heads are more likely to have agriculture as their main occupation in Ethiopia but less likely in Nigeria and Tanzania.

Households with PwD are larger in Nigeria and smaller in Ethiopia. There are fewer working age members, both male and female, in households with PwD. There are more women of working age in households with PwD in Tanzania. Households with PwD are more likely to own the house they live in all three countries. In Nigeria and Tanzania, households with PwD are more likely to live in houses with walls made up of mud, dirt or wood. Additionally, in Tanzania, the households with PwD are more likely to live in houses with floors made up of mud, dirt or wood. Households with PwD are less likely to have a drinking water tap during rainy season in Ethiopia and Tanzania. Households with PwD are less likely to have a toilet in Ethiopia and more likely to have a toilet in Nigeria and Tanzania. All in all, housing conditions appears to be poorer for households with PwD. In all three countries, households with PwD are more likely to be vulnerable to all kinds of shocks.

Table 2 here

Test of differences of means of outcome variables are presented in the appendix (Tables A1- A3). Poverty related outcomes include per capita net income, adult equivalent expenditure, adult equivalent expenditure on food, non-food, and education. In addition, likelihood of being in the lowest two quintiles of the income and the expenditure distribution is also considered. As food insecurity is one of the dimensions of poverty, we include outcomes like whether households have worried about not having enough food, relied on less preferred food, limited variety or portion size, reduced frequency of meals and fasted for 24 hours because there was no food. The recall period is seven days.

Even though households with PwD have significantly less per capita net income in only Ethiopia and Nigeria, they are more likely to be in the lowest two quintiles of the income distribution in Tanzania. In Ethiopia and Tanzania, households with PwD are more likely to be in the lowest two quintiles of expenditure distribution and particularly in the lowest two quintiles of food expenditure. Households with PwD spend significantly less on non-food items in Ethiopia and they are also more likely to fall in the lowest two quintiles. However, in both countries, households with PwD are more likely to be in the lowest two quintiles and less likely to be in the highest two quintiles of the non-food expenditure distribution. Households with PwD spend significantly less on education in Ethiopia and Nigeria. Households with PwD are significantly more likely to be food insecure in Ethiopia and Tanzania while there is no difference in food security variable in Nigeria. It is also important to note that unlike Tanzania and Ethiopia where the biggest share of expenditure is on food, households in Nigeria.

The surveys include modules on time-use in income generating activities like agricultural activities, non-agriculture activities, casual/part-time/temporary job, work for wage/salary/commission and unpaid labor. In Ethiopia, PwD are more likely to engage in non-agricultural activities, casual/part-time/temporary job, work for wage/salary/commission and unpaid labor than person without disabilities. In Nigeria, PwD are less likely to engage in agricultural and non-agricultural activities and work for wage/salary/commission than person without disabilities. In Tanzania, PwD are less likely to engage in unpaid labor.

Outcomes pertaining to economic activities include likelihood of participating in agriculture, non-agriculture activities. In Ethiopia, households with PwD are more likely to engage in off-farm activities. Within agriculture, there are no differences in shares of income from agricultural pursuits across the countries. Households with PwD in Ethiopia are more likely to have certificates for their plots and use fertilizers. In Ethiopia and Nigeria, households are more likely to use extension programs. Households with PwD are less likely to use improved seeds in Ethiopia but are more likely to use them in Tanzania. In addition, households with PwD are also more likely to use free seeds.

Within non-agricultural activities, households with PwD have smaller share of non-agricultural wages in Ethiopia and Tanzania and smaller share of self-employment in non-

agriculture sector in Ethiopia. In Ethiopia, households with PwD earn significantly less in non-agriculture wage as well as self-employment income. Both wages and self-employment income in non-agricultural sector also contribute less to the total income for households with PwD. In Nigeria, there is no differences between households with and without PwD in terms of non-agricultural wages or its share in the total income. However, households with PwD earn significantly less from self-employment and the share of self-employment income in the total is lower than that for households without PwD. The outcome variables also include number of enterprises, number of household and hired labor. There are no differences in the number of enterprises in both countries. In Ethiopia, households with PwD hire fewer labor to work in their non-agricultural enterprises.

Households with PwD in Ethiopia and Nigeria are also more likely to engage in transfers and other miscellaneous income generating activities and as a result the share of income from public and private transfers are higher for households with PwD.

Econometric Specification

The data used contains extensive panel data with information on disability and households' economic activities pertaining to agricultural and non-agricultural undertakings. The availability of panel data for all countries allows the use of a fixed effects regression approach that can control for unobserved heterogeneity in the form of time-invariant differences across entities as well as entity-invariant differences over time.

As described in the data section, PwD and their households are statistically different than person without disabilities and their households. In case of time-invariant differences across entities, a fixed effect regression will include a coefficient that is constant over time and will produce a distinct estimated intercept for every single entity. Similarly, in case of entity-invariant differences over time, a fixed effect regression will control for this heterogeneity by including a coefficient that is constant across entities but will vary with each time period. By separating and removing these differences, the net effect of disability on outcome variables can be assessed.

By controlling for all time-invariant differences in observables and unobservables, fixed effects models are able to greatly reduce the omitted variable bias. However, estimates may be still biased because the model is not able to account for unobservables that vary over time within each group.

But because the time between the consecutive waves are short, it is plausible to assume that the unobservables are indeed time-invariant.

