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Rural Poverty and Disability in LMICs[a]

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Abstract

Disability is neither a purely medical nor a purely social phenomenon. Rather, it is an outcome of their interplay. The main contributions of our study are two-fold: (i) a synthesis of the extant literature on the links between poverty and disability in LMICs. However, the studies focused on these links in rural areas are sparse. (ii) As rural economies-specifically, agriculture- continue to play an important role in economic growth, it is necessary to deepen our understanding of factors associated with rural disabilities, their association with rural employment and, finally, whether disabilities are associated with rural poverty. We use panel data for India and Ethiopia to illustrate these linkages, using rigorous econometric methodology. In particular, an important contribution is to corroborate the bidirectional association between disability and poverty, noted in many but validated in a few. The CRPD has ensured a concomitant shift in global initiatives, most notably the 2015 Sustainable Development Goals (SDGs) which explicitly recognise disability as a major impediment to elimination of poverty and hunger. In the current development discourse, disability has thus acquired high priority. Although there is a plethora of legislation banning discrimination against the disabled in LMICs-including India and Ethiopia and other LMICs-discrimination against disabled women and elderly is rampant. While it is imperative to fix the policy failures, a remedial strategy has to mainstream the disabled in a sustainable rural development framework, with a key role of the community and mass media in dismantling the barriers to the participation of the disabled in the political, economic and social spheres. Although the challenges are formidable, our study offers grounds for optimism.

Key Words: Rural Disabilities, Employment, Poverty, Pervasive and Persistent Discrimination, Policy Failures, LMICs, India and Ethiopia.

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Rural Poverty and Disability in LMICs

Introduction

One billion people worldwide, or 15% of the world's population, live with disabilities[1,2]. Disability is part of the human condition, and almost everyone will be temporarily or permanently impaired at some point in life, and those who survive into old age will experience increasing difficulties in functioning. Disability is neither a purely medical nor a purely social phenomenon. Rather, it is an outcome of their interplay. Non-communicable diseases (NCDs) such as asthma, cancer, cardiovascular disease, and stroke are associated with impairments that get aggravated by stigma and discrimination in access to educational and medical services and employment. "Higher disability rates among older people reflect an accumulation of health risks across a lifespan of disease, injury, and chronic illness"[3]. The co-occurrence of NCDs and disabilities poses a considerably higher risk of mortality.

Disability encompasses impairments resulting from congenital disorders, diseases, accidents, or ageing. With increasing age, several physiological changes occur, and the risk of NCDs rises. By age 60, the major burdens of disability and death stem from age-related losses in hearing, seeing and moving, as well as from the NCDs, especially in low- and middle-income countries[4]. Furthermore, aging is taking place alongside other broad social trends that will affect the lives of older people. Economies are globalizing, people are more likely to live in cities, and technology is evolving rapidly. Demographic and family changes mean that there will be fewer older people with families to care for them[4]. On an everyday basis, the elderly have to carry out activities of daily living (ADLs) and instrumental activities of daily living (IADLs). Together these represent key life tasks that people need to accomplish in order to live at home and be fully independent. The ADLs include walking, eating, dressing and grooming, and toileting among others. The IADLs require more complex thinking skills, including managing finances, transportation, shopping, and meal preparation among others.

There is a *bidirectional* link between disability and poverty: disability may increase the risk of poverty, and poverty may increase the risk of disability. Households with disabled members are more likely to experience material hardship, including food insecurity, poor housing, lack of access to safe water and sanitation, and inadequate access to healthcare. Poverty may increase the likelihood that a person with an existing health condition becomes disabled due to lack of access to appropriate health and rehabilitation services[2,5].

Research shows that in many countries, a disability and development gap is growing; unless people with disabilities are routinely included in development efforts, their socioeconomic status often remains unchanged while the status of nondisabled people surges ahead. Besides, unless systematically planned for and included in policies and programmes, people with disabilities are at

greater risk of being adversely affected in times of humanitarian disasters and emergencies or climate change [6]

The landmark UN Convention on the Rights of Persons with Disabilities (CRPD) was passed in 2006. Momentum for the CRPD's policy and programming changes has continued to increase, and it has now been ratified by more than 170 countries. The CRPD has ensured a concomitant shift in global initiatives, most notably the 2015 Sustainable Development Goals (SDGs).

The SDGs resolve to create conditions for sustainable, inclusive and sustained economic growth, shared prosperity and decent work for all, taking into account different levels of national development and capacities. The SDGs, which aim for 'leaving no one behind', seek to build on the Millennium Development Goals (MDGs), and accomplish what MDGs did not achieve, particularly reaching the most vulnerable. In the 2030 agenda for sustainable development 'Persons with disabilities' or 'disability' are specifically mentioned eleven times and 'Persons in vulnerable situations' are specifically mentioned six times. Some of the SDGs address issues related to disabled persons. The SDG 4 aims at 'Guaranteeing equal and accessible education', SDG 6 is for 'Promoting inclusive economic growth, full and productive employment', SDG 10 is for 'Emphasising the social, economic and political inclusion of persons with disabilities', SDG 11 is for 'Creating accessible cities and water resources, affordable, accessible and sustainable transport systems' and SDG 17 is for 'disability disaggregated data'. In the current development discourse, disability has thus acquired high priority[7].

Injuries and disabilities are inter-related. Injuries are often viewed as consequences of random events or accidents. There is, however, growing recognition that policies and guidelines can be put in place to mitigate the severity of injuries. In a recent survey of 4 countries[8] (Cameroon, Ethiopia, Ghana, and India), the focus is on the burden of injuries, how they impact individuals and wider society, what is likely to help the injured, and suggestions on improvements in the trauma systems. A few findings are highlighted here as a more detailed discussion is given later.

The poor are vulnerable to injuries, with 83% of the 4.6 million global deaths from injury occurring in LMICs. For every injury related death, 10 to 50 people sustain temporary or permanent disabilities. Injuries result in more than 220 million disability adjusted life years (DALYs) lost each year in LMICs; higher than that for cancer or ischemic heart disease, or for tuberculosis, HIV and malaria combined. The main causes of deaths related to injury in LMICs are road traffic injuries, followed by suicide, falls, and other unintentional injuries. Road traffic crashes killed 1.2 million people and injured another 5.3 million in 2016. Low-income countries have more than double the death rate from such crashes than high-income countries. The highest rate of injury occurs in the working-age population, causing a substantial loss of earnings for households and societies. An estimated US$180 billion is likely to be lost annually due to injury in LMICs. Death and disability from injury are often avoidable through prevention schemes, simple emergency procedures at the scene, and timely access to good-quality trauma-care systems with safe surgery and rehabilitation.

Armed conflicts contribute to the burden of injury, disability and mortality. Armed conflicts have substantial, direct and long-lasting impacts, particularly in developing countries, which are ill-equipped to deal with them, and where most wars occur. Armed conflicts are a major cause of injury, disability and mortality, imposing heavy burdens on populations, governments, economies, and health care systems. We review the Colombian armed conflict as it is a long-drawn conflict primarily in rural areas.

Extreme natural hazards, particularly the hydro-meteorological disasters, are emerging as a cause of major concern in the coastal and other regions of India and many other developing countries. These have become more frequent in the recent past and are taking a heavy toll of life and livelihoods. Low level of technological development in the rural areas together with social, economic and gender inequities enhance the vulnerability of the largely illiterate, unskilled, and resource-poor fishing, farming and landless labour communities[9,10].

Geophysical hazards (i.e. earthquakes, volcanic eruptions) originating from within the Earth's interior are common. Powerful earthquakes resulting in vertical displacement of the tectonic plates at the bottom of the sea can produce destructive tsunami waves as happened on 26 December 2004. The hydro- meteorological hazards consist of tropical cyclones, landslides, floods and droughts. In the 1990s, more than 90% of those killed in natural disasters lost their lives in hydro-meteorological events (mainly droughts, floods and wind-storms)[11]. While earthquakes accounted for 30% of the estimated risk, they caused just 9% of all fatalities due to natural disasters. In contrast, hunger caused by famines worldwide killed 42% of people in the affected regions, but accounted for just 4% of damage to assets over the past decade. Further, the number of geophysical disasters has remained fairly steady during the past two decades (1980s and 1990s), but the number of hydro-meteorological disasters has increased substantially[11,10]. Emerging events such as melting of ice in the Polar Regions and the Himalayas, rise in sea levels and increasing intensity and frequency of floods, hurricanes and typhoons suggest that global warming is influencing the number of hydro-meteorological disasters.

The majority of natural disasters affect poor nations and the poor in all nations the most, since their coping capacities are limited. Climate change directly affects sensitive sectors such as agriculture, forestry and fishery and thereby the livelihoods of millions of coastal and other communities[9,10].

Scheme

The scheme is as follows: Section 1 reviews the literature on global diability. This includes sub-sections on global disability, years lived with disability, country case studies, and climate change and disabilities. Section 2 is devoted to injuries, including musculoskeletal. Section 3 reviews evidence on armed conflicts, disabilities and injuries in Colombia, primarily because it is a long-drawn armed conflict in remote rural areas. Section 4 reviews the literature on the association between poverty and disabilities in selected LMICs. Section 5 contains econometric analyses of rural poverty and disabilties in India and Ethiopia.These fill an important gap as the literature on rural areas is sparse.

Moreover, the countries chosen are highly populous-India has the second largest population in the world and Ethiopia has the second largest in Africa. In both countries, rural poverty is dominant. Section 6 offers first a synthesis of evidence on poverty, disabilities, natural disasters, and injuries to broaden the policy perspective. In the subsequent sub-section, we highlight the significance of our econometric analyses of rural poverty and disabilities in India and Ethiopia, respectively. Section 7 focuses on policy challenges that LMICs face-including India and Ethiopia- in implementing an inclusive and sustainable rural development agenda, and some of these are anchored to IFAD's rural development strategies in India and Ethiopia. While IFAD's initiatives in sustainable rural development have been innovative and forward-looking, attention is drawn to complementarities among the multilaterals, donors and recipient countries to accomplish the vision of SDGs. However, in order to mainstream the disabled in rural development agenda in accordance with SDGs, it is argued that there is a long way to go.

Section 1
Literature Review

The introduction gives a snapshot of disability, injury and poverty. A more detailed but selective review is carried out below.

Section 1: Literature Review

(1a) Global Disability

From the perspective of SDGs, a recent UN report[7] gives a detailed account of the burden of disability and a review of policies pursued mostly by developing countries to help curb this burden. Unfortunately, constrained by scarcity of data on disability in rural areas, most of the discussion is at the national level. In a broad-brush summary, the main findings sans policy prescriptions are given below.

National data on income poverty disaggregated by disability remain scarce, but available data show that the proportion of persons with disabilities living under the national or international poverty line is higher, and in some countries double that of persons without disabilities. Besides, persons with disabilities and their households are more likely to not always have food to eat, than persons without disabilities and their households. Although financial inclusion can help persons with disabilities out of poverty, access to financial services such as banks remains restricted. In some countries, persons with disabilities find that more than 30 per cent of banks are not physically accessible[7].

Compared to persons without disabilities, persons with disabilities are more likely to have poor health: among 43 countries, 42 per cent of persons with disabilities versus 6 per cent of persons without disabilities perceive their health as poor. In some countries, less than 20 per cent of persons with disabilities report poor health, while in others more than 70 per cent of persons with disabilities report the same.

Access to health-care services remains a challenge for persons with disabilities, who are more than three times as likely to be unable to get health care when they need it. Access to rehabilitation services is also difficult. In some countries, more than 50 per cent of persons with disabilities have an unmet need for these services. The main reasons include lack of financial resources, lack of access to and accessibility of medical facilities and transport, as well as inadequate training of health personnel. The gap is stark compared with men without disabilities: women with disabilities are three times more likely to have unmet needs for health care; three times more likely to be illiterate; two times less likely to be employed and two times less likely to use the Internet. . Moreover, women with disabilities are more vulnerable to sexual violence compared to those without disabilities[7].

Persons with disabilities encounter impediments in access to water, sanitation and hygiene, including physical, institutional, social and attitudinal barriers. This is particularly true for persons with severe disabilities.

Persons with disabilities have limited access to the labour market. The employment-to-population ratio of persons with disabilities aged 15 and older is almost half that of persons without disabilities, and employed persons with disabilities tend to earn lower wages than their counterparts without disabilities. In eight developing countries, 32 per cent of persons with disabilities consider their workplace hindering or not accessible[7].

Discrimination is a major cause of exclusion of persons with disabilities. In some countries, more than 50 per cent of persons with disabilities have experienced discrimination**.** Even though most countries have ratified the CRPD, discriminatory laws and policies still exist in some countries, especially in the areas regulating the right to marry, legal capacity and political participation. Only 36 per cent of countries have no legal restrictions for persons with disabilities to marry, only 13 per cent have no restrictions to vote and only 9 per cent have no restrictions to be elected for public office[8].

Among persons with disabilities, persons with intellectual and psychosocial disabilities are even more disadvantaged. They are more likely to experience forced institutionalization, poor living conditions and abuses occurring in psychiatric hospitals as well as harmful and coercive treatment practices. In addition, they are less likely to be literate and employed and, are more likely to find health facilities hindering and to be excluded from family and community activities.

Persons with disabilities living in rural areas tend to face more challenges than persons with disabilities living in urban areas: they are less likely to attend school and to live in a household that owns a mobile phone. Births from mothers with disabilities living in rural areas are also less likely to be attended by a skilled health worker.

Persons with disabilities are particularly vulnerable during natural disasters, extreme climate events, conflict and humanitarian emergencies. They are often unprepared as 72 per cent have no personal preparedness plan for disasters and 79 per cent would not be able to evacuate immediately without difficulty in the event of a disaster**.** Refugees with disabilities are often exposed to discrimination in the places where they seek to live[8].

Persons with disabilities experience a heightened risk of violence, in part as a result of stigma, discrimination and exclusion from society. Evidence from five developing countries suggests that about one in five persons with disabilities has been beaten or verbally abused because of their disability[12].

1(b) Global Burden of Disease Estimates of Years Lived with Disability (YLD)

The Global Burden of Diseases, Injuries, and Risk Factors Study 2017[12] includes a comprehensive assessment of incidence, prevalence, and years lived with disability (YLDs) for 354 causes in 195 countries and territories from 1990 to 2017[b]. The main findings, confined to YLD, are reviewed below[13].

While age-standardised all-cause global YLD rates decreased by less than 4% over the nearly three-decade period from 1990 to 2017, the number of total YLDs has increased by more than 50% during this time. This pattern is worrying given the lack of substantial improvement in age-standardised rates over time as well as the increased magnitude of total health loss. These patterns are driven by population growth and ageing as well as increasing numbers of YLDs from conditions such as type 2 diabetes and opioid use disorders, which were less common in 1990. YLD increases, even when age-standardised rates are slightly improving, are likely to be a major burden on economies and health-care systems that have not expanded proportionally to population growth or in populations where economic improvements have not been equitably distributed.