These estimations are conducted with the help of the following regression model:

$$Y_{it} = \beta dis_{it} + \alpha X_{it} + \gamma_i + \delta_t + \varepsilon_{it}$$

where *i* denotes the entity (individual or household depending on the regression), *t* denotes the respective survey wave. The main independent variable, dis_{it}, identifies as a dummy variable whether an individual, *i*, is disabled in time, *t*, for all regressions at the individual level. For all regressions at the household level, the variable whether a household, *i*, has a member who is disabled in time, *t*. A vector of control variables, X_{it}, that include the individual (for individual regressions), household and household head's characteristics are also added to the regression. Furthermore, coefficients γ_i and δ_t represent the entity and time fixed effect respectively. Finally, ε_{it} represents the error term. Robust standard errors are estimated, and intra-cluster correlations are accounted for by clustering the standard errors at the community level in all the regressions.

For individual level gender differentiated effects of disability, the estimation is conducted using the following regression model:

$$Y_{it} = \beta dis_{it} + \pi gender_{it} + \tau(gender * dis)_{it} + \alpha X_{it} + \gamma_i + \delta_t + \varepsilon_{it}$$

where *gender*dis* is an interaction term between gender and disability. The marginal effect, τ, captures the difference in probability to participate in an activity by gender among PwD.

In addition, we also estimate whether and to what extent severity or the kind of disability – physical or cognitive – affects outcomes among those that are disabled or households in which they reside in.

Results

Because results from each country are unique, they are presented by country. The estimated coefficients and marginal effects (β) for the main independent variable, dis_{it}, are presented in Tables 3-5. Table 3 summarizes results on poverty and food security variables. Table 4 and 5 respectively present results on economic activities at household and individual level.

Table 3 here

Ethiopia

Poverty and Food Security. When time-variant and time-invariant observable and unobservable characteristics are controlled for, the differences in income and expenditure between households with and without PwD more or less disappears. It is noted that expenditure is perhaps a better proxy for welfare in the context of rural and agricultural households where income is more volatile. However, having a PwD in the household increases the likelihood of being in the lowest two quintiles of education expenditure. Among households with PwD, households with severely disabled members have a higher income. But results from expenditure variables strongly support that households with severely disabled members are poorer among households with PwD. The results by disability kind also do not reveal whether poverty is higher among households with individuals with physical or cognitive disabilities. Households with PwD with physical disability are less likely to be in the lowest two quintiles of non-food and education expenditure in comparison to households with individuals with cognitive disability in Ethiopia.

Even though income and expenditure variables, generally used to gauge poverty status, do not provide a consistent and clear story, effects on measures for food security demonstrate that households with PwD are highly food insecure in Ethiopia. They are more likely to worry about food, have limited variety of food, limit the portion size of meals, and reduce the frequency of meals in the last seven days. Adults in the households with PwD are also more likely to restrict their consumption in the last seven days. Members in households with PwD are more likely to fast 24 hours in the last seven days in Ethiopia. This complements the results from the test of differences in means of food security variables. The negative effects on food security variables are also consistent with those in Simeu & Mitra (2019). There are little to no effect of severity and disability kind on food security among households with PwD.

Economic Activities. Households with PwD in Ethiopia are more likely to participate non-agricultural activities (both for wage and self-employment), transfers and/or other miscellaneous income activities, off-farm activities like wage work in both agriculture and non-agricultural sectors, self-employment in non-agricultural activities. However, the shares of total income from agricultural wages and public/private transfers are the only ones larger for households with PwD. Among those who engage in crop production, it is also evident that households with PwD are less likely to use improved seeds and more likely to use free seeds.

Among households with PwD, those with severely disabled members are less likely to engage in nonfarm activities but more likely to engage in transfer and off-farm activities. However, they have a differentially lower share of income from non-agricultural activities. Households with severely disabled individuals are more likely to have a certificate for their plots. This could be a strategy to overcome liquidity constraints if needed. The share of income from self-employment is also higher for households with physically disabled than those with individuals with cognitive disability.

Individual level Time-Use. Having a disability reduces the likelihood of engaging in agricultural activities. Although being disabled does not alter the likelihood of engaging in activities that are not agricultural in nature, disabled men are less likely to engage in non-

agricultural activities and work as a casual, part-time, temporary labor than women with disabilities.

Among PwD, severely disabled individuals are less likely to spend time in agricultural activities and more likely to spend time in casual, part-time, temporary jobs. There are no gender differences between individuals with severe disability and those with less severe disability. Individuals with physical disabilities are more likely to engage in agricultural activities, non-agricultural activities, casual labor and work for wage/salary/commission than those with cognitive disabilities. Men who are physically disabled are less likely to engage in non-agricultural activities and casual labor than women who are physically disabled. This analysis enhances the results from Mitra (2018c) – which finds that PwD in Ethiopia have a higher chance of leaving work. The analysis on the effects of being disabled on different kinds of economic activities shows that there is variation by type of activity, gender, severity and type of disability.

Table 4 here

Nigeria

Poverty and Food Security. Similar to Ethiopia, there is little to no evidence that supports the hypothesis that having a PwD affects households' income and expenditure in Nigeria. Having a PwD in the household increases the likelihood of being in the lowest two quintiles of total net income and expenditure on education.

But unlike the results in Ethiopia, households with PwD are not differentially food insecure. They are less likely to rely on less preferred food in the last seven days. This may be because Nigeria is wealthier and food security and nutrition is less of an issue than in Ethiopia.

Even within households with PwD, there is no evidence that households with severely disabled individuals are poorer based on the results for income, expenditure and food security measures. Households with physically disabled individuals have higher income but are more likely to rely on less preferred food and limited variety in the last seven days than those with cognitive disability.

Economic Activities. Households with PwD are less likely to participate in non-agricultural activities (both for wage and self-employment). They have fewer non-farm enterprises. They are more likely to receive public and private transfers, which make a bigger share of their total income. Among those that engage in agriculture, households with PwD are more likely to have a certificate and use an extension program. Even though they do not have significantly different share of income from crop production per hectare, they are less likely to sell their harvest. The share of livestock income is also lower for households with PwD. Within the subsample of households with PwD, those with severely disabled individuals have a higher share of income from crops but lower share from livestock. Households with physically disabled individuals are significantly less likely to engage in farm activities and as result, they have less income from crops per hectare and agricultural income per hectare in general. Additionally, they are less likely to sell their harvest than the households with members that have cognitive disability.

Individual Time-Use. Having a disability reduces the likelihood of engaging in agricultural activities, non-agricultural activities and work for wages/salary/commission in Nigeria. This is consistent with the results from Mitra (2018c) and Mani, Mitra, & Sambamoorthi (2018). Disabled men are less likely to engage in agriculture activities than disabled women. Among PwD, severely disabled individuals are less likely to spend time in agricultural activities and non-agricultural activities. Furthermore, men with severe disability are less likely to spend time in agricultural activities but more likely to spend time in non-agricultural activities than women with severe disability. Physically disabled individuals are more likely to engage in agricultural activities than those with cognitive disability.

Table 5 here

Tanzania

Poverty and Food Security. Having a PwD in the household increases the likelihood of being in the lowest two quintiles of food expenditure in Tanzania. This is consistent with the results from food security measures. Households with PwD are more likely to worry about food, have limited variety of food, limit the portion size of meals, and reduce the frequency of meals in the last seven days. Adults in the households with PwD are also more likely to restrict their consumption in the last seven days.

Consistent with results from Ethiopia, among households with PwD in Tanzania, households with severely disabled members have a higher income. Results from expenditure variables show that households with severely disabled members also spend more, which is strongly driven by differentially higher spending in education. Households with severely disabled members also have smaller lands. Households with physically disabled individuals in Tanzania spend more on non-food items and less on education. They are more likely to fall in the lowest two quintiles of food expenditure. There are no effects of severity and disability kind on food security.

Economic Activities. Having a PwD does not affect household's economic activities. Among households with PwD, those with severely disabled members have more non-farm enterprises. Although households with physically disabled individuals in Tanzania are not different in terms of their participation in different economic activities from those with individuals with cognitive disability, they have significantly less agricultural income per hectare. Households with physically disabled individuals have fewer non-farm enterprises.

Individual Time-use. There are no differences – in general or by gender – in time use between person with and without disabilities in Tanzania. This implies that PwD, both men and women, are equally likely to participate in economic activities as those without. This is in contrast to the results from Mitra (2018c) and Mani, Mitra, & Sambamoorthi (2018).

Summary and Discussion

The goal of this paper is to not only reevaluate the disability and poverty relationship using panel data and rigorous econometric techniques but also to study the role of disability status in affecting economic activities of PwD as well as their families in rural contexts of sub-Saharan African countries. In doing so, it adds to a new line of research that uses panel data and fixed effect models (Mitra, 2018; Mani, Mitra, & Sambamoorthi, 2018) and extends it by doing a more in-depth analysis on the economic activities .

The results from the three sub-Saharan countries provide unique stories about the effect of disability on households' economic activities. In Ethiopia, although the likelihood of participating in agricultural activities is not affected by the presence of a disabled member in the household, households with PwD are found to be highly food insecure. The statistically higher likelihood of participation of households with PwD in non-farm, off-farm and transfers, which translates into a higher share of income from agricultural wages and transfers, brings their income and expenditure to a level that is no different than those without PwD. The role of income from non-farm activities and transfers is further confirmed by the results from the analysis by severity. Among households with PwD, households with severely disabled members are still more likely to participate in transfers and off-farm activities but, unlike households with PwD, households with severely disabled individuals are less likely to participate in non-farm activities, which results in a lower share of income coming from self-employment. In addition, the share of income from transfer is no longer higher for households with severely disabled members. In terms of food security, households with individuals with severe and those with less severe disabilities are equally food insecure. Although PwD in Ethiopia are less likely to engage in agricultural activities, they are equally likely to engage in other income generating activities as person without disabilities. Additionally, women with disabilities are more likely to engage in non-agricultural and temporary jobs than men with disabilities.

Like Ethiopia, in Nigeria having a PwD does not affect the likelihood of engaging in agricultural activities. Among those who do engage in agricultural activities, households with PwD are less likely to sell their harvest. This could be the reason why they are not more

food insecure. But unlike those in Ethiopia, households with PwD are less likely to rely on nonfarm activities and transfers. As households with PwD receive a significantly high income from transfers, they have similar income and expenditure as households without PwD. PwD in Nigeria are less likely to engage in agricultural, non-agricultural activities and work for wage/salary/commission.

Apart from statistically higher number of enterprises, having a PwD does not seem to affect any other economic activities in Tanzania and as such, income and expenditure outcomes are also not statistically different from those without PwD. However, households with PwD are more likely to be food insecure. PwD in Tanzania are equally likely to engage in agricultural, non-agricultural activities and unpaid labor.

Despite the variation in results from these three countries, three common themes can be observed. First, households with PwD are poorer based on at least one dimension. They either have lower income or expenditure or are highly food insecure or have lower capabilities or are prone to more shocks. However, the effects of disability on most poverty measures disappear when time varying observable and unobservable characteristics are controlled using time and entity fixed effects model with control variables that include the household and household head characteristics. In summary, using panel data and a fixed effect model, we find no effect of disability on poverty. This result is consistent with results from (Mitra, 2018c).

Second, in countries like Tanzania and Ethiopia, where participation rate in on-farm activities is over 92% (in comparison to 77% in Nigeria), having a PwD increases likelihood of food insecurity regardless of whether PwD are less or equally as likely to participate in agriculture as person without disabilities.