While YLD rates are highest in older ages, globally, YLD numbers are heavily concentrated in working-age males and females (ie, from 20–54 years). This finding is significant for two reasons. First, these age groups have a considerable number of years to live that would otherwise be in full health, emphasising how conditions at these ages, even if having lower disability weights, can still contribute substantially to the non-fatal burden. Second, a disabling condition that occurs during this period of life could represent lost human capital.

There is heterogeneity in outcomes experienced across different sexes, geographies, and income levels, and identify regions and causes where sexes have had divergent health trends over time[14]. These findings should help to focus prevention and treatment efforts on groups and areas that have experienced inequitable health outcomes.

[b] DALYs are sometimes incorrectly used to measure the magnitude, burden, or causes of disability. DALYs measure the perceived desirability of different health states and not disability as the term is used in public health discourse. DALYs are composed of two components: (i) years of life lost due to premature death and (ii) years lived with disability (YLD) associated with nonfatal injuries and disease. YLD is calculated as the discounted present value of years lived in a condition multiplied by a disability or severity weight for that condition assigned on a scale from 0 (representing perfect health) to 1 (representing death). Weights closer to 1 imply that a year spent in that condition is perceived as being more equivalent to death than to a state of health. Because YLD is based on perceived desirability rather than measures of activity limitations, the DALY does not meaningfully measures disability[14].

(1c) *Disability in Asia and the Pacific (APR)*

A notable study of disability in Asia and the Pacific (APR) is High Level Intergovernmental Meeting on Disability in Asia and the Pacific[15] Reports that 690 million persons live with disabilities in APR, representing one in six persons. The number is expected to rise because of population aging, climate-related disasters, chronic health conditions, road traffic injuries, and poor working conditions.

Not only do women have more disabilities than men, they also live longer with diminished quality of life. Furthermore, they need more assistance from others and the health-care system. However, nonfatal disabling conditions may not receive medical care commensurate with their frequency and their impact; thus, women may be less likely to recover from an initial illness experience.

In India, being female, belonging to rural, with no education and widowhood are likelier to be disabled. Half of the disabled older population (60 years or more) is not affiliated to a social network and the majority are living with their children. Moreover, more than half of the disabled older persons are not working.

China

(i) Disability among Elderly

With global population ageing, the population of old adults (aged ≥60 years) is rapidly growing, and most such individuals are in need of health care and assistance. A rigorous study[16] aims to assess changes in disability in basic activities of daily living (ADL), and in instrumental activities of daily living (IADL) among old Chinese individuals.

This study throws valuable light on the plight of the elderly. It used data from three surveys of the China Health and Retirement Longitudinal Study, conducted in 2011 (N=7380), 2013 (N=8328), and 2015 (N=9594). Disability is defined as need of assistance or inability to perform any of the ADLs or IADLs. Generalised estimating equation models were used to assess the time trend in the prevalence of disabilities in ADL and IADL.

The prevalence of disability in IADLs rises from 1496 (20·96%, weighted) of 7330 participants in 2011 to 2584 (26·51%, weighted) of 9348 in 2015, with a relative annual increase of 1·92% in the total sample (p trend<0·0001). . After controlling for various confounding factors, functional capacities in ADLs and IADLs are substantially worse in women than in men. The prevalence of IADL disability rises among older Chinese adults during 2011–15, whereas the prevalence of ADL disability remains stable.

(ii) *Disability in Rural China*

There are few studies of rural disability in LMICs. Of these, a notable but not- so- recent study[17] throws light on the prevalence of different types of disability and relationships between disability and socio-demographics, health status, and health behaviour in a rural Chinese community. The site comprises villages near the city of Qiqihar, in China's northernmost province, Heilongjiang Province.

At the time of this study, approximately 70% of Chinese resided in rural areas and worked primarily in agriculture. Agricultural workers operate within hazardous environments and are potentially at risk for injury and resulting disability.

Univariate logistic regression is used to compare disability prevalence across socio-demographic groups. Besides, it is supplemented with analysis of persons with disabilities and persons without disabilities within categories of self-reported health status, lower back pain, injuries, daily average sleep, smoking status, alcohol use, and method of medical payment.

In this sample of rural Chinese residents, 7.0% report 1 or more disabilities. The prevalences of ADL and IADL disabilities are 2.3% and 3.1%, respectively. Forty-eight percent of those with disabilities identify themselves as needing the help of others in completing personal care needs (i.e., eating or dressing, ADLs) or in completing routine needs (i.e., household chores or shopping, IADLs).

The prevalence of disability is significantly higher among older participants, those with lower education level, and those previously married. The highest prevalence of disability is found among those 65 - 84 years old (23.6%). Although more than half of the sample possesses a middle school education or above, over 60% (93 of 154) of individuals with disabilities only have elementary school education or less. No significant difference is found in the prevalence of disability between men and women.

Over half (54.6%) of individuals reporting disability view their health status as poor or very poor. Compared with individuals without disabilities, those reporting disabilities are more likely to have reported injuries (20.1% vs. 7.2%), lower back pain (57.8% vs. 35.6%), and daily average sleep less than 6 hours. 0.1% of persons with disabilities suffered an injury prior to April 2007, while only 7.2% of persons without disabilities reported any injury in this time period. Though disability may be caused by a nonfatal injury, preventing injury among individuals with disabilities is also important. Disability has been associated with the increased risk of secondary injuries.

(1d) Disability and Resilience to Climate Change

There has been an increase in both the severity and frequency of disasters, and the link between climate change and extreme events is increasingly being recognised[18]. Evidence suggests that disasters have a disproportionate impact on some groups in situations of risk, including persons with disabilities. A recent report[20] reviews the available literature around disability and climate resilience, humanitarian assistance, and, more generally, development. Although a broad-brush treatment, it yields valuable insights.

As noted earlier, the environmental impacts of climate change are well documented. Consequences include increased temperatures, sea-level rise, excess rainfall and droughts, and increasing extreme weather events[18] Extreme events associated with climate change are also increasing in their severity. These changes inevitably impact the resilience of the communities that are exposed to their risks.

Agricultural production, access to water, mobility and many other aspects of everyday life are disrupted. Broadly, the consequences of climate change threaten the rights of the people that are impacted in terms of access to safe water, food, security and exposure to health risks.

That the links between inequality and exposure to climate change have negative consequences is demonstrated, with a specific mention of disability as one of the categories at risk[21].

Predictions show that low-income countries – which, by producing the lowest amounts of greenhouse gases, have contributed the least to global warming – are more adversely affected by climate change. These countries are also predicted to have less capability to adapt to growing risks[22]. Majority of the world's poorest people live in ten countries, and that six of those countries are likely to be in the top 20 most impacted by climate change.

The people who face the greatest levels of risk – and therefore require the highest resilience – are likely to be those that face the highest inequality and barriers accessing their rights in everyday life. This comprises people with disabilities, women, children, older persons, minority and indigenous groups, people with chronic health conditions and other contextually marginalised people.

A recent study[19] classifies potential impacts into the following categories:

Health: The health status, and prevalence, of people with disabilities is expected to be impacted by increases in malnutrition and the burden of diarrhoeal diseases, and the changing distribution of infectious diseases. Increased disease and injury are also likely, due to an increase in the frequency of extreme weather events.

Food Security: People with disabilities and their families living in poverty often face food shortages. Climate change is predicted to exacerbate food shortages and malnutrition in many of the world's poorest countries, aggravating risks for women, children, older persons and people with disabilities.

Water: Climate change is exposing hundreds of millions of people to increased water stress. People living in poverty are at the greatest risk, and many people with disabilities already face barriers accessing safe water for drinking, sanitation and hygiene. People with disabilities may also have increased sensitivity to water-borne pathogens.

Drought: Up to 1.3 million people have been affected by drought, up to 800,000 being impacted severely. Of those people around 20% are estimated to be highly vulnerable including people with disabilities, children under 14, female headed households, pregnant women, older persons and people living with illness. Tackling barriers to working in the agricultural sector has also been highlighted as a challenge for people with disabilities but increasing drought will further limit employment opportunities.

Migration: At least 200 million people (18 million people with disabilities) could be displaced by climatic events by 2050. Many people with disabilities will also be left behind when others have moved on, with the consequent loss of crucial social and support networks.

Access to resources: Climate change also increases pressure on available resources and services, which could lessen their availability for the poorest people, including people with disabilities living in

poverty. This will also place greater pressure on impacted people to maintain and rebuild their assets after climatic shocks.

As people with disabilities themselves are not a homogenous group, individuals with disabilities display varying degrees of resilience to climatic shocks, depending on several factors. Women with disabilities may have very different resilience and vulnerabilities when comparing lived experiences in different contexts. For example, in the event of an evacuation, crowded shelters with insufficient protection can lead children and women to be at higher risk of sexual abuse. This may be more difficult it they also have a disability; if they have no male family members; or if they are poorer than others[20, 21].

Section 2 : Injuries

Estimates of rural injuries are sparse. However, a few case studies are revealing. A small sample of studies[22,23,24] throw some light on rural injuries. In Somalia, for example, there are no significant differences in the mechanisms of injuries in urban and rural areas. Falls are the most common cause of nonfatal injuries, consistent with studies in Iran, Sri Lanka, and China. Falls from trees have been reported as a leading cause of injury in rural areas in developing countries such as Nigeria and Papua New Guinea, where the products of tall trees are important sources of food and income. Falls of elderly individuals in rural areas are more susceptible to fall injuries compared with other age-groups. Falls in elderly individuals have different etiology and may be associated with decreased daily physical activity. In rural Ghana and Tanzania, however, evidence suggests that lacerations are the leading cause of injuries, with the majority of these injuries sustained during agricultural activities. Although motor -vehicle related injuries are less common, they are the most common cause of injury related deaths. In rural and urban Ghana, transport-related injuries are more severe than other types of injuries in terms of mortality, disability and economic consequences. However, in rural areas, a higher proportion of males have injuries due to falls, motorcycle crashes, and gunshot wounds, compared with females.

A contrast emerges from a detailed study of injuries in rural Bangladesh[25]. The injury mortality rate is 38 deaths per 100,000 people, and for every injury death, there are close to 500 individuals who suffer nonfatal injuries severe enough to require treatment and/or absence from work or school for at least one day. Drowning is the leading cause of injury deaths in children, burn injuries being more common in females, and elderly people being more prone to falls. There is also a huge burden of suicides, especially in female adolescents and young adults. About 168 suicides occur every day in the country. The low status of women in the society, child marriage, economic dependence on, and oppression from, husbands and in-laws and illiteracy are some of the reasons that underlie increased suicide rate among females.

As in suicides, the burden of burn injuries is disproportionately borne by young girls and women in rural Bangladesh. Most fatal burn injuries are due to flames from cooking fires, and because women

traditionally cook and perform household chores. Burns could also be linked to suicides and intimate partner violence.

A recent study[25] assessed the validity of GBD estimates by comparing them with fire-related deaths registered by the Indian Civil Registration System (CRS). Although the CRS is incomplete and many deaths are classified with unspecified causes, it serves as a reliable lower bound for estimates of fire-related deaths. GBD and CRS estimates are available for three states for 2016: Delhi, Karnataka, and Kerala. Medically certified fire-related deaths of women that were registered by CRS far exceeded GBD estimates in Karnataka, where they were 93% greater, and in Delhi, where they were 260% greater.

(2.a) Musculoskeletal Injuries

Data on the burden and impact of musculoskeletal injuries in LMICs are paltry. Most have poor or non-existent centralised death registration systems and instead use data from the police, which are frequently incomplete. Very few LMICs have ongoing comprehensive trauma registries.

A survey of four countries is insightful[8]. Our review is confined to two country case studies viz. Ethiopia and India.

Ethiopia

Road traffic crashes are the leading cause of death in men aged 15 to 49 years in Ethiopia. Estimates show 22.1 deaths related to road traffic crashes per 100,000 population. This is high for a country with a low vehicle ownership rate of 0.95 registered cars in use per 1,000 population. It is due to poor road safety plans and the failure of drivers to abide by the traffic rules.

Pedestrians are most commonly involved in fatal road traffic crashes, followed by motor vehicles, motorcycles and bicycles. The rate of crashes involving motorcycles and bicycles is lower than the average rate for low-income countries.

Evidence from an emergency department of one of the main tertiary referral hospitals in Addis Ababa shows that over a one-year period, one in 12 emergency admissions is due to road traffic injuries. Out of the 522 road traffic injuries admitted with medical records, the most common injuries sustained are to the lower limbs (36%), followed by head (20%) and upper limbs (15%). Around a third are fractures and two- thirds lacerations. Among the 78 hospitalised cases, 62% are admitted to the surgical department and 16% to the orthopaedic department.

Ethiopia has a high rate of injuries caused by violence. The death rate from interpersonal violence is estimated to be 11.9 per 100,000 population, higher than the average rate of 6.8 per 100,000 for low-income countries.

The value of lost output from deaths due to injuries is estimated to result in a cumulative loss of $25.814 billion in Ethiopia between 2015 and 2030. This estimate of loss of productivity translates to an economic loss of up to 0.77% of all economic output by 2030. If welfare losses are incorporated, injuries are estimated to result in US$5.585 billion or 6.16% of GDP in 2010 alone in Ethiopia.

India

6,407 per 100,000 persons sustain injuries that are likely to result in musculoskeletal trauma. 1 in 5 of these injuries is likely to result in musculoskeletal trauma. 58.4 per 100,000 die from injuries due to musculoskeletal trauma. 2,368 per 100,000 DALYs are lost from injuries that lead to musculoskeletal trauma.

Road traffic crashes are the leading cause of death in 15 - 29 year old men in India and the eighth biggest cause of death across the whole population. *The Million Death Study*, a large nationally representative verbal autopsy household study, found that road traffic crashes are the biggest killer of men in both urban and rural areas, but to a greater extent in urban areas (23.6% of deaths in urban areas compared to 21.4% in rural). Pedestrians are most commonly involved in fatal road injuries, followed by motorcycles, motor vehicles and bicycles.

The value of lost output from deaths due to injuries is estimated to result in a cumulative loss of US $1100 billion in India between 2015 and 2030. This estimate of loss of productivity translates to an economic loss of up to 0.93% of all economic output by 2030.

Injuries in Rural Sri Lanka

Among the few studies of injuries in a rural context, a not-so-recent study[27] focuses on a rural community in Sri Lanka. Approximately 11% of all admissions to state sector hospitals in Sri Lanka are associated with some form of physical injuries (both intentional and unintentional). Further, injuries remain the main cause of deaths among the people of the most active age group, i.e., from 25 to 49 years of age.