Third, households with PwD have statistically higher (Ethiopia and Nigeria) or equal participation (Tanzania) in certain income generating activities, which could be a mechanism through which they are able to compensate for any possible disadvantages they may face in the labor markets attributable to disability. This would be possible if PwD are still active in the labor market and/or other members of the households work more to make up for any reduction in labor hours of PwD. The individual time use results do reveal that although PwD are less likely to engage in certain activities (agriculture in Ethiopia; agriculture, non-agriculture and work for wage/salary/commission in Nigeria), they were equally likely to engage in other activities as person without disabilities (non-agriculture, temporary, work for wage/salary/commission, unpaid in Ethiopia; agriculture, non-agriculture and unpaid in Tanzania).

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Figures[26]

Figure 1: Proportion of persons with disability by waves and countries

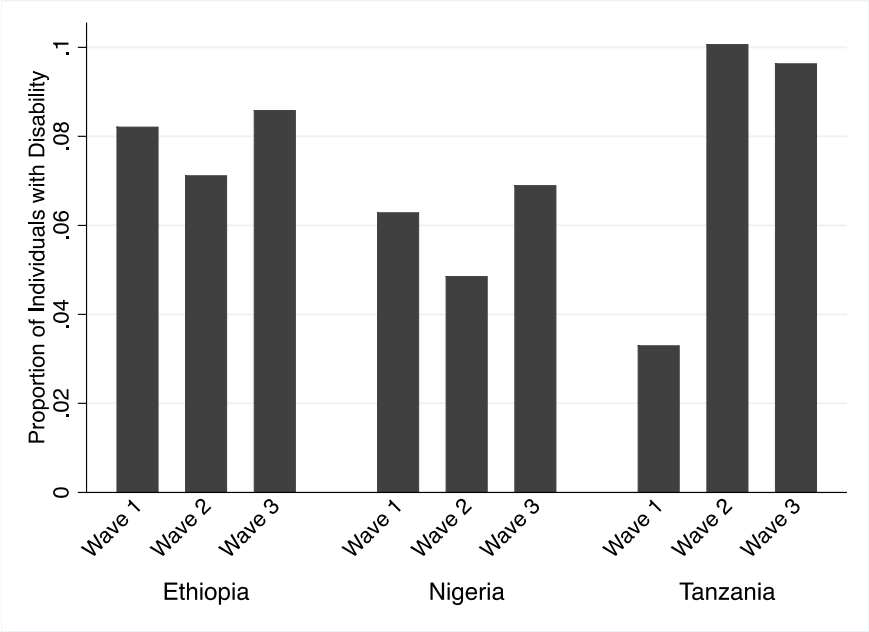
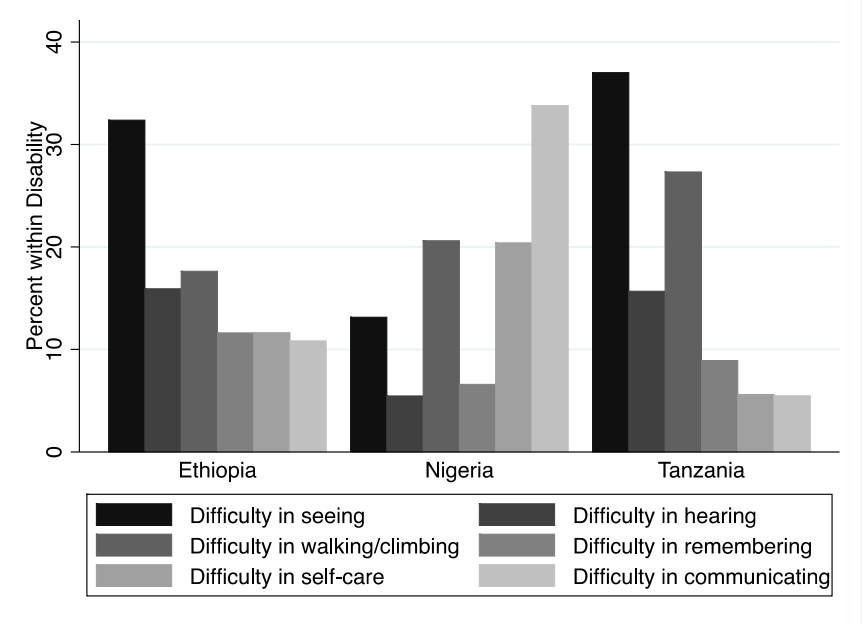


Figure 2: Proportion of PwD with different kinds of disability (panel)



[26] Note: Wave 3 of Nigeria only asks about difficulty in seeing. Tanzania also has incomplete disability questionnaire in wave 3. As such, the variable is imputed using previous waves in the respective countries with the assumption that if an individual had a disability in wave, *t-1*, they are likely to have in wave, *t*.

Figure 3: Severity distribution by disability kind (panel)

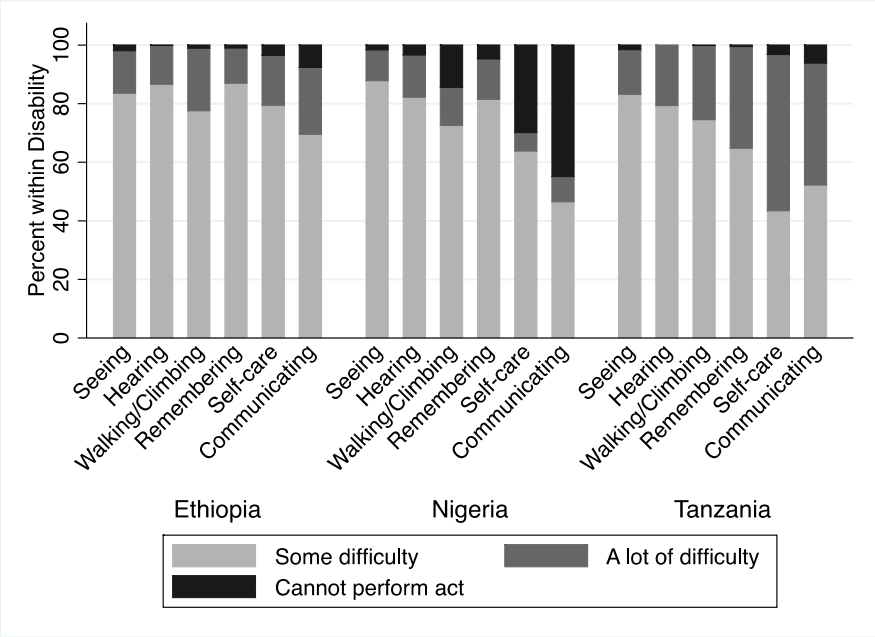


Table 1: Weighted Averages of individual characteristics by disability status

	Ethiopia			Nigeria			Tanzania		
Individual Characteristics	**PwD**	**Non-PwD**	**P-value**	**PwD**	**Non-PwD**	**P-value**	**PwD**	**Non-PwD**	**P-value**
Age	43.796	21.458	0.000***	29.763	24.264	0.003***	47.091	22.821	0.000***
Gender is male	0.484	0.508	0.033**	0.526	0.506	0.125	0.47	0.49	0.425
Married	0.509	0.322	0.000***	0.275	0.34	0.004***	0.407	0.257	0.000***
If married, in polygamous marriage	0.044	0.024	0.007***	0.247	0.345	0.001***	0.203	0.219	0.495
Literate	0.287	0.497	0.000***	0.329	0.551	0.000***	0.531	0.657	0.000***
Any schooling	0.286	0.564	0.000***	0.481	0.667	0.000***	0.579	0.687	0.000***
Disability: reason for no school	0.025	0.001	0.000***	0.016	0.001	0.003***	-	-	-
Education: Below primary	0.088	0.095	0.726	0.02	0.013	0.187	0.001	0.000	0.420
Education: Primary	0.803	0.803	0.997	0.488	0.428	0.065*	0.740	0.465	0.000***
Education: Secondary (9^{th} and 10^{th} grade)	0.046	0.066	0.031**	0.045	0.117	0.000***	-	-	-
Education: Secondary (11^{th} and 12^{th} grade)	0.007	0.009	0.541	0.114	0.225	0.000***	0.036	0.037	0.933
Education: Vocational	0.026	0.014	0.124	0.01	0.004	0.043**	0.003	0.001	0.328
Education: Some college	0.001	0.002	0.132	0.037	0.037	0.941	-	-	-
Education: College and higher	0.005	0.003	0.489	0.015	0.021	0.163	0	0	0.254
Education: Religious	0.004	0.001	0.161	0.157	0.101	0.12	-	-	-
Main Occupation: Agriculture	0.874	0.898	0.006***	0.572	0.57	0.96	0.755	0.664	0.005***
Number of individuals in the panel	4,098	47,256		3,182	50,124		2,214	27,908	

Table 2: Weighted Averages of household characteristics by disability status

	Ethiopia			Nigeria			Tanzania		
Variables	**PwD**	**Non-PwD**	**P-value**	**PwD**	**Non-PwD**	**P-value**	**PwD**	**Non-PwD**	**P-value**
Household head's characteristics									
Age	53.951	43.358	0.000***	54.133	51.458	0.003***	55.523	46.087	0.000***
Gender is male	0.725	0.81	0.000***	0.867	0.834	0.015**	0.71	0.777	0.000***
Married	0.717	0.82	0.000***	0.831	0.79	0.008***	0.578	0.635	0.001***
Religion: in majority	0.493	0.481	0.63	-	-	-			
Head is literate	0.339	0.478	0.000***	0.377	0.376	0.988	0.657	0.752	0.000***
Head has no education	0.725	0.575	0.000***	0.427	0.373	0.006***	0.342	0.248	0.000***
Main Occupation: Agriculture	0.857	0.837	0.081*	0.35	0.381	0.064*	0.338	0.393	0.061*
Household's characteristics									
Household size	5.704	5.879	0.047**	6.949	6.615	0.033**	5.96	5.744	0.128
Number of male member between ages 15 and 60	1.095	1.246	0.000***	1.498	1.564	0.158	1.425	1.40	0.603
Number of female member between 15 and 60	1.237	1.265	0.292	1.639	1.691	0.211	1.480	1.408	0.097*
Own house (dummy)	0.935	0.916	0.008***	0.868	0.799	0.000***	0.933	0.901	0.002***
Has electricity (dummy)	0.27	0.285	0.56	0.399	0.393	0.831	0.044	0.05	0.395
Walls are made up of mud, dirt or wood	0.006	0.008	0.161	0.618	0.563	0.018**	0.624	0.586	0.068*
Roofs are made up of mud, dirt or wood	0.006	0.005	0.821	0.194	0.188	0.683	0.43	0.475	0.051*
Floors are made up of mud, dirt or wood	0.038	0.051	0.167	0.395	0.388	0.735	0.844	0.885	0.007***
Drinking water comes from a tap (rainy season)	0.224	0.264	0.043**	0.065	0.061	0.775	0.010	0.014	0.242
Has a toilet	0.314	0.357	0.033**	0.467	0.425	0.018**	0.15	0.027	0.015**
Shock: death in the family	0.032	0.019	0.017**	0.15	0.137	0.232	0.160	0.158	0.824
Shock: illness in the family	0.215	0.135	0.000***	0.101	0.042	0.000***	0.155	0.088	0.000***
Shock: Farm-crop damage and/or loss of livestock	0.125	0.1	0.127	0.046	0.021	0.000***	0.515	0.500	0.444
Shock: Non-farm-job loss and/or business failure	0.008	0.01	0.32	0.057	0.042	0.081*	0.017	0.021	0.370
Shock: Natural disaster (drought, flood, heavy rain)	0.234	0.183	0.004***	0.123	0.087	0.001***	0.558	0.511	0.005***
Shock: Price changes	0.315	0.274	0.049**	0.147	0.099	0.000***	0.728	0.721	0.626
Number of households in the panel	2,999	7,881		2,089	7,150		1,691	4,320	