In Sri Lanka, the currently available injury data are hospital -based. However, it is known that the hospital data show only a fraction of the complete picture of physical injuries in a community, since most of the injured are treated as outpatients.

The survey covered two small adjoining villages in the Kadugannawa area in the Kandy district.

The highest number of injuries (40%) is noted in the age group of 25-45 years although when calculated as the percentage of the population of this age group, it constitutes only 9.7% and is less than the incidence (12.4%) in the next higher age group, >45-60 years. The elderly and young adults have fewer injuries and the incidences are 5.7% and 4.5%, respectively, in their age groups. These findings are consistent with the national inpatient data that have shown the highest number of injuries among the people of the most active age group. In general, the victims of these age groups are the sole bread winners of their respective families, and therefore, pose an additional economic burden.

The most common cause of injuries is animal bites. The next two common causes of injuries are falls and objects fallen on the victim. Being a rural area, it is not surprising to find more animal bites and falls and less traffic-related accidents.

Work-Related Injuries in Vietnam

Incidence of work-related injuries is often high, as illustrated in a study of a commune in Vietnam, Xuan Tien, in 2005[27]. The incidence rate at 681 per 1000 residents is considerably higher than reported from a national survey (49/1000 residents).

Overall, 482 of the injuries reported are attributed to work activities (82%) by independent review, yielding an annualised work-related incidence rate of 1001/1000 full time equivalents (FTE). The incidence rate of injury for non-workers (161/1000 non- working residents) is much lower than for workers (1149/ 1000 working residents). Non-workers are those residents who did not report any work in the last year.

Several types of injuries are attributed exclusively to work activities. Crushing injuries, amputations and foreign body injuries are entirely associated with work. More than 80% of burns to the face, neck and eyes, open wounds to an upper or lower extremity, upper extremity contusions, and sprains and strains are reported as work related. Finally, 88% of all fractures of the skull are due to work. The highest number of injuries is in the manufacturing sector, while agriculture is second and wholesale and retail trade third.

In sum, injuries are a neglected epidemic in LMICs. They disproportionately affect the poor, with 83% of the 4.6 million global deaths occurring in developing countries. Deaths from injuries among LMICs worldwide are higher than from TB, malaria and HIV combined. However, they continue to receive comparatively little funding despite being largely preventable.

Section 3: Disability, Injury and Armed Conflicts

There are a few substantive studies of impact of armed conflicts on disability, injury and deaths. The one discussed below of conflict in Colombia is not only designed to capture the effects of long-term conflict but also has a strong focus on rural areas[28].

Colombia is a middle-income country with a registered population of 48.2 million. Of this, 27.8 per cent live below the poverty line. According to the 2005 national census, 6.4 per cent of the population have some form of disability (approximately 3 million people). However, ‘disability’ is still mainly understood on a medical-model basis and is therefore underestimated. Furthermore, the identification of persons with disabilities is said to be largely under-reported owing to insecurity, lack of access and social stigma. The actual percentage of persons with disabilities is therefore likely to be far higher than the census figure.

Colombia has been in a state of non-international armed conflict (NIAC) for 52 years. During that period, 220,000 people have been killed and at least 7.7 million people displaced. The conflict has predominately raged in remote rural areas of Colombia where there is little state presence. This state of lawlessness in rural areas has also facilitated an environment of extreme violence committed by armed criminal gangs associated with drug production and illegal mining.

It is widely believed that the conflict has had a disproportionate impact on persons with disabilities, recognized as being at increased risk of: death or serious injury owing to an inability to flee the

violence; abandonment owing to the inability of families and carers to quickly flee the violence with a person with a disability and any equipment they may need; extrajudicial killings by state authorities of persons with disabilities in order to present such persons as the lawful killing of members of illegal armed groups; being subjected to sexual violence; and being killed or injured by landmines.

Persons with disabilities have been subjected to extrajudicial execution during the conflict. The killings were often cases of 'false positives' whereby a person would be lured into a remote area, often on the promise of work, and killed.

Gender-based violence is widespread in Colombia and women and girls with disabilities remain particularly vulnerable to abuse. Sexual violence has been a prominent feature of the conflict. According to the Unit for Victims, between 1980 and 2016, 17,100 women and girls have been subjected to conflict-related sexual violence, subject to the caveat of underreporting because of social stigma and insecurity.

Vast areas of Colombia are still mined and there are reports of armed drug cartels and guerrilla groups continuing to use anti-personnel mines to protect illegal crops and mineral mining. Between 1990 and 2017, there have been approximately 12,000 direct mine victims (meaning those who sustained a physical injury from a mine).

In sum, the long-drawn conflict in Colombia has had a disproportionate impact on persons with disabilities. There are still large rural areas where the state has no presence and armed groups control the territory; and this poses a major challenge to implementing the CRPD.

Section 4: Disability and Poverty

Disability and Poverty in Developing Countries

In an ambitious study of 15 developing countries[29], it is reported that persons with disability are a sizeable group and more likely to suffer from multiple deprivations, relative to those without[c]. The study uses self-reported measures of functional or activity limitations. In general, these measures are found to be valuable. Both temporary and permanent limitations are captured in a 30-day recall period. A person who experiences severe or extreme difficulty in any functioning is classified as disabled.

A multidimensional approach is employed and considers both monetary (consumption expenditure) and non-monetary aspects of living standard and poverty (e.g., education, living conditions), at the household level (e.g., expenditures, assets), and at the individual level (educational attainment, employment). Differences in economic well- being across disability status are assessed for each dimension and across dimensions using multidimensional poverty measures[30].

The analysis is based on comparison of means using t-tests, based on data obtained from World Health Survey. No regression analysis was carried out because of the presumption that poverty and

[c] These countries are drawn from Africa, Asia, Latin America, and the Caribbean.

disability are simultaneously determined[d]. Comparison of means, however, is problematic as the role of confounding factors (eg, assets) is overlooked. Two main hypotheses are: (i) disability is associated with multidimensional poverty; and (ii) types of economic deprivation associated with disability vary across countries.

The main findings include:

- Disability is significantly associated with higher multidimensional poverty in most of the developing countries. In other words, persons with disabilities experience multiple deprivations at higher rates and in higher breadth, depth and severity than persons without disabilities.
- There was not a single economic well-being dimension where disability was systematically associated with deprivation in the 15 developing countries. Dimension level results support the hypothesis that the types of economic deprivation (non-employment, low educational attainment) that persons with disabilities face vary across countries. This finding is suspect as there is no control for confounders.
- Households with disabilities are not worse-off when their well-being is measured in non-health PCE and when poverty is measured through the headcount, poverty gap and severity. This finding is just as suspect as the previous for lack of control over confounders.
- Among persons with disabilities, persons aged 40 and above and persons with multiple disabilities are more likely to be multidimensionally poor.
- Disability prevalence is variable across the 15 countries and is high in most countries (above 5% level). Nine countries have prevalence rates between 5-10%, and four countries have prevalence rates of between 10% and 15%. Persons with disabilities thus account for a sizable fraction of the working-age population in the developing countries.
- At the individual level, in most of the countries, persons with disabilities have lower educational attainment and lower employment rates than persons without disabilities.

Disability and Well-Being in Indonesia

In fact, some effects may be compounded over time. For instance, households that rely on borrowing as a coping strategy may face high interest repayments leading them to worse material insecurity in the long term than in the short term.

Disability prevalence in Indonesia is between 10 and 15%. It is also much higher among older people, women and in rural areas. There is much evidence showing that in LMICs, households with disabled people (compared to their nondisabled counterparts), face extra costs that include expenditures on items like medical care or access to information[31].

[d] Not necessarily, as there could be lags either way.

Together with extra expenditures, households face a drop in earnings. Disability represents a barrier to labour supply and thus affects the amount of income the household can rely on for a living. This is corroborated by recent evidence for Indonesia where 56% of people with a moderate disability and 26% of people with a severe disability work, while 64% of those without disabilities work. Further, another study[32] shows that the onset of a physical disability among working age Indonesians decreases their probability of being employed and reduces work hours among those employed.

The ILFS socioeconomic survey comprises five waves covering 21 years. The more recent study[31], however, bases the analysis on three waves, covering information collected in 1997, 2000 and 2014.

An ADL index at the household level is constructed. This is obtained by dividing the sum of individual ADL indices by the number of adults in the household. Thus, it reflects the average level of disability of adults in the household. The authors[32] use a fixed effects specification that addresses time-invariant heterogeneity and systematic measurement error using the ILFS longitudinal data.

A key finding is that disability exposes households to an increase in health expenditures. Besides, there is a drop in labour income, in line with a negative impact of disability on the labour supply of the disabled as well as that of the caregiver. There is no evidence of consumption smoothing for non-health items. It is not unlikely that the consumption insurance hypothesis that is supported with data covering short time frames[33] is rejected when considering data collected over a long period. This might suggest that households tend to adopt adverse coping strategies that sustain short-term consumption while compromising their long-term welfare. None of the components of expenditures escape the negative impact of disability. That is, food, education and other non-food expenditures experience a drop. It is worth noting that education expenditures are associated with the largest drop.

In sum, the disability index is associated with significant increase in economic deprivation.

Disability and Poverty in China

A two-way, negative relationship is believed to exist between income and disability. In one direction, poverty can lead to medical impairments. Low-income households may also have difficulty supporting family members with impairments to fully participating in the economy and society, thus exacerbating disabilities from the social rather than the medical perspective. In the other direction, households with persons with disabilities tend to face greater economic challenges than households with persons without disabilities[34].

Beyond the two-way negative relationship between income and disability, households with disabled persons also face a *conversion* handicap[35]. Given a fixed amount of income, households with disabled persons cannot achieve the same standard of living (SOL) as households without disabled persons. A few estimates of these extra costs of disability exist: that is, the excess income that a household with disabled persons would require to have an equivalent SOL as a household without a disabled person.

An important study[36] throws light on the economic situation of the disabled in China. They use China's 2006 *Second National Survey of Disabled Persons*, a survey of more than 2.5 million individuals, to illustrate the two-way negative relationship between income and disabilities.

Unsurprisingly, households with persons with disabilities have lower incomes on average than households with persons without disabilities (for all types of households). Similarly, households with persons with serious disabilities tend to have lower incomes than households with persons with mild disabilities. In addition, households in urban (versus rural) areas and those with more (versus less) adult members have higher household incomes, on average, within each disability category (i.e., *type* and *level* of severity). Finally, households with persons with intellectual, mental, and speech disabilities have lower incomes on average than households with persons with other types of disability.

The prevalence rate of impairments is negatively related to household income throughout the income distribution. The relationship between income and disability is most pronounced at the lowest end of the income distribution with a substantial drop in the rate of disability (more than 16% to 8%) from the first to the second decile. The overall downward trend and steeper decline from first to the second decile, in fact, exist for each main type of impairment.

For any given amount of income households with disabled persons have a lower SOL than households without disabled persons. Besides, households with disabled persons require a greater amount of income to achieve the same SOL.

Extra costs of disability as a percentage of income can be substantial (8 % to 43 %). These costs appear larger for households with fewer adults, presumably because these households rely more on outside care for the person with disability. Further, the extra costs of disability are larger for urban households than for rural households. Finally, extra costs are higher in absolute terms for households with more than one disabled person than households having one person with disability but less per disabled person.

After accounting for the extra costs of disability, the proportion of individuals under the poverty line, $1 per day, increases from 12.5 % to 15.3 %. The proportion of individuals living under $2 per day increases somewhat less, from 35.8 % to 37.8 %.

Section 5: Econometric Applications

Two countries are chosen for detailed econometric analyses: India and Ethiopia. The themes covered include burden of rural disabilities, and their employment and poverty associations. As we have a 2-wave panel survey for India for 2005 and 2012[37], ordered probit models are employed in which the ordered outcomes of disabilities, employment and per capita expenditure terciles in 2012 are regressed on the 2005 values of covariates to circumvent the endogeneity problem in the explanatory variables. As the LSMS Ethiopia surveys are available for 2010, 2012 and 2014, we are able to use richer panel models with random individual/household effects.

The choice of India is governed by various considerations. India's growth has been impressive. It is also the most populous economy in the world, after China. Its rural economy continues to contribute about 40 % of India's GDP. Ethiopia is the second most populous nation in Africa after Nigeria, and

the fastest growing economy in the region. However, it is also one of the poorest, with a per capita income of $790. In both countries, poverty is largely a rural phenomenon. So a comparison of the links between rural poverty and disabilities in these two countries is likely to yield useful policy insights.

(5.a) India Study

An Overview of the Indian Economy

India is the world's seventh-largest economy. Its GDP growth recently dipped to 5.7%; still, India is growing faster than any other large economy except for China. By 2050, India's economy is projected to be the world's second-largest, behind only China. India is home to 1.34 billion people – 18% of the world's population. It will have overtaken China as the world's most populous country by 2024. It has the world's largest youth population, but is not yet fully able to capture this potential demographic dividend – over 30% of India's youth are NEETs (not in employment, education or training) (Bloom, 2013). India ranked a disappointing 60th among the 79 developing economies assessed in the World Economic Forum's latest Inclusive Development Index. This is reflected in growing inequality: India's richest 1% own 53% of its wealth, up from 36.8% in 2000[e].

The rise in inequality is slowing the pace at which India is lifting people out of extreme poverty. About one-third of the world's population living on under US$1.90 live in India – some 224 million people. Our on-going analysis suggests that a sharp rise in income inequality is largely responsible for the worsening of poverty in India between 2012 and 2017 and not so much the decline in per capita income/expenditure.

India is predominantly a rural country with two- thirds of India's population and 70% of the workforce residing in rural areas. The rural economy constitutes 46 per cent of national income. Despite the rise of urbanisation more than half of India's population is projected to be rural in 2050. Thus growth and development of the rural economy and population are key to overall growth and inclusive development of the country.

Although food-secure in the aggregate, India grapples with high rates of malnutrition. Challenges include making agriculture more remunerative; enhancing productivity while tackling climate change; and moving from food security to nutrition security.

Contrary to the common perception about predominance of agriculture in rural economy, about two-thirds of rural income is now generated in non- agricultural activities. However, the impressive growth of the non- agricultural sector in rural India has not brought significant employment gains or reduction in disparity between farm and non-farm worker productivity.

[e] Credit Suisse Global Wealth Reports are widely used for their comprehensive and reliable estimates of wealth distribution.

The prevalence of dsability is 9.70 % in the rural population in 2012. Of the disabled, more than half (51.3 %) suffer from 2-4 disabilities. As aging grows rapidly, the burden of disabilities is likely to surge. But at the same time, high prevalence of disability among a large segment of the working age group is likely to have deleterious employment effects (Authors' calculations).