Table 3: Any Disability and Poverty and Food Security

	Coefficients/Marginal Effects								
	Ethiopia			Nigeria			Tanzania		
Outcome Variables	**Any disability**	**Severe Disability**	**Physical Disability**	**Any disability**	**Severe Disability**	**Physical Disability**	**Any disability**	**Severe Disability**	**Physical Disability**
Poverty related outcomes									
Log of per capita net income[1]	0.0028	0.342*	-0.278	-0.164	-0.098	0.524**	-0.033	1.040*	0.245
In the lowest two quintiles of total net income[1] *	-0.000547	-0.0241	-0.032	0.0417*	-0.011	0.0138	0.0324	0.038	-0.025
Log of adult equivalent expenditure	0.018	-0.0884**	-0.0131	-0.064	-0.025	0.227	-0.0902	0.494*	0.432
In the lowest two quintiles of adult equivalent expenditure *	0.017	0.0661***	-0.006	-0.007	-0.005	-0.0001	0.041	-0.074	0.040
Log of adult equivalent expenditure on food	0.0048	-0.105**	-0.0221	0.007	-0.0223	-0.034	-0.084	0.380	0.384
In the lowest two quintiles of adult equivalent expenditure on food *	0.0183	0.0543**	-0.008	-0.0189	0.049	0.0460	0.081***	-0.039	-0.0476
Log of adult equivalent expenditure on non-food	0.0426	0.0192	-0.004	-0.077	-0.057	0.347	0.073	0.219	0.074*
In the lowest two quintiles of adult equivalent expenditure on non-food *	0.001	0.0202	-0.0434*	-0.003	-0.006	-0.0001	-0.023	0.072	-0.059
Log of adult equivalent expenditure on education	0.0324	0.134	0.102	0.0808	-0.088	-0.317	0.266	1.685**	-3.240***
In the lowest two quintiles of adult equivalent expenditure on education *	0.0225*	0.0485**	-0.0541**	0.079***	0.0348	-0.026	0.0138	0.026	0.0587
Land owned (in hectare) if not landless[1]	0.341	0.950	0.087	-0.0707	-0.310	0.190	0.730	-1.113*	-6.102
Food Security									
Worried about not having enough food in the last 7 days? *	0.0394***	0.0253	-0.00719	-0.027	-0.0434	0.0535	0.124***	0.0275	0.0918
Relied on less preferred food in the last 7 days? *	0.0292***	0.000579	0.0239	-0.064***	-0.0231	0.0677**	0.118***	0.069	0.115
Limited variety in the last 7 days? *	0.0268***	0.00165	0.0347*	-0.015	-0.0117	0.0672**	0.0468	0.009	0.0688
Limited portion size in the last 7 days? *	0.0389***	0.0133	0.00997	-0.024	-0.0170	0.0143	0.0474**	-0.008	0.0484
Reduced frequency of meals in the last 7 days? *	0.0399***	0.0127	0.00303	-0.008	-0.0384	0.00826	0.0741**	-0.014	0.116
Adults restricted consumption in the last 7 days? *	0.0263***	0.00327	-0.00264	-0.0056	-0.0130	0.00420	0.0338**	-0.0149	-0.0319
Fasted for 24 hours because there was no food in the last 7 days? *	0.0201***	0.00809	0.00207	-0.006	-0.0204	5.16e-05	-0.000538	-0.005	0.0399
Number of households with PwD/Severely disabled/physically disabled	2,999	684	777	2,089	828	964	1,691	513	1,369
Number of households in the panel	10,870	2,999	2,999	9,239	2,089	2,089	6,011	1,689	1,689

Note:1. Estimated using RIGA data (only first two waves available for Ethiopia). * Marginal effects are reported for variables labelled. ***p-value <0.01; **p-value<0.05; *p-value<0.1.

Table 4: Any Disability and Economic Activities at the Household level

	Coefficients/Marginal Effects								
	Ethiopia			Nigeria			Tanzania		
Outcome Variables	**Any disability**	**Severe Disability**	**Physical Disability**	**Any disability**	**Severe Disability**	**Physical Disability**	**Any disability**	**Severe Disability**	**Physical Disability**
Participation in crop and/or livestock activities (onfarm)[1] *	-0.008	0.0032	0.0111	0.00324	-0.039	-0.0593***	-0.004	-0.004	-0.012
Participation in non-agriculture wage and/or self-employment (nonfarm)[1] *	0.0289**	-0.047*	0.0240	-0.0681**	-0.025	0.0226	-0.0102	0.0614	-0.050
Participation in transfers and/or other miscellaneous income activities (transfer)[1] *	0.0665***	0.123***	0.0209	0.0259***	-0.011	0.0265	-0.0106	0.050	0.004
Participation in ag-wage, non-ag wage, self-employment and/or other activities (off-farm)[1] *	0.0684***	0.051*	0.0383	-	-	-	-0.0102	0.027	-0.029
Share of income from agricultural wages[1]	0.0107*	-0.0036	-0.001	0.004	-0.008	-0.008	-0.012	0.015	-0.028
Share of income from crops[1]	-0.00811	0.003	0.008	0.009	0.048*	0.012	0.0021	-0.007	-0.023
Share of income from livestock[1]	-0.0126	-0.005	-0.021	-0.019***	-0.017*	0.003	0.013	-0.059	0.030
Log of income from crops per hectare[1]	0.190	-0.071	-0.479	0.120	0.321	-0.727**	-0.0730	0.342	-2.004***
Log of agricultural income (crops and livestock) per hectare[1]	0.0145	-0.019	-0.374	0.0900	0.106	-0.629*	0.018	-0.0599	0.450
Likelihood of selling the harvest*	0.0136	0.011	0.0283	-0.0552**	0.046	0.078*	0.033	0.003	0.061
Likelihood of having a certificate *	0.00879	0.0621**	0.0148	0.0677***	-0.014	-0.069	-	-	-
Likelihood of using extension programs *	-0.0172	-0.0154	0.000	0.0281**	-0.005	-0.046*	-	-	-
Likelihood to use fertilizers*	0.0042	-0.001	0.0435*	-0.004	0.005	0.026	-0.001	-0.122	0.006
Likelihood of using improved seeds*	-0.0119	-0.023	0.0306*	-0.003	-0.0004	0.067	-0.008	0.051*	0.0434
Likelihood of using purchased seeds*	-0.0265*	-0.003	0.0236	-0.013	-0.005	0.034	0.013	0.003	-0.037
Likelihood of using free seeds*	0.0184**	0.006	-0.0214	0.0151*	0.008	-0.006	-	-	-
Share of income from non-agricultural wages[1]	0.0004	0.006	0.008	-0.005	-0.0028	-0.009	-0.000	0.005	-0.014
Share of income from self-employment income[1]	-0.0498	-0.018*	0.0204*	0.009	-0.013	0.006	-0.004	0.022	0.019
Number of enterprises	0.0116	-0.008	0.0215	-0.128**	0.017	0.206	-0.0412	5.98***	-6.928***
Share of income from public and private transfers[1]	0.0147**	0.018	-0.0144	0.014**	-0.003	0.0013	-0.000	0.015	0.014
Number of households with PwD/Severely disabled/physically disabled	2,999	684	777	2,089	828	964	1,691	513	1,369
Number of households in the panel	10,870	2,999	2,999	9,239	2,089	2,089	6,011	1,689	1,689

Note:1. Estimated using RIGA data (only first two waves available for Ethiopia). * Marginal effects are reported for variables labelled. ***p-value <0.01; **p-value<0.05; *p-value<0.1

Table 5: Any Disability and Economic Activities at the Individual level

	Marginal Effects								
	Ethiopia			Nigeria			Tanzania		
Outcome Variables	**Any disability**	**Severe Disability**	**Physical Disability**	**Any disability**	**Severe Disability**	**Physical Disability**	**Any disability**	**Severe Disability**	**Physical Disability**
Does having a disability affect whether individuals engage in:									
Agricultural activities in the last 7 days?	-0.0327**	-0.0849**	0.0823***	-0.155***	-0.14***	0.116***	0.028	-0.104	0.0564
Non-agricultural activities in the last 7 days?	-0.0018	-0.00172	0.0431***	-0.116***	-0.102**	0.000	0.006	0.046	-0.038
Casual, part-time, temporary job in the last 7 days?	0.003	0.0218*	0.0281**	-	-	-	-	-	-
Work for wage, salary, commission in the last 7 days?	0.001	-0.00419	0.0159**	-0.02**	-0.000	0.0585	-	-	-
Unpaid labor in the last 7 days?	-0.001	0.00633	0.0107	-	-	-	0.026	-1.52	-0.017
***Do men and women with disabilities engage differently in:**									
Agricultural activities in the last 7 days?	-0.0285	0.0470	-0.0285	-0.214***	-0.173*	0.0318	0.029	-0.025	-0.185
Non-agricultural activities in the last 7 days?	-0.0491***	-0.00454	-0.0491***	0.0182	0.303**	-0.006	0.020	0.638	0.089
Casual, part-time, temporary job in the last 7 days?	-0.0212**	-0.00763	-0.0212**	-	-	-	-	-	-
Work for wage, salary, commission in the last 7 days?	-0.009	-0.00812	-0.00986	-0.008	-0.21**	0.056	0.008	-2.089	0.036
Unpaid labor in the last 7 days?	-0.0016	0.0567	-0.00162	-	-	-	-	-	-
Number of PwD/Severely disabled/physically disabled individuals	4,074	760	2,684	3,182	2,071	1,934	2,214	555	1,740
Number of individuals in the panel	51,253	4,074	4,074	53,299	3,182	3,182	30,122	2,214	2.214

*the reported marginal effects are for the interaction terms between disability and gender. ***p-value <0.01; **p-value<0.05; *p-value<0.1.

Appendix

Table A1: Weighted Averages of poverty related outcome variables by disability status