(5. b) Analysis of Rural Poverty, Employment and Disabilities in India

Data

Our analysis draws upon the two rounds of the nationally representative *India Human Development Survey* (IHDS)[37] data conducted in 2005 and 2012, jointly by the University of Maryland and the National Council of Applied Economic Research, New Delhi. The first round (IHDS-1) is a survey of 41,554 households in 2004–05. The second round (IHDS-II) involves re-interviews with 83% of the original households as well as split households residing within the same locality, along with an additional sample of 2,134 households[f]. The total for IHDS-II is therefore 42,152 households. The sample is spread across 33 (now 34) states and union territories, and covers rural as well as urban areas. Repeated interviewing of the same households at two points in time facilitates a richer understanding of which households are able to partake in the fruits of growth, what allows them to move forward, and the process through which they are incorporated into or left out of a growing economy.

Topics covered by the IHDS relevant in the present context include employment, major morbidity (including NCDs), limitations in ADLs, health insurance, castes, assets, social networks (eg, self-help groups), exposure to mass media, and demographic characteristics (e.g. gender, age, household size).

IHDS collected labour force participation data as part of its detailed income question. Work participation included farm, business, and wages/salary. Within each income section, IHDS asked who in the household participated in this activity and what was their level of participation.

The NCDs include cataracts, high blood pressure, heart disease, type 2 diabetes, leprosy, cancer, asthma, epilepsy, and mental disorders. The number of cases of mental disorder and cancer are very small for detailed analysis. Disabilities in ADLs show the dependence of an individual on others, with need for assistance in daily life. The (reported) disabilities include (1) difficulty walking; (2) difficulty using toilet facilities; (3) difficulty dressing; (4) difficulty with hearing; (5) difficulty speaking, (6) long sightedness/far sightedness; and (7) short sightedness.

Burden of Disabilities

[f] An additional sample of 2134 households was added to IHDS-II urban areas to reduce the impact of high attrition on the standard errors of a few key variables. The simulations estimated that the attrition would increase standard errors to unacceptable levels if 8 out of 15 households were unreachable in each urban cluster. Hence, the interviewers were asked to report to NCAER supervisors if they were unable to recontact 5 or more households in a cluster. The supervisor verified the losses and randomly assigned households to the right, the left, or at the original location (for households that migrated) using a predefined rule. A similar addition to the rural sample was not attempted because of much lower attrition rates (Personal communication by Sonalde Desai).

Our first analysis pertains to the burden of disabilities and the associated factors in rural India. The analysis covers the period 2005 -2012. First, some descriptive statistics are reviewed, followed by an econometric analysis.

The means and standard deviations of the variables used in this analysis are given in Table 1.

Table 1: List of Variables Used in Rural Disability Analysis

Variable		Mean	Std.Dev,	Min	Max
Disabilities (2012)		0.237	0.803	0	4
Disabilities (2005)	1	0.010	0.097	0	1
	2-4	0.010	0.098	0	1
	>4	0.005	0.073	0	1
Gender	Female	0.493	0.500	0	1
Marital Status					
	Unmarried	0.156	0.363	0	1
	Widowed/D~d	0.090	0.286	0	1
Caste					
	Brahmin	0.046	0.210	0	1
	High Caste	0.125	0.331	0	1
	Dalit	0.234	0.423	0	1
	Adivasi	0.101	0.302	0	1
	Others	0.109	0.312	0	1
Asset Quartile (2005)					
	q2	0.245	0.430	0	1
	q3	0.281	0.450	0	1
	q4	0.252	0.434	0	1
Schooling					
	1-4	0.096	0.294	0	1
	6-8	0.218	0.413	0	1
	9-10	0.140	0.347	0	1
	>10	0.080	0.272	0	1
NCD (2005)	Yes	0.062	0.241	0	1
Age Group (2005)					
	15-30	0.393	0.489	0	1
	51-60	0.121	0.327	0	1
	61-70	0.059	0.236	0	1
	>70	0.020	0.138	0	1
Social Network (2005)					
	1	0.189	0.391	0	1
	>1	0.185	0.388	0	1
Household Size					
	1	0.006	0.078	0	1
	2-5	0.485	0.500	0	1
Conflict In Village/ward 2005	Yes	0.488	0.500	0	1

Smoke	Yes	0.165	0.372	0	1
Chullah (2005)					
	No Biomas Stove	0.071	0.257	0	1
	Open Fire	0.254	0.435	0	1
	Improved Chullah	0.041	0.199	0	1

Source: Author's Computations from IHDS 2015. Chullah refers to a fire place for cooking.

In a broad-brush treatment, and based on cross-tabulations, an attempt is made below to throw light on a few associations between disability and affluence, location (rural or urban), gender and age, and NCDs, mainly for their descriptive value. Moreover, in order to circumvent the two-way relationship between, say, disability and affluence, the measures of disability are for 2012 while affluence and other covariates are for 2005. This is also consistent with the subsequent econometric specifications.

The prevalence of disability is 9.70 % in the rural population. Of the disabled, more than half (51.3 %) suffer from 2-4 disabilities. Persistence is also largest in this range of disabilities (about 31 % remain in it between 2005and 2012). Prevalence is higher among females than males in all disability ranges, as also the shares of females among disabled in 2012.

Within the youngest (15-30 years), about 98 % do not suffer from any disability which declines among older age-groups (just under 50 % among the oldest >70 years). In the age-group (31-50 years), a large majority do not suffer from any disability, and small proportions suffer from a single and 2-4 disabilities. A similar pattern is observed among those in the age-group, 51-60 years, with substantially lower proportions without any disability and larger proportions suffering from single and multiple disabilities. Among the older, 61-70 years, the proportion without disability is considerably lower, but those with single and multiple disabilities rise, with about 30 % suffering from >4 disabilities. As aging grows rapidly, the burden of disabilities is likely to surge.

Affluence is measured using asset quartiles. The least affluent belong to the first and the most to the fourth quartile. There is a striking contrast between the first and fourth quartiles. Single disability is more prevalent in the fourth quartile while multiple disabilities are more prevalent in the first quartile. No disability is, however, equally prevalent in the two quartiles. The contrast is interesting as high prevalences of single and multiple disabilities among the least affluent stem largely from their unsanitary living conditions and failure to access healthcare facilities while those of the most affluent are attributable to their life-style factors such as rich diets, high consumption of cigarettes and alcohol and sedentary living.

Schooling is a form of human capital. It enhances awareness of healthy living and expands remunerative employment opportunities. The prevalences of single and multiple disabilities fall with schooling level.

As there is a two-way relationship between disability and NCDs (eg, vision impairment and diabetes, lack of mobility and cardiovascular diseases), some illustrative evidence is given here. The prevalence of no disability among those with NCDs is considerably lower than that without NCDs. However, the

prevalences of single and multiple disabilities are higher and rise across disability intervals except in the interval >4 disabilities.

As these comparisons are based on averages without any control for confounding variables, these may differ from those based on marginal effects/associations, obtained from an ordered probit specification.

Ordered Probit Specification

The ordered probit (OP) is a generalization of the widely used probit analysis to the case of more than two outcomes of an ordinal dependent variable (a dependent variable for which the potential values have a natural ordering, as in poor, fair, good, excellent, or, as in the present case, no disability, 1 disability, 2 or more disabilities). To avoid repetition, a brief algebraic exposition of the ordered probit specification is given below to unravel factors associated with 1 or more disabilities in rural India[38]. For other applications, the same structure of the model is used with variations in outcomes and corresponding explanatory variables.

Let us begin with a latent variable specification

$y* = \boldsymbol{x}\,\boldsymbol{\beta}' + \varepsilon$ (1)

$y*$ is unobserved and $\boldsymbol{x}$ is a vector of explanatory variables. What we do observe is

y = 0 if $y* \leq 0$,

=1 if $0 < y* \leq \mu_1$

= 2 if $\mu_1 < y* \leq \mu_2$

.

.

=J if $\mu_{j-1} \leq y*$.

The μ*'s* are unknown parameters to be estimated with $\boldsymbol{\beta}'$. Suppose there is a health survey to assess health status of an individual. The respondents have their own preferences which depend on certain measurable factors such as age, gender, and wealth, and some unmeasurable factors. The essential ingredient is the mapping from an underlying, naturally ordered preference scale to a discrete ordered observed outcome in terms of disease outcomes (in the present case, disabilities and their combinations). Given only, say, three possible answers, they choose the cell that most closely represents their preferences.

It is assumed that ε is normally distributed. The mean and variance are normalised to zero and one, respectively. With the normal distribution, the following probabilities are obtained:

Prob(y=0) =$\Phi(-\boldsymbol{x}\,\boldsymbol{\beta}')$,

Prob(y=1) = $\Phi(\Phi(\mu 1 - \boldsymbol{x}\,\boldsymbol{\beta}') - \boldsymbol{x}\,\boldsymbol{\beta}') - \Phi(-\boldsymbol{x}\,\boldsymbol{\beta}')$,

Prob(y=2) = $\Phi(\mu 2 - \boldsymbol{x\,\beta'}) - \Phi(\mu 1 - \boldsymbol{x\,\beta'})$,

.

Prob(y=J) =1- $\Phi(\mu_{j-1} - \boldsymbol{x\,\beta'})$

In order for all probabilities to be positive, it must be the case $0 < \mu_1 < \mu_2 \ldots \ldots < \mu_{j-1}$.

The marginal effects/associations are different from the ordered probit (OP) regression coefficients and more useful[g]. Besides, both the sign and magnitude of marginal effects/associations vary with the ordered outcome. As well-known textbooks offer a detailed account of how the marginal effects/associations are calculated, we have refrained from an exposition here. Note that in the present context, marginal effects are *synonymous* with marginal associations.

The Wald test examines the linear restrictions $\beta_1 = \beta_2 = \cdots . \beta_{j-1}$ or H_0: $\beta_q - \beta_1 = 0$, $q = 2, \ldots, J-1$

Note also that the dependent variables refer to *reported* disabilities in 2012 and the explanatory variables/covariates refer to 2005.

Another useful clarification is that we have avoided use of interactions between explanatory variables, as there are both computational and interpretational difficulties[h].

Interpretation of Results

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[g] $\hat{\beta}$ or the estimated coefficient shows in principle whether a variable affects the response probability or in other words, the latent variable (y*= $\hat{\beta}$ X explanatory variable). Suppose X is a continuous variable (e.g. age), what is meant by $\hat{\beta}$ is not clear. Suppose a one year increase in age increases 'y*' by 0.01. It can only be said that the latent variable increases by 0.01, but it is less useful unless it is transformed to marginal effect (showing the marginal increase of the probability in response to change in y* by 0.01). In other words, marginal effects in mprobit or probit can be interpreted in the same way as β in linear models, such as OLS and this it is useful[38].

[h]In non-linear models, such as probit, ordered-probit (OP), or multinomial probit (MNP), the interpretation of the interacted term is difficult unlike in the linear model. Suppose we are interested in the interacted effect of age ('age') and whether an individual is female ('female') on whether the person is ill ('illness') in the probit model. In the linear model, such as OLS, the interaction term, 'age x female' denotes a gender difference in the partial marginal effect of age on the probability of being ill. The interaction captures the average difference in slopes for male and female samples. On the other hand, in the probit, for instance, the estimated coefficients of 'age', 'female' and 'age x female' denote the partial effect of each factor on the latent variable (e.g. utility) underlying the individual 'choice' for being ill or not where the transformation is premised on the cdf of the standard normal distribution, which is different from the partial marginal effect on the probability of being ill. Because of the non-linearity, the gender difference in the marginal effect of age on the probability of illness can be calculated by the probit model only with 'age' and 'female' (i.e. without an interaction) as the difference in a marginal change in cdf with respect to age between male and female samples. So the interacted effect can be captured by the model without an interaction. Once 'age x female' is inserted, the estimated coefficient cannot be interpreted at face value because the value of 'age x female' cannot change independently of the values of 'age' and 'female' and so Stata cannot compute the marginal effect of the interaction based on the command 'margins'. The justification for including the interacted term rests on whether the shape of the cdf with respect to age is significantly different for male and female samples (e.g. a steeper curve for some age groups of female sample)[39]. *However, even in this case, unlike the linear case, there still remain both interpretational and computational difficulties of the interaction term because the cross-partial derivative of 'age' and 'female' depends on the level of age, whether female, as well as the effect of any changes in these two variables on the latent factor*. (FN) In practical terms, if the purpose is to obtain the differential marginal effects for male and female samples, inclusion of the interaction is not recommended. If male and female samples show different cdf on the probability of illness with respect to age, probit may need to be estimated separately. [39]

.

The overall ordered probit specification of the prevalence and persistence of disabilities in rural India during 2005-12 is validated by the Wald test ($\chi^2 = 781.6$ significant at ≤ 0.0 per cent).

The dependent variable is: no disability, 1 disability, 2-4 disabilities and > 4 disabilities. Variations in these are sought to be explained by lagged disabilities, NCDs, gender, marital status, caste affiliation, asset quartile, education, age-group, whether a conflict occurred in the village/ward, affiliation to social networks, household size, whether a regular smoker, and state dummies. As all explanatory variables are for 2005, the priority in time avoids two-way relationships, say, between NCDs and disabilities. As the βs from the OP are not so useful, as explained before, only the marginal effects/associations are given as these are are far more useful. The marginal effects/associations are given in Table 2.

As our strategy here is to focus more on disabilities and NCDs in 2005, we will comment on their associations with disabilities in greater detail. However, as some controls are important in themselves, brief comments on them are included.

The associations show high persistence of disabilities between 2005 and 12. Relative to those not suffering from any disability, those suffering from 1 disability display a lower probability of no disability in 2012, and higher probabilities of 1, 2-4 and > 4 disabilities. The highest probability is associated with > 2-4 disabilties. A similar pattern is observed among those suffering from 2-4 disabilities-a lower probability of no disability and highest probability of 2-4 disabilities in 2012. This pattern is also reproduced among those who suffered from >4 disabilities. The lowest probability is that of no disability and highest of 2-4 disabilities in 2012.