	Ethiopia			Nigeria			Tanzania		
Variables	**PwD**	**Non-PwD**	**P-**	**PwD**	**Non-PwD**	**P-**	**PwD**	**Non-PwD**	**P-**
Poverty related outcomes									
Total Income[1] (USD)	120.534	141.405	0.039**	3.106	5.678	0.030**	493.1	497.5	0.865
In the lowest two quintiles of total net income[1]	0.423	0.391	0.195	0.402	0.381	0.31	0.430	0.388	0.008***
Adult equivalent total expenditure (USD)	237.407	251.979	0.021**	14181.63	69621.69	0.236	230.55	236.883	0.337
In the lowest two quintiles of total expenditure	0.402	0.377	0.103	0.576	0.554	0.248	0.433	0.391	0.020**
Adult equivalent expenditure on food (USD)	193.359	199.069	0.23	249.361	325.113	0.2	174.02	176.689	0.550
In the lowest two quintiles of adult equivalent expenditure on food	0.399	0.378	0.092*	0.48	0.472	0.707	0.43	0.393	0.058*
Adult equivalent expenditure on non-food (USD)	41.825	50.257	0.004***	13918.68	69278.78	0.237	46.861	48.020	0.639
In the lowest two quintiles of adult equivalent expenditure on non-food	0.42	0.371	0.035**	0.576	0.554	0.239	0.409	0.388	0.214
Adult equivalent expenditure on education (USD)	2.224	2.653	0.039**	13.589	17.795	0.005***	6.186	6.453	0.689
In the lowest two quintiles of adult equivalent expenditure on education	0.401	0.377	0.17	0.484	0.428	0.003***	0.407	0.383	0.229
Food Security									
Worried about not having enough food in the last 7 days?	0.223	0.149	0.000***	0.448	0.453	0.83	0.551	0.629	0.001***
Limited variety in the last 7 days?	0.267	0.198	0.000***	0.337	0.344	0.744	0.377	0.520	0.000***
Limited portion size in the last 7 days?	0.238	0.161	0.000***	0.246	0.248	0.9	0.333	0.507	0.000***
Reduced frequency of meals in the last 7 days?	0.223	0.153	0.000***	0.214	0.21	0.845	0.436	0.557	0.000***
Adults restricted consumption in the last 7 days?	0.144	0.102	0.001***	0.114	0.117	0.794	0.274	0.470	0.000***
Fasted for 24 hours because there was no food in the last 7 days?	0.052	0.03	0.005***	0.029	0.026	0.612	0.232	0.453	0.000***
Number of households in the panel	2,999	7,881		2,089	7,150		1,691	4,320	

Note:1. Estimated using RIGA data (only first two waves available for Ethiopia).

Table A2: Weighted Averages of economic activities related outcome variables by disability status

	Ethiopia			Nigeria			Tanzania		
Variables	**PwD**	**Non-PwD**	**P-value**	**PwD**	**Non-PwD**	**P-value**	**PwD**	**Non-PwD**	**P-value**
Participation in crop and/or livestock activities (onfarm)[1] *	0.925	0.924	0.858	0.792	0.767	0.224	0.968	0.968	0.879
Participation in non-agriculture wage and/or self-employment (nonfarm)[1] *	0.262	0.282	0.337	0.589	0.594	0.852	0.472	0.480	0.665
Participation in transfers and/or other miscellaneous income activities (transfer)[1] *	0.442	0.322	0.000***	0.152	0.113	0.004***	0.590	0.832	0.182
Participation in ag-wage, non-ag wage, self-employment and/or other activities (off-farm)[1] *	0.661	0.598	0.007***	-	-	-	0.836	0.831	0.644
Share of income from agricultural wages	0.057	0.052	0.4	0.009	0.008	0.672	0.066	0.073	0.499
Share of income from crops	0.595	0.583	0.416	0.411	0.401	0.606	0.443	0.428	0.611
Share of income from livestock	0.173	0.187	0.145	0.055	0.066	0.14	0.149	0.134	0.631
Income from crops per hectare (USD)	335.878	517.708	0.11	4.27	4.03	0.547	144.832	134.53	0.288
Agricultural income (crops and livestock) per hectare	99.691	108.166	0.333	593.074	82.97	0.342	196.5	205.5	0.497
Proportion of households that sell their harvest*	0.742	0.756	0.374	0.577	0.616	0.109	0.718	0.698	0.27
Proportion of households that have a certificate *	4.608	0.549	0.000***	0.107	0.086	0.329	-	-	-
Proportion of households that use extension programs *	0.377	0.422	0.020**	0.201	0.133	0.014**	-	-	-
Proportion of households that use fertilizers*	0.513	0.573	0.012**	0.54	0.498	0.142	0.161	0.15	0.501
Proportion of households that use improved seeds*	0.224	0.263	0.060*	0.127	0.132	0.79	0.468	0.412	0.001***
Proportion of households that use purchased seeds*	0.589	0.612	0.218	0.323	0.327	0.815	0.677	0.648	0.076*
Proportion of households that use free seeds*	0.104	0.083	0.072*	0.071	0.068	0.683	-	-	-
Share of income from non-agricultural wages	0.028	0.045	0.005***	0.079	0.09	0.299	0.074	0.089	0.047*
Share of income from self-employment income	0.067	0.088	0.003***	0.362	0.383	0.281	0.165	0.18	0.212
Number of enterprises	1.198	1.271	0.147	1.836	1.798	0.456	1.31	1.275	0.296
Share of income from public and private transfers	0.079	0.045	0.000***	0.061	0.034	0.001***	0.099	0.094	0.587
Number of households in the panel	2,999	7,881		2,089	7,150		1,691	4,320	

Table A3: Weighted Averages of individual time use related outcome variables by disability status

	Ethiopia			Nigeria			Tanzania		
Variables	**PwD**	**Non-PwD**	**P-value**	**PwD**	**Non-**	**P-value**	**PwD**	**Non-**	**P-value**
Does having a disability affect whether individuals engage in:									
Agricultural activities in the last 7 days?	0.453	0.434	0.218	0.247	0.283	0.041**	0.534	0.532	0.880
Non-agricultural activities in the last 7 days?	0.104	0.082	0.003***	0.034	0.042	0.226	0.13	0.129	0.973
Casual, part-time, temporary job in the last 7 days?	0.032	0.024	0.081*	0.144	0.187	0.001***			
Work for wage, salary, commission in the last 7 days?	0.016	0.012	0.072*						
[i]Unpaid labor in the last 7 days?	0.04	0.028	0.017**				0.17	0.423	0.000***
Number of individuals in the panel	4,098	47,256		3,182	50,124		2,214	27,778	