Table 2: Marginal Effects/Associations of Factors Associated with Disability in Rural India

Variables	No Disability		1 Disability		2-4 Disabilities		>4 Disabilities	
	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
Disabilities (2005)								
1	-0.1187***	(0.0148)	0.0294***	(0.0033)	0.0595***	(0.0074)	0.0298***	(0.0045)
2-4								
>4	-0.1775***	(0.0263)	0.0405***	(0.0048)	0.0876***	(0.0126)	0.0494***	(0.0094)
Gender								
Female	-0.0142***	(0.0037)	0.0041***	(0.0011)	0.0071***	(0.0019)	0.003***	(0.0008)
Marital Status								
Unmarried	-0.0483***	(0.0083)	0.013***	(0.0021)	0.0243***	(0.0042)	0.0111***	(0.0022)
Widowed/Divorced	-0.0202***	(0.0048)	0.0057***	(0.0013)	0.0102***	(0.0025)	0.0043***	(0.0011)
Caste								
Brahmin	-0.0029	(0.0076)	0.0008	(0.0021)	0.0015	(0.0038)	0.0006	(0.0016)
High Caste	0.0046	(0.0051)	-0.0013	(0.0015)	-0.0023	(0.0026)	-0.001	(0.0011)
Dalit	0.0095**	(0.0043)	-0.0027**	(0.0012)	-0.0048**	(0.0022)	-0.002**	(0.0009)
Adivasi	0.037***	(0.0049)	-0.0111***	(0.0016)	-0.0187***	(0.0025)	-0.0073***	(0.0010)
Others	0.0064	(0.0055)	-0.0018	(0.0016)	-0.0032	(0.0028)	-0.0014	(0.0012)
Asset Quartile - 2005								
Q2	0.0086*	(0.0050)	-0.0024*	(0.0014)	-0.0043*	(0.0025)	-0.0018*	(0.0011)
Q3	0.0116**	(0.0050)	-0.0033**	(0.0014)	-0.0058**	(0.0025)	-0.0025**	(0.0011)

Q4	0.0149***	(0.0054)	-0.0043***	(0.0015)	-0.0075***	(0.0027)	-0.0031***	(0.0012)
Schooling								
1-4	0.0194***	(0.0050)	-0.0057***	(0.0015)	-0.0098***	(0.0025)	-0.004***	(0.0010)
6-8	0.0225***	(0.0044)	-0.0066***	(0.0013)	-0.0114***	(0.0022)	-0.0046***	(0.0009)
9-10	0.0277***	(0.0060)	-0.0082***	(0.0019)	-0.014***	(0.0031)	-0.0056***	(0.0012)
>10	0.0401***	(0.0065)	-0.0121***	(0.0021)	-0.0203***	(0.0033)	-0.0078***	(0.0012)
NCD (2005)								
Yes	-0.0375***	(0.0076)	0.0104***	(0.0020)	0.0189***	(0.0038)	0.0083***	(0.0019)
Age Group (2005)								
15 – 30	0.0609***	(0.0032)	-0.024***	(0.0014)	-0.0308***	(0.0017)	-0.0061***	(0.0005)
51 – 60	-0.1252***	(0.0076)	0.0362***	(0.0024)	0.0664***	(0.0043)	0.0226***	(0.0018)
61 – 70	-0.2241***	(0.0114)	0.0561***	(0.0029)	0.1179***	(0.0064)	0.0501***	(0.0039)
>70	-0.3692***	(0.0218)	0.0736***	(0.0033)	0.1873***	(0.0105)	0.1083***	(0.0108)
Social Network (2005)								
1	0.0021	(0.0045)	-0.0006	(0.0013)	-0.0011	(0.0023)	-0.0004	(0.0009)
>1	-0.0001	(0.0042)	0.00003	(0.0012)	0.00005	(0.0021)	0.00002	(0.0009)
Household size								
1	-0.0209	(0.0189)	0.0059	(0.0052)	0.0105	(0.0095)	0.0045	(0.0043)
2-5	-0.0058*	(0.0032)	0.0017*	(0.0009)	0.0029*	(0.0016)	0.0012*	(0.0007)
Conflict in Village (2005)								
Yes	0.003	(0.0032)	-0.0009	(0.0009)	-0.0015	(0.0016)	-0.0006	(0.0007)
Smoke (2005)								
Yes	-0.0082	(0.0050)	0.0023*	(0.0014)	0.0041	(0.0025)	0.0017	(0.0011)
Chullah (2005)								
No Biomass Stove	0.0086	(0.0061)	-0.0025	(0.0018)	-0.0044	(0.0031)	-0.0018	(0.0012)
Open Fire	0.0021	(0.0041)	-0.0006	(0.0012)	-0.0011	(0.0020)	-0.0004	(0.0008)
Improved Chullah	-0.0124	(0.0133)	0.0035	(0.0037)	0.0062	(0.0067)	0.0027	(0.0030)
State Dummies	Yes							
Number of Observations	62073							

*** p<0.01, ** p<0.05, * p<0.1

There are significant associations between disabilities and NCDs. There is a negative association between no disability and NCDs, implying that NCDs are associated with lower probability of no disability. However, the association between a single disability and NCDs is positive, as also between 2-4 and > 4 disabilities, implying higher pobabilities of single and multiple disabilities.The largest (absolute) association is between no disability and NCDs, followed by 2-4 disabilities.

Age and disability show strong associations. Relative to the omitted age- group of 31-50 years old, the youngest (15-30 years) display a positive association with no disability and negative associations with 1 or more disabilities in 2012. However, a different pattern emerges for older persons (51 years or more). Among those 51-60 year old, there is a lower probability of no disabiliy and higher probabilities of 1 or more disabilities in 2012. The highest probability is of 2-4 disabilities. Similar patterns are observed among those in the age-groups 61-70 years and > 70 years in 2012.

Relative to the males, the females are associated with a significantly lower probability of no disability, and higher probabilities of 1 or multiple disabilities in 2012. The largest probability is of 2-4 disabilities. However, while all these associations are significant, their magnitudes are small.

Marital status yields significant associations. Relative to the married, the unmarried are more likely to suffer from 1 and multiple disabilities. A similar pattern is observed among the widowed/divorced.

The asset quartiles in 2005 show significant associations with disabilities in 2012, relative to the omitted first quartile. The second quartile is positively associated with no disability, implying a higher probability of no disability in 2012. However, there are negative associations with single and multiple disabilities, implying lower probabilities. While the associations are significant, their (absolute) numerical values are small. The third and fourth quartiles replicate this pattern, suggesting affluence is associated with lower prevalence of disabilities.

A form of human capital is schooling. The omitted category is illiterates in 2005. So relative to them, those with 1-4 years of schooling display higher probability of no disability, and lower probabilities of single and multiple disabilities. However, except for the probability of no disability, all other probabilities are economically small (in absolute terms) in 2012. Similar associations are replicated with higher schooling attainments. It follows therefore that while the association between schooling and no disability is non-negligible, those between schooling and single and multiple disabilities have the right sign but the magnitudes are neglible.

Somewhat surprising is the absence of significant associations between social networks and disabilities. No less surprising is the absence of significant associations between conflicts in the village/wards and disabilities.

Among life-style variables an important one is smoking. It turns out that regular smoking is associated with lower probability of no disability and higher probabilities of single and multiple disabilities. However, all these associations are significant at about 0.1 % level.

In brief, there is persistence of disabilities between 2005and 2012. Disabilities in 2012 also show significant associations with NCDs, age, gender, affluence, and schooling.

Rural Employment and Disabilities

The means and standard deviations of variables used in this analysis are given in Table 3.

Table 3: List of Variables used in Rural Employment Analysis

Variable		Mean	Std. Dev	Min	Max
Work participation (farm, business, wage salary)		1.585	1.073	0	3
Age					
	15-30	0.396	0.489	0	1
	51-60	0.120	0.326	0	1
	61-70	0.059	0.235	0	1
	>70	0.019	0.137	0	1
Caste					
	Brahmin	0.047	0.212	0	1
	High Caste	0.128	0.334	0	1
	Dalit	0.233	0.423	0	1
	Adivasi	0.100	0.300	0	1
	Others	0.109	0.312	0	1

Gender	Female 2	0.489	0.500	0	1
Schooling					
	1-4	0.096	0.294	0	1
	5-8	0.219	0.413	0	1
	9-10	0.142	0.349	0	1
	>10	0.082	0.274	0	1
Marital Status					
	Unmarried	0.156	0.363	0	1
	Widowed/D~d	0.079	0.269	0	1
Household Size					
	1	0.003	0.050	0	1
	>5	0.516	0.500	0	1
Radio regular Men					
	Regularly	0.157	0.364	0	1
Radio regular Women					
	Regularly	0.123	0.329	0	1
Newspaper regular Men					
	Regularly	0.115	0.319	0	1
Newspaper regular Women					
	Regularly	0.048	0.214	0	1
TV regular Men					
	Regularly	0.253	0.435	0	1
TV regular Women	Regularly	0.290	0.454	0	1
Minutes to workplace					
	1-29	0.170	0.376	0	1
	30-60	0.251	0.434	0	1
	>60	0.016	0.126	0	1
NCD					
	Yes	0.062	0.241	0	1
Disability					
	Yes	0.024	0.153	0	1
Social Networks					
	1	0.189	0.391	0	1
	>1	0.183	0.387	0	1
Conflict in village					
	Yes	0.486	0.500	0	1
Pension					
	Yes	0.012	0.108	0	1
Asset Quartile 2005					
	q2	0.244	0.429	0	1
	q3	0.283	0.450	0	1
	q4	0.256	0.436	0	1
Ratio Income Share Top 1% to Bottom 50 %		0.464	0.120	0.226	0.858
Net State Domestic Product		21475	8239	7914	63877

Source: Author's Computations from IHDS 2015.

As noted earlier, employment in rural areas in 2012 is disaggregated by duration into four categories: no employment, <240 hours in the previous year (ie, previous to 2012), part time employment >240 hours, and full time employment (at least 250 days and at least 2000 hours). The largest share of employment is of part time (>240 hours), followed by no employment, and then full time employment.

What is indeed striking is that among the disabled, the proportion of not employed is just under half, highest in part time employment, followed by full-time employment. Except for not employed and those employed <240 hours, in all other cases, the proportions of disabled are markedly lower.

The highest proportion of females is in not employed category, followed by part time employment. Their proportion in full-time employment is barely a fraction of part time employment. Males, however, display markedly lower proportion of not employed compared with their proportions in part-time (highest) and full time employment.

If we consider proportion of employed in different age-groups, a mixed pattern is obtained. In <240 hours and part-time employment, the proportions of the older group >31-50 years are highest but in full time employment that of the youngest, 15-30 years, is slightly higher. Among those in the older group, 51-60 years, the highest proportion are in part-time employment, followed by <240 hours. In the age-group, 61-70 years, while the proportion of not employed is much higher (relative to the youngest), their proportions in <240 hours and part time employment are moderate. Even the proportion in full time employment is non-negligible. Among the oldest, > 70 years, while a vast majority (about 80 %) is not employed, their shares in <240 hours and part-time employment are about moderate.

A measure of affluence is physical assets, classified into quartiles, with the first representing the least affluent and the fourth the most affluent. Among the least affluent, the majority are employed part-time, followed by no employment and then full-time employment. Among those in the second quartile, the largest share is in part-time employment, followed by no employment and then in full time employment. Among those in the fourth quartile, the highest proportion is of part time employment, followed by no employment and then full time employment.

Among all levels of schooling, the highest proportions are in part-time employment but proportions of full time employment rise with level of schooling, the highest being among those with >10 years of schooling. Part-time employment falls at schooling levels above > 4 years, with the lowest being among those with highest level of schooling, >10 years.

Econometric Analysis

An ordered probit specification is used in which duration of employment in farm, business, wages/salary is disaggregated into four categories: 1=none (did not work at this type of employment, and missing hours), 2=<240 hours last year, 3=part-time: ≥ 240 hours last year but not full year and 4. =full time last year (both at least 250 days and at least 2000 hours) in 2012.The explanatory variables include disability, NCDs, age-group, gender, marital status, household size, caste, asset quartile,

schooling, distance to workplace, pension, exposure to mass media of men and women, social networks, conflict in village and neighbourhood, and two state level variables: net state domestic product and Piketty measure of income inequality measured as share of top 1 % to that of the bottom 50 % in total income in 2005[40]. As interactions between disability and, say, gender or age are difficult to interpret, these are not considered.

Since marginal effects/associations of factors associated with rural employment are of greater analytical interest than the OP coefficients, we confine our interpretation to the former. These are given in Table 4. The OP specification is validated by the Wald chi-square test ($\chi 2 = 12220.12$ significant at < 0.01 %).

As before, our main comments are on the associations between employment, disability and NCDs. As some of the controls are important in themselves, brief comments are offered on them.

There is a positive association between no employment in 2012 and disability in 2005, as also with employment of <240 hours, relative to those without any disability in 2005. What these findings imply are that disabled persons are either not able to work or work for low durations. Probabilities of higher durations of employment of part-time employment of ≥ 240 hours and of full time employment (both at least 250 days and at least 2000 hours) are lower –especially of part-time employment. Thus disability is associated with lower prospects of high duration employment.

Similar associations are found between employment and NCDs. Positive associations between no employment and NCDs, as also between employment of <240 hours and NCDs are significant,

Table 4:
Marginal Effects/Associations of Factors Associated with Rural Employment

Variables	No Employment		<240 hours		part-time: ≥ 240 hours		full time	
	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
Age Group (2005)								
15 – 30	0.0144***	(0.0039)	0.00244***	(0.0007)	-0.00335***	(0.0009)	-0.0135***	(0.0037)
51 – 60	0.102***	(0.0061)	0.0123***	(0.0007)	-0.0339***	(0.0026)	-0.0807***	(0.0043)
61 – 70	0.184***	(0.0157)	0.0155***	(0.0007)	-0.0740***	(0.0087)	-0.126***	(0.0075)
>70	0.384***	(0.0169)	0.00641***	(0.0017)	-0.200***	(0.0120)	-0.190***	(0.0042)
Caste								
Brahmin	0.0266***	(0.0082)	0.00329***	(0.0009)	-0.00666***	(0.0022)	-0.0233***	(0.0069)
High Caste	0.00609	(0.0050)	0.000823	(0.0007)	-0.00139	(0.0012)	-0.00553	(0.0045)
Dalit	0.0296***	(0.0052)	0.00362***	(0.0006)	-0.00750***	(0.0014)	-0.0257***	(0.0044)
Adivasi	0.0291***	(0.0053)	0.00356***	(0.0006)	-0.00735***	(0.0014)	-0.0253***	(0.0045)
Others	0.0317***	(0.0056)	0.00383***	(0.0006)	-0.00809***	(0.0015)	-0.0274***	(0.0047)
Gender								
Female	0.209***	(0.0042)	0.0389***	(0.0014)	-0.0703***	(0.0022)	-0.178***	(0.0037)
Schooling (2005)								
1 – 4	0.0108*	(0.0058)	0.00123*	(0.0006)	-0.00304*	(0.0017)	-0.00895*	(0.0048)
5 – 8	0.00338	(0.0046)	0.000399	(0.0005)	-0.000928	(0.0013)	-0.00285	(0.0039)
9 – 10	-0.0171***	(0.0056)	-0.00221***	(0.0007)	0.00431***	(0.0014)	0.0150***	(0.0050)
>10	-0.0472***	(0.0073)	-0.00696***	(0.0012)	0.0102***	(0.0014)	0.0440***	(0.0073)

Marital Status (2005)								
Unmarried	0.0655***	(0.0054)	0.00646***	(0.0005)	-0.0190***	(0.0018)	-0.0529***	(0.0041)
Widowed/Divorced	0.0228***	(0.0083)	0.00271***	(0.0009)	-0.00566**	(0.0023)	-0.0198***	(0.0070)
Household Size (2005)								
1	-0.0406	(0.0277)	-0.00572	(0.0046)	0.00888*	(0.0047)	0.0374	(0.0276)
>5	-0.00936***	(0.0033)	-0.00115***	(0.0004)	0.00239***	(0.0009)	0.00812***	(0.0029)
Radio regular Men (2005)								
Regularly	-0.0107	(0.0082)	-0.00137	(0.0011)	0.00265	(0.0019)	0.00945	(0.0073)
Radio regular Women (2005)								
Regularly	0.00694	(0.0089)	0.000843	(0.0011)	-0.00182	(0.0024)	-0.00597	(0.0075)
Newspaper regular Men (2005)								
Regularly	0.0126*	(0.0067)	0.00150*	(0.0008)	-0.00335*	(0.0019)	-0.0107*	(0.0056)
Newspaper regular Women (2005)								
Regularly	0.0223**	(0.0095)	0.00255**	(0.0010)	-0.00621**	(0.0029)	-0.0187**	(0.0077)
TV regular Men (2005)								
Regularly	0.00492	(0.0062)	0.000605	(0.0008)	-0.00127	(0.0016)	-0.00425	(0.0053)
TV regular Women (2005)								
Regularly	0.0139**	(0.0062)	0.00170**	(0.0007)	-0.00366**	(0.0017)	-0.0120**	(0.0053)
Minutes to workplace								
1 – 29	-0.307***	(0.0042)	-0.0925***	(0.0023)	0.113***	(0.0044)	0.286***	(0.0050)
30 – 60	-0.311***	(0.0041)	-0.0959***	(0.0024)	0.106***	(0.0042)	0.301***	(0.0045)
>60	-0.329***	(0.0052)	-0.110***	(0.0039)	0.0695***	(0.0106)	0.369***	(0.0168)
NCD (2005)								
Yes	0.0358***	(0.0074)	0.00389***	(0.0007)	-0.0104***	(0.0024)	-0.0293***	(0.0057)
Disability (2005)								
Yes	0.0550***	(0.0102)	0.00541***	(0.0008)	-0.0170***	(0.0037)	-0.0433***	(0.0073)
Social Network (2005)								
1	0.00567	(0.0051)	0.00071	(0.0006)	-0.00143	(0.0013)	-0.00495	(0.0044)
>1	0.0180***	(0.0042)	0.00213***	(0.0005)	-0.00476***	(0.0012)	-0.0153***	(0.0035)
Conflict in Village (2005)								
Yes	-0.0127***	(0.0035)	-0.00158***	(0.0004)	0.00325***	(0.0009)	0.0111***	(0.0031)
Pension (2005)								
Yes	0.0524***	(0.0160)	0.00517***	(0.0012)	-0.0162***	(0.0057)	-0.0414***	(0.0115)
Asset Quartile – 2005								
Q2	-0.00596	(0.0048)	-0.000655	(0.0005)	0.00164	(0.0013)	0.00498	(0.0040)
Q3	-0.0150***	(0.0055)	-0.00172***	(0.0006)	0.00398***	(0.0015)	0.0128***	(0.0047)
Q4	-0.0298***	(0.0058)	-0.00365***	(0.0007)	0.00743***	(0.0014)	0.0260***	(0.0051)
Ratio of share of top 1% to bottom 50% (2005)	-0.0674***	(0.0113)	-0.00836***	(0.0014)	0.0172***	(0.0029)	0.0585***	(0.0098)
Net State Domestic Product (2005)	-1.63e-06***	(0.0000)	-2.02e-07***	(0.0000)	4.16e-07***	(0.0000)	1.41e-06***	(0.0000)
Number of Observations	60203							
*** p<0.01, ** p<0.05, * p<0.1								

implying higher probabilities of no employment and low duration of employment among those suffering from NCDs, relative to those not suffering from any NCD. Besides, the probabilities of working longer (part time employment of ≥ 240 hours and of full time employment (both at least 250 days and at least 2000 hours) are lower-especially the latter. The association between no employment and NCDs is strongest (in absolute) value.

The omitted age-group is 31-50 years in 2005. So relative to this group, the youngest (15-30 years) display positive associations with no employment and low duration of employment (<240 hours) in 2012, implying that this age-group is more likely to be not employed and employed for short duration (<240 hours). Besides, their probabilities of longer duration employment (part-time employment of ≥ 240 hours and of full time employment (both at least 250 days and at least 2000 hours) are lower. The associations are nearly equally strong (in absolute value) for no employment and full –time employment. The older groups (51-60 years, 61- 70, >70years) replicate this pattern. A plausible and striking finding is that reduction in probabilities of both part –time and full time employment is large.

As number of males is larger than that of females, the omitted category is males. So relative to males, females are associated with higher probabilities of no employment and short duration employment in 2012. Besides, their probabilities of longer duration part-time and full-time employment are significantly lower.

Relative to the married, the unmarried are more likely to be in short duration employment and less likely to be in long duration employment. A similar pattern is observed among the widowed/divorced.

Relative to the first quartile (the least affluent) in 2005, the second quartile does not yield any significant associations with employment. The wealthier third quartile, however, does, as there are significant negative associations with no employment and low duration employment and positive with high duration of both part-time and full-time employment in 2012. So the probabilities of no employment and low duration employment are lower and those of high duration part-time and full-time employment are higher, relative to the least affluent. However, most of the associations are economically small (in absolute terms). A similar pattern is observed among the most affluent (the fourth quartile) but with the difference that two associations (with no employment and full time employment) are economically moderate.

The omitted group of schooling comprises illiterates. So relative to this group, those with 1-4 years of schooling show significant positive associations with no employment and low duration employment but negative associations with high duration part-time and full-time employment. Those with more schooling (5-8 years) do not yield any significant association. However, those with 10 years of schooling show significant negative associations with no employment and low duration employment but positive associations with part-time and full –time employment-especially the former. Those with highest level of schooling (> 10 years) also show a similar pattern with the difference that probabilities of no employment and highest duration of full-time employment are economically more

than moderate (in absolute terms). Thus higher schooling implies lower probabilities of no employment and higher probabilities of high duration employment-including full –time employment

Pensions (including old-age pension, widow's pension, disability allowance) are positively associated with no employment and low duration of employment but negatively with high duration part-time and full-time employment. Although a conjecture and subject to empirical validation, it is plausible that pensions discourage job search for long duration employment.

Distance to work is classified into: no time, 1-29 minutes, 30-60 minutes and > 60 minutes. The omitted category is no time. So relative to it, there are significant negative associations between no employment and low duration employment and positive associations with high duration part-time and full-time employment for all ranges of distance, implying lower probabilities of no employment and low duration employment-especially the former- and higher probabilities of long duration part-time and full-time employment-especially the latter. What is somewhat intriguing is that probabilities of no employment and of full time employment are larger (in absolute value) when distance is longer. One conjecture is that in remote villages long-duration employment opportunities are in far-flung areas.

Awareness of employment opportunities in rural areas is limited, in part due to high rates of illiteracy –especially among women. An important contribution of the present study is the detailed analysis of exposure of men and women to media-listening regularly to radio by men and women, reading of newspapers regularly by men and women, watching of tv regularly by men and women. In each category, not listening, not watching and not reading regularly, respectively, are the omitted categories. Regular reading of newspapers by men is positively associated with no employment, implying that they are more likely to be not employed. They are also positively associated with low duration of employment, implying that they are more likely to be in low duration employment. However, they are less likely to be in longer duration part-time and full-time employment. A similar pattern is observed among women reading newspapers regularly. However, a sharp contrast is observed between men and women watching tv regularly. Only women show significant associations. They are more likely to be not employed; and they are also more likely to be in low duration employment. However, they are less likely to be in high duration part-time and full-time employment.

State inequality in income distribution measured using Piketty's measure (ratio of share of top 1% to that of the bottom 50 % in total income) is negatively associated with no employment and low duration employment but positively with high duration part-time and full-time employment. These are intriguing results as the rise in the share of the top 1 % is associated with speculative gains in the share and real estate markets which do not generate much employment. Whether there are backward linkages from real estate activities to rural non-farm activities (eg, supply of bricks and other construction material) is not unlikely. However, whether there are other backward linkages too needs further scrutiny.

In sum, disabilities, as also NCDs, are associated with lower probabilities of long duration part-time and full-time employment; women display lower probabilities of long duration part-time and full time

employment; higher levels of schooling yield higher probabilities of long duration of part-time and full-time employment; wealthier households are associated with higher probabilities of long duration part-time and full-time employment; pensions yield higher probabilities of no employment or low duration employment and lower probabilities of long duration part-time and full-time employment; exposure of both men and women to mass media is associated with higher probabilities of low duration employment; and, finally, the greater the income inequality, the higher is the probability of long duration employment.

Rural Poverty and Disability

The means and standard deviations of the variables used in this analysis are given in Table 5.

Instead of using a poverty cut-off (the World Bank uses several), we have used terciles of per capita expenditure (at constant prices). The bottom tercile denotes extremely poor, the next middle class and the third affluent. It is a somewhat rough and ready approximation but not altogether implausible.

Table 5:
List of Variables used in the Rural Poverty-Disability Analysis

Variables	Mean	Standard deviation	Min	Max
Expenditue Terciles 2005				
T1 (omitted)	0.33	0.47	0	1
T2	0.33	0.47	0	1
T3	0.33	0.47	0	1
Expenditure Terciles 2012				
T1	0.33	0.47	0	1
T2	0.33	0.47	0	1
T3	0	0.47	0	1
General	0.235	0.424	0	1
SCs	0.240	0.427	0	1
STs				
Members in Household				
1	0.006	0.076	0	1
>5	0.466	0.499	0	1
Proportion of Male members in HH				
0	0.059	0.236	0	1
>>0-0.4	0.211	0.408	0	1
>0.6	0.326	0.469	0	1
Highest Adult (21+) Schooling				
Illiterate	0.275	0.447	0	1
1-5 years	0.179	0.384	0	1
11-14 years	0.105	0.307	0	1
Graduates	0.080	0.271	0	1
Proportion Disability				
0-.30	0.019	0.138	0	1
0.31-0.6	0.016	0.125	0	1
>0.6.	0.022	0.145	0	1
Conflict in Village/neighbourhood	0.486	0.50	0	1

2005 (yes)				
N married women in household 2005	1.423	0.837	0	8
N married men in household 2005	1.353	0.804	0	8
Radio Regular Men 2005	0.149	0.356	0	1
Radio Regular Women 2005	0.119	0.323	0	1
Newspaper Regular Men 2005	0.108	0.311	0	1
Newspaper Regular women 2005	0.045	0.206	0	1
TV regular Men 2005	0.248	0.432	0	1
TV Regular Women 2005	0.285	0.452	0	1
Social Groups/networks				
1	0.187	0.390	0	1
>1	0.181	0.385	0	1
Ratio of Share of top 1% to bottom 50 %	0.461	0.115	0.226	0.858
NSDP Per capita (Rs, 2005)	21716	8499	7914	63877

Author's computations based on IHDS 2015.

Let us first examine the persistence in and mobility across the terciles. Just under half of those in the lowest tercile remain in it between 2005 and 2012; above one-third in the second tercile and more than half in the third tercile. Hence persistence is highest among the most affluent, followed by the extremely poor and then lowest among the second tercile (a little over one-third). The majority of those in the first tercile move up-about one-third into the second and under 20 % into the third. Out of the second tercile, about one-third decend into the lowest tercile, and about 30 % move up into the the third/ affluent tercile.

A disaggregated measure of disability is used in this analysis. The groups are: no disability in the household, <0.31 proportion of dsabled household members, between 0.31-0.60,and >0.60 In the non-disabled households, the proportions are almost equally distributed among the terciles. In the lowest disability group (<0.31), the proportion in the first tercile is lowest, and highest in the second and third terciles. The highest disability group (>0. 60) offers a contrast. The proportion in the lowest tercile is highest compared with other disability groups but lower than the proportion in the second tercile. Their proportions in the third tercile not just within this disability group but also across all other disability groups are lowest. The proportions of illiterates is highest in the first tercile or extremely poor group, and lowest in the third tercile or affluent group. This is in striking contrast to the graduates whose proportions rise sharply across the terciles with nearly 60 % in the affluent group. Those at the lower schooling level (11-14 years) do well too as their proportion in the first tercile doubles in the third.

Conflicts destroy livelihoods, property and dampen agricultural and non-farm growth. So the question here is whether there is impoverishment. If we consider proportions of households in conflict areas, the highest proportion is in the lowest tercile, and it drops in higher expenditure terciles with about 30 % in the third tercile. So the association between conflict and impoverishment cannot be ruled out.

There are plausible associations between membership of social networks (eg, self-help groups, women's associations, producers'associations) and the welfare metric in terms of the three expensiture terciles. Three groups of networks are considered: none, 1 and >1 networks. If we consider the proportions within each network category including none, we observe a steady diminution across the terciles. In contrast, there is a small rise in the proportions of members of one network, with a little more than one-third in the third tercile which is slightly higher than that of those not networked. A sharper contrast is yielded by those affiliated to 2 or more networks. Their proportion of extremely poor is about 29 % (lowest in the terciles) which rises to over 39 % in the third tercile. This is 8 percentage points higher than that of not-networked. It is thus plausible that support of networks –financial, facilitating access to community resources, and markets-is likely to be associated with welfare gains across the terciles including the extremely poor.

Econometric Analysis

The dependent variable in 2012 includes the expenditure terciles: the bottom one-third of the rural population, designated as extremely poor, the next one-third, designated as the middle class, and the top one-third, designated as the affluent. As these categories are ordered, an ordered probit analysis is carried out. The explanatory variables include their lagged values in 2005, male/female ratio, marital status, household size, proportion of aged individuals (number of 60 years or more) divided by household size, caste, schooling, prevalence of disabilities, whether a conflict occurred, exposure to mass media (e.g., radio, newspapers and tv), affiliation to social networks, and two state level variables: state gross domestic product per capita, and the Piketty measure of income inequality (ratio of share of top 1 % to that of the bottom 50 % in total income).

The OP specification is validated by the Wald test (chi-square statistic (475.84) rejects the null at $\leq$ 0.0 % level).

The marginal effects /associations are given in Table 6.

Table 6: Marginal Effects/Associations in the OP Analysis of Rural Poverty and Disability

	Extremely Poor		Middle Class		Affluent	
Variables	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
Extreme Poverty (2005)						
Middle Class	-0.099***	(0.0098)	0.0146***	(0.0019)	0.0842***	(0.0083)
Affluent	-0.224***	(0.0100)	-0.00323	(0.0026)	0.227***	(0.0101)
Caste						
General	-0.034***	(0.0086)	-0.003***	(0.0010)	0.0374***	(0.0095)
SC	0.0693***	(0.0099)	-0.0027***	(0.0010)	-0.0666***	(0.0092)

ST	0.160***	(0.0128)	-0.021***	(0.0033)	-0.139***	(0.0100)
Household Size (2005)						
1	0.00287	(0.0416)	3.04E-05	(0.0003)	-0.0029	(0.0419)
>5	0.0244***	(0.0084)	-0.000356	(0.0002)	-0.024***	(0.0082)
Proportion Male (2005)						
0	-0.0356**	(0.0159)	-0.00184	(0.0015)	0.0375**	(0.0173)
>0 – 0.4	0.0525***	(0.0096)	-0.003***	(0.0009)	-0.050***	(0.0090)
>0.6	0.00013	(0.0081)	8.91E-07	(0.0001)	-0.00013	(0.0081)
Proportion of 60 and Plus (2005)	-0.00221	(0.0218)	2.84E-05	(0.0003)	0.00218	(0.0215)
Highest Schooling of Adults (2005)						
Illiterate	0.0663***	(0.0099)	-0.003***	(0.0009)	-0.063***	(0.0094)
1-5	0.0491***	(0.0107)	-0.00135*	(0.0008)	-0.048***	(0.0102)
11-14	-0.034***	(0.0122)	-0.00258*	(0.0014)	0.0363***	(0.0135)
Gradute	-0.091***	(0.0122)	-0.015***	(0.0036)	0.106***	(0.0155)
Proportion Disabllity (2005)						
0 – 0.31	-0.00851	(0.0198)	-7.7E-06	(0.0002)	0.00852	(0.0201)
0.31 – 0.6	0.0468*	(0.0263)	-0.00284	(0.0029)	-0.0440*	(0.0235)
>0.6	0.0560***	(0.0207)	-0.00393	(0.0026)	-0.052***	(0.0182)
Conflict in Village (2005)						
Yes	0.0399***	(0.0073)	-0.000549	(0.0004)	-0.039***	(0.0072)
Proportion Married Women (2005)	0.0072	(0.0118)	-9.27E-05	(0.0002)	-0.00711	(0.0117)
Proportion Married Men (2005)	0.00635	(0.0116)	-8.18E-05	(0.0002)	-0.00627	(0.0115)
Radio regular Men (2005)						
Regularly	-0.01	(0.0183)	4.42E-05	(0.0001)	0.00997	(0.0184)
Radio regular Women (2005)						
Regularly	0.000478	(0.0201)	-6.35E-06	(0.0003)	-0.000471	(0.0199)
Newspaper regular Men (2005)						
Regularly	-0.0337**	(0.0135)	-0.000756	(0.0008)	0.0345**	(0.0143)
Newspaper regular Women (2005)						
Regularly	-0.062***	(0.0176)	-0.00382	(0.0026)	0.0655***	(0.0201)
TV regular Men (2005)						
Regularly	-0.00392	(0.0130)	4.01E-05	(0.0001)	0.00388	(0.0129)
TV regular Women (2005)						
Regularly	-0.055***	(0.0122)	-0.00111	(0.0008)	0.0563***	(0.0129)
Social Network (2005)						
1	-0.00262	(0.0098)	3.03E-05	(0.0001)	0.00259	(0.0097)
>1	-0.00148	(0.0090)	1.9E-05	(0.0001)	0.00146	(0.0089)
Ratio of share of top 1% to bottom 50%	0.0176	(0.0250)	-0.000226	(0.0004)	-0.0173	(0.0246)
Net State Domestic Product (2005)	-1.87e-06***	(0.0000)	2.41e-08	(0.0000)	1.85e-06***	(0.0000)
Number of Observations	25785					

*** p<0.01, ** p<0.05, * p<0.1

The omitted group is extremely poor. (Lagged) middle class in 2005 is negatively associated with extremely poor but positively with the middle and affluent in 2012. The affluent in 2005 are negatively associated with extremely poor but positively with the affluent in 2012. So there is some persistence as well as mobility between these three groups.

Three proportions of disability within a household in 2005 are considered: 0- <.31, 0.31 -0.6, and >0.6. The omitted group is those not suffering from any disability. So relative to this group, the lowest disability group does not yield any significant association with any group in 2012; the next higher group of disabilities (0.31 -0.6), however, displays positive association with extreme poverty and negative association with affluence. The highest group of disabilities (>0.6) is positively associated with extreme poverty and negatively with affluence. So the probabilities of extreme poverty are significantly higher among those with high fractions of disability in a household, and lower among the affluent, relative to households without any disability.

The omitted caste category is OBCs in 2005. So relative to this category, the group classified as *General* displays lower probabilities of being extremely poor and of being in the middle class but higher probability of being affluent in 2012. The SCs display significantly higher probability of being extremely poor and lower probabilities of being in the middle class and affluent in 2012. The STs display a similar pattern with much higher probabilities of being extremely poor and lower probabilities of being in the middle class and the affluent.

We have disaggregated highest schooling of adults (≥ 21 years) in the following categories: illiterate,1-5 years, 8-10 years (omitted), 11-14 years and graduates. So relative to the omitted group, the illiterates are more likely to be extremely poor, and less likely to be in the middle class and among the affluent in 2012. Those with 1-5 years of schooling are also more likely to be extremely poor but less likely to be in the middle class and among the affluent in 2012. However, those with higher level of schooling (11-14 years) are less likely to be extremely poor and in the middle class but more likely to be affluent. The graduates display a similar pattern with the difference that the probability of being poor is considerably lower and that of being affluent considerably higher in 2012, relative to the omitted group in 2005.

Occurrence of conflicts in a village and its neighbourhood can be destructive of livelihoods and cause physical harm, depending on their severity. Relative to no conflict, our results show that if a conflict occurred, the likelihood of extreme poverty is significantly higher and of affluence lower in 2012, relative to no conflict in 2005.

The omitted categories are not listening to radio, not reading newspapers and not watching tv in 2005, respectively. Listening regularly to radio by men does not possess significant associations with any of the three expenditure terciles. Nor does by women. However, reading newspapers regularly by men yields lower probabilities of being extremely poor and higher probabilities of being affluent. In an almost similar pattern,women who read newspapers regularly are less likely to be extremely poor, and (weakly) less likely to be in the middle class but more likely to be affluent in 2012, relative to not

reading of newspapers in 2005. While watching tv regularly by men does not yield any significant association, regular watching of tv by women makes them less likely to be extremely poor and more likely to be affluent. These are interesting results but it is not self-evident why women more exposed to tv are more susceptible to information than men.

But the greater the state affluence (measured in per capita state domestic product) is, the lower is the probability of being extremely poor and the higher the probability of being affluent. Although statistically significant, the (absolute) values are negligible.

In sum, lagged middle class is associated with lower probability of being extremely poor and higher probability of being affluent in 2012, relative to extremely poor in 2005; similarly, lagged affluent yield lower probability of being extremely poor and higher probability of being affluent in 2012. An important point is that (absolute) magnitudes of these probabilities are large for the extremely poor and affluent in 2012. Disabilities-especially the highest range- are associated with higher probabilities of extreme poverty and lower probabilities of affluence. Schooling as a form of human capital-especially higher levels of schooling-are associated with significant reductions in probabilities of being extremely poor and being in the middle class, and with significant increase in the probability of being affluent. Conflicts in the village/wards and neighbourhoods are associated with higher probabilities of extreme poverty and lower probabilities of household affluence. Another important contribution is unravelling the associations of mass media with extreme poverty and affluence. Regular reading of newspapers by men and women ia associated with lower probabilities of extreme poverty and higher probabilities of affluence. Somewhat surprisingly, affiliation to social networks does not yield any significant association.

(*5b) Analysis of Disability, Employment and Poverty in Ethiopia*

An Overview of the Economy

With about 109 million people (2018), Ethiopia is the second most populous nation in Africa after Nigeria, and the fastest growing economy in the region. However, it is also one of the poorest, with a per capita income of $790[i]. Ethiopia's economy experienced strong, broad-based growth averaging 9.9% a year from 2007/08 to 2017/18, compared to a regional average of 5.4%. Ethiopia's real gross domestic product (GDP) growth, however, decelerated to 7.7% in 2017/18. Industry, mainly construction, and services accounted for most of the growth. Agriculture and manufacturing made lower contributions to growth in 2017/18 compared to the previous year.

Ethiopia's main challenges are sustaining its positive economic growth and accelerating poverty reduction, which both require significant progress in job creation as well as improved governance. The government is devoting a high share of its budget to pro-poor programmes and investments.

[i] It draws upon a recent assessment of the Ethiopian economy[41].

The 2015/16 El Niño induced drought had severe impact on agricultural production (crop and livestock), which left nearly 10 million people in need of food assistance. However, improved weather conditions and measures taken by the government to mitigate the effects of the preceding year's drought have improved livestock production and productivity during 2016/17.

About 80% of the Ethiopian population live in rural areas, but they are increasingly migrating to urban areas due to lack of job opportunities. However, with unemployment levels at 16.5%, the situation in urban areas offers even fewer possibilities of finding employment.

Major policies were assessed under Ethiopia's Rural Job Opportunity Creation Strategy (RJOCS), adopted in 2017, which aims to address lack of job opportunities in rural areas, especially for young people, and related effects such as migration to urban areas and poverty. This is high priority as it faces a youth bulge. More than 40 per cent of the population is below the age of 15, and 71 per cent is under 30. Most young people live in rural areas, where livelihood opportunities are increasingly scarce[j]. Overall, given the median years of education obtained by rural youth, it is a challenge to improve the living standards of today's poor children. Despite the government's large investments in education, few youths in the rural areas of Ethiopia complete primary school.

The RJOCS seeks to address this by improving rural conditions and creating sustainable job opportunities for rural job seekers, primarily unemployed and underemployed women and men over 15 years of age, literate or illiterate, and those without regular and sufficient income. All of the simulated scenarios show potential for job creation in the agricultural and food sectors, particularly if stimulated with investment policies such as the expansion of agroparks[k]. All of the scenarios (aside from the Productive Safety Net Programme or PSNP) are also associated with increased household incomes.

The expansion of agroparks is found to benefit food production the most, speeding up the structural transformation of agriculture, and would also improve the trade deficit through a massive increase in food exports and have significant positive impacts on per-capita GDP. The livestock sector is found to have the greatest potential for generating employment, followed by cash crops, food crops and the agri-food industry, indicating that policies focusing on rural and agri-food sectors have great potential to create job opportunities.

There has been tremendous expansion in access to social services such as education, health, water and sanitation as well as infrastructure including roads, railways, telecommunication and power generation among others[l]. Access to universal primary education reached 100 percent, health

[j] However, a recent assessment by WFP, FAO and IFAD[42] found that their investments in the Tigray and the Somali regions of Ethiopia increased resilience of both, the ecosystem and the livelihoods of the youth as well as the older generation (including the ageing), who now have significant opportunities to earn income and prosper in the rural areas. Young couples who had previously migrated to the urban centres have moved back to the rural areas where such investments have created enabling conditions for gainful employment.

[k] For details, see a recent European Union Report[43].

[l] Paper presented at the Inter-Agency Group Meeting[44], April 18 -20, 2018, Addis Ababa, Ethiopia,

coverage 98 percent, access to potable water 65 percent, and life expectancy reached 64.6 years. Ethiopia has achieved some of the MDGs well ahead of the 2015 timeline and the latest assessment on the MDGs indicated that six of the eight M|DGs are either achieved or on track to be achieved by 2015. This robust economic and social performance helped to reduce the level of poverty.

The Government has been formulating and implementing ambitious and robust mid-term plans since the mid-2000s.Plan for Accelerated and Sustained Development to End Poverty (PASDEP) has been implemented during 2005/06 to 2009/10 followed by the First Growth and Transformation Plan (GTP I) that was implemented from 2010/11 to 2014/15. Currently, the Second Growth and Transformation Plan's (GTP II) major objectives include maintaining the strong growth of 11 percent achieved in the past, deepening economic transformation, and aiming to become a lower middle income and carbon neutral status by 2025. However, sustainable rural development has not received the attention it deserves. Agricultural productivity is being hampered by land degradation, poor water management, low technology usage and an underdeveloped marketing system, among other factors. The country loses about 2 billion tonnes of fertile soils annually to land degradation, and the siltation of water bodies is already a major threat to irrigation development[m].

Over the past fifteen years, the headcount poverty rate has declined by about 93 percent from 45.5 percent in 2000 to 23.5 percent in 2016. According to the recent Household Consumption Expenditure Survey report, between 2010/11 and 2015/16 about 5.3 million people are lifted out of poverty. Poverty gap and poverty severity indices have respectively declined from 10.1 percent and 3.9 percent in 2000 to 3.7 percent and 1.4 percent in 2016. Nonetheless poverty is still a challenge in Ethiopia as over 22 million people are living below the national poverty line.

Poverty is predominantly a rural phenomenon in Ethiopia. While urban headcount poverty declined from 36.9 percent in 2000 to 14.8 percent in 2016, rural poverty only declined from 45.4 percent to 25.6 percent in the same period. The high population rate will place increasing pressures on the country's natural resource base and significantly expand the numbers of young Ethiopians needing educational services and basic health care, not to mention straining the labour market which already fails to provide the young with sufficient employment opportunities. In line with its overall development policy goals, Ethiopia is investing heavily to reduce poverty and promote social development. The proportion of public spending on pro-poor sectors has increased from 57 percent in 2004/05 to two-thirds in 2016/17. Ethiopia needs to sustain this focus on poverty while ensuring the efficiency of resource utilization and its effectiveness in having the necessary impact. Balance needs

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[m] In the drought-prone Somali region, for example, the Rome –based agencies (viz. WFP, FAO and IFAD or RBAs) are creating linkages also with the private sector and outlined the GTP II strategic priorities to enhance both crop and livestock value chains, through targeted investments in water (for irrigation, livestock, domestic use), technical services and other infrastructure, including the Government's investment in Integrated Agro-industrial Parks[42].

to be achieved between spending within a sector, such as between primary education and secondary education, primary health care and hospital care, and rural roads and major highways.

The government is also implementing a huge social protection programme to help the poor maintain their livelihood. The Productive Safety Net Programme (PSNP) is the largest social protection programme in Africa which has supported close to 8 million chronically food insecure people since its implementation in 2005.

Unfortunately, none of these and other studies examine the role of health in reducing poverty. In what follows, therefore, we focus on rural disability as an impediment to promoting rural employment and reduction of rural poverty**.**

About 13.77 % of the rural Ethiopian population suffers from disabilities in 2015-16. About 63% suffers from a single disability while the rest from multiple disabilities (>1). The largest share is of the age-group, 31-50 years, followed by the older age-group,51-70 years. These two age-groups together account for over 70 % of suffering from a single disability.

Disability, Employment and Poverty in Ethiopia

Data

ESS began as ERSS (Ethiopia Rural Socioeconomic Survey) in 2011/12. The first wave of data collection in 2011/12 included only rural and small town areas. The survey name dropped the word "Rural" in the second wave of data collection when the sample was expanded to include all urban areas. The urban supplement was done in such a way as to ensure that the ESS data can provide nationally representative estimates. ESS refers generally to the survey, ESS1 refers to the first wave of the ESS carried out in 2011/122; ESS2 refers to the second wave of the ESS carried out in 2013/14 and ESS3 refers to the third wave of the ESS carried out in 2015/2016. ESS1, ESS2, and ESS3 together create a panel data set of households from rural and small town areas (ie. the same households that were interviewed in ESS1 were tracked and re-interviewed in ESS2 and ESS3). ESS2 and ESS3 together represent a panel of households and individuals for rural and urban areas.

ESS uses a nationally representative sample of over 5,000 households living in rural and urban areas. The urban areas include both small and large towns. The sample is a two-stage probability sample. The first stage of sampling entailed selecting primary sampling units, or CSA enumeration areas (EAs). A total of 433 EAs were selected based on probability proportional to size of the total EAs in each region. For the rural sample, 290 EAs were selected from the AgSS EAs. A total of 43 and 100 EAs were selected for small town and urban areas, respectively. In order to ensure sufficient sample size in the most populous regions (Amhara, Oromiya, SNNP, and Tigray) and Addis Ababa, quotas were set for the number of EAs in each region. During wave 3, 1255 households were re-interviewed yielding a response rate of 85 percent. Attrition in urban areas is 15% due to consent refusal and inability to trace the whereabouts of sample households.

The ESS3 data need to be weighted to represent the national-level population of rural, small and large town households. A sample weight with post-stratification adjustments was calculated for the

households and this weight variable is included in all the datasets. It reflects the adjusted probability of selecting the household into the sample. The inverse of this weight can be considered an expansion factor that sums to the total population of households in the nation. When this weight is used in a household-level file, it sums to the population of households. When this weight is used in an individual-level file, it sums to the population of individuals.

The survey consists of five questionnaires. These questionnaires are similar to the questionnaires used during the ESS1 and ESS2 with revisions based both on the results of the ESS2 and also on identified areas of need for new data.

Household questionnaire: The household questionnaire provides information on basic demographics; education; health (including anthropometric measurement for children); labour and time use; saving; food and non-food expenditure; household nonfarm income-generating activities; food security and shocks; safety nets; housing conditions; assets; credit; and other sources of household income.

Community questionnaire: The community questionnaire solicits information on infrastructure; community organizations; resource management; changes in the community; key events; community needs, actions and achievements; and local retail price information.

Agriculture questionnaire: The *post-planting* and *post-harvest* agriculture questionnaires focus on crop farming activities and solicit information on land ownership and use; farm labour; inputs use; GPS land area measurement and coordinates of household fields; agriculture capital; irrigation; and crop harvest and utilization.

The livestock questionnaire collects information on animal holdings and costs; and production, cost and sales of livestock by products.

Descriptive Statistics

We sketch below (i) factors associated with rural disability in Ethiopia; (ii) factors associated with rural employment-especially the association between employment and disability; and (iii) association between rural poverty and disability and the underlying links, based on cross-tabulations, before each econometric analysis. Since the (selected) comparisons are based on averages, there is no control for confounding variables. Hence the marginal associations obtained from the ordered probit regressions may differ.

A list of variables used with their means and standard deviations is given in Table 7.

Table 7: Rural Disability and Covariates in Ethiopia

Variable	Mean	Std. Dev.	Min	Max
Disability	0.187	0.503	0	2
L.Per Capita Expenditue Tercile				
Poor	0.291	0.454	0	1
Middle	0.316	0.465	0	1
Shocks				
1	0.169	0.375	0	1
>1	0.245	0.430	0	1
L.Injuries				
Yes	0.011	0.106	0	1

L.Type of Toilet facility				
Flush Toilet	0.017	0.128	0	1
Other	0.416	0.493	0	1
L.Distance to Micro-finance Institution				
0.1-5.0 km	0.117	0.321	0	1
6-10 km	0.145	0.352	0	1
11-20 km	0.208	0.406	0	1
>20 km	0.221	0.415	0	1
L.Source of Drinking Water (dry)				
Tap Water	0.254	0.435	0	1
Protected Well	0.278	0.448	0	1
L.Source of Drinking Water (wet)				
Tap Water	0.275	0.447	0	1
Protected Well	0.282	0.450	0	1
Religion				
Muslim	0.342	0.474	0	1
Traditional/Pagan	0.016	0.124	0	1
Other	0.006	0.076	0	1
L.Household size				
1	0.030	0.171	0	1
2	0.061	0.239	0	1
3-5	0.419	0.493	0	1
Age Group				
31-50	0.385	0.487	0	1
51-70	0.159	0.365	0	1
>70	0.030	0.171	0	1
Schooling				
Others/read write	0.056	0.229	0	1
1-5	0.207	0.406	0	1
6-10	0.134	0.341	0	1
>10	0.030	0.171	0	1
Marital Status				
Never Married	0.181	0.385	0	1
Divorced/Separated	0.044	0.204	0	1
Widowed	0.070	0.254	0	1
Gender				
Male	0.474	0.499	0	1

1. Author's computations from ESS.

In the cross –tabulations summarised below, disabilities are for 2015-16 and the covariates for 2011-12, primarily to circumvent *reverse* association.

About 13.77 % of the rural Ethiopian population suffers from disabilities in 2015-16. About 63% suffer from a single disability while the rest from multiple disabilities (>1). The largest share is of the age-group, 31-50 years, followed by the older age-group,51-70 years. These two age-groups together account for over 70 % of those suffering from a single disability. The largest share of multiple disabilities is among 51-70 years old, followed by the oldest (>70 years) and 31-50 years. The

combined share of 31-50 years and 51-70 years is about 67 %. If we go by prevalence of disability by age-group, it is highest among the oldest, followed by 51-70 years old. A similar pattern is observed for multiple disabilities except that the prevalence among the oldest is just under 50 %.

Disability by gender shows a frequently observed contrast. The shares of females in both single and multiple disabilities-over 52 %- is higher in 2015-16. However, differences between prevalences by gender are low, with slighly higher prevalences among females.

Whether (per capita real) expenditure terciles in 2011/12 show any association with disabilities in 2015/16 is of considerable interest as the extremely poor lack resources for treatment and assistive devices. The shares of those suffering from one disability in 2015-16 are about 1/3rd in each, with highest in the third tercile/affluent but only slightly. A similar pattern is observed for multiple disabilities, with the highest in the third tercile. However, proportions of those suffering from single and multiple disabilities are highest in the first tercile/extremely poor. Hence the extremely poor are most vulnerable to disabilities.

Although proportions of those suffering from single and multiple disabilities at each schooling level vary, the highest is among illiterates, and followed by others (a residual mix of categories such as not completed primary education). However, apart from these groups, the prevalences are considerably lower at higher schooling levels but do not show a pattern.

Ordered Probit Random Effect Model

An ordered probit random effect specification is used[45, 38] The latent variable specification of the model can be written as

$h_{it}^{*} = \boldsymbol{x_{i\,t-1}\beta'} + \boldsymbol{z_i\delta'} + d_t + \alpha_i + \varepsilon_{it}$ (i=1.....N, t =2...T) (2)

where $\boldsymbol{x}_{i\,t-1}$ is a set of observed variables in the previous wave which are posited to be associated with disability in the more recent wave, $\boldsymbol{z_i}$ represents time-invariant factors associated with disability, α_i is an individual/household specific, random and time-invariant component, d_t is a time/wave dummy, and ε_{it} is the disturbance which is normally distributed and uncorrelated across individuals and waves and α_i. The disturbance is assumed to be strictly exogenous. Note that $\boldsymbol{x_{i\,t-1}}$ is lagged by one wave to circumvent their endogeneity.

In our data the latent outcome $h_{it}^{*}$is not observed. Instead, we observe an indicator of the category in which the latent indicator falls (h_{it}). The observation mechanism is expressed as

$h_{it} = j$ if $\mu_{j-1} < h_{it}^{*} < \mu_{j}$, j=1....M,

where $\mu_0 = -\infty, \mu_j \leq \mu_{j+1}, \mu_m = \infty$. Given the assumption that the error term is normally distributed, the probability of observing the particular category of disability reported by an individual i at time t (h_{it}), conditional on the regressors and the individual effect and time dummy is :

$$P_{itj} = P(h_{it} = j) = \Phi(\mu_j - \boldsymbol{x_{it-1}\beta'} - \gamma h_{it-1} - \boldsymbol{z_i\delta'} - \alpha_i - d_t - \Phi(\mu_{j-1} - \boldsymbol{x_{it-1}\beta'} - \gamma h_{it-1} - \boldsymbol{z_i\delta'} - \alpha_i - d_t),$$

where $\Phi(.)$ is the standard normal distribution function .

As an exposition of the maximum likelihood estimation procedure is given in several well-known text books[45] it is unnecessary to repeat it here.

This specification with appropriate changes in the dependent variables and changes in the expanatory variables is used for examining the links between rural employment and disability, and between rural poverty and disability.

Econometric Analysis

Disabilities are classified into: no disability, 1 disability and > 1 disability or multiple disabilities. The ordered probit specification is validated by the Wald test (the $\chi^2 = 781.66$, significant at ≤ 0.01 % level). The marginal effects/associations are given in Table 8. To focus better on key associations our comments are deliberately selective.

Table 8:
Marginal Associations of Rural Disability and Its Covariates

Variables	No Disability (1)		1 Disability (2)		➢ 1 Disability(3)	
	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
L.Per Capita Expenditue Tercile						
Extremely Poor	-0.00816	(0.0069)	0.00445	(0.0038)	0.00371	(0.0032)
Middle	-0.0151**	(0.0064)	0.00815**	(0.0035)	0.00690**	(0.0030)
Shocks						
1	-0.00822	(0.0073)	0.00442	(0.0039)	0.0038	(0.0034)
>1	0.00758	(0.0064)	-0.00414	(0.0035)	-0.00345	(0.0029)
L.Injuries						
Yes	-0.0126	(0.0229)	0.00674	(0.0121)	0.00583	(0.0108)
L.Type of Toilet facility						
Flush Toilet	-0.0448*	(0.0232)	0.0231**	(0.0115)	0.0217*	(0.0117)
Other	0.0106*	(0.0058)	-0.00573*	(0.0032)	-0.00482*	(0.0026)
L.Distance to Micro-finance Institution						
0.1-5.0 km	-0.0134	(0.0093)	0.00733	(0.0050)	0.00608	(0.0042)
6-10 km	-0.0196**	(0.0088)	0.0107**	(0.0048)	0.00895**	(0.0041)
11-20 km	-0.00601	(0.0078)	0.00331	(0.0043)	0.0027	(0.0035)
>20 km	-0.0229***	(0.0080)	0.0124***	(0.0043)	0.0105***	(0.0037)
L.Source of Drinking Water (dry)						
Tap Water	-0.00756	(0.0180)	0.00411	(0.0098)	0.00345	(0.0083)
Protected Well	-0.0101	(0.0157)	0.00548	(0.0085)	0.00463	(0.0072)
L.Source of Drinking Water (wet)						
Tap Water	0.0081	(0.0171)	-0.00442	(0.0094)	-0.00368	(0.0078)
Protected Well	-0.00556	(0.0160)	0.003	(0.0086)	0.00256	(0.0074)
Religion						
Muslim	0.0184***	(0.0064)	-0.0100***	(0.0035)	-0.00836***	(0.0029)
Traditional/Pagan	0.0238	(0.0219)	-0.013	(0.0123)	-0.0108	(0.0097)
Other	-0.00526	(0.0382)	0.0028	(0.0203)	0.00246	(0.0179)

L.Household size						
1	-0.101***	(0.0204)	0.0522***	(0.0099)	0.0486***	(0.0107)
2	-0.0663***	(0.0137)	0.0355***	(0.0071)	0.0308***	(0.0067)
3-5	-0.0217***	(0.0063)	0.0121***	(0.0035)	0.00956***	(0.0028)
Age Group						
31-50	-0.0739***	(0.0071)	0.0489***	(0.0048)	0.0250***	(0.0026)
51-70	-0.233***	(0.0132)	0.133***	(0.0073)	0.101***	(0.0072)
>70	-0.480***	(0.0291)	0.207***	(0.0081)	0.273***	(0.0242)
Schooling						
Others/read write	0.0249**	(0.0125)	-0.0137*	(0.0070)	-0.0112**	(0.0055)
1-5	0.0316***	(0.0085)	-0.0175***	(0.0048)	-0.0141***	(0.0037)
6-10	0.0348***	(0.0105)	-0.0193***	(0.0061)	-0.0154***	(0.0045)
>10	0.0162	(0.0188)	-0.00887	(0.0104)	-0.00735	(0.0084)
Marital Status						
Never Married	-0.0398***	(0.0123)	0.0217***	(0.0065)	0.0180***	(0.0059)
Divorced/Separated	-0.0782***	(0.0167)	0.0412***	(0.0083)	0.0370***	(0.0085)
Widowed	-0.0790***	(0.0138)	0.0416***	(0.0071)	0.0374***	(0.0069)
Gender						
Male	-0.0111*	(0.0067)	0.00600*	(0.0036)	0.00508*	(0.0031)
Number of Observations	12860					

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Relative to the third expenditure tercile (or affluent), the second tercile (or middle class) is less likely to not suffer from any disability, and more likely to suffer from one and multiple disabilities.

Relative to age-group 15-30 years, those 31-50 year old are less likely to suffer from any disability, and more likely to suffer from one and multiple disabilities; those 51-70 year old display a similar pattern, with lower likelihood of no disability and higher likelihoods of one and multiple disabilities (the highest marginal association in absolute value relates to no disability); and a similar pattern is observed for the oldest (> 70 years). However, unlike the previous case, the marginal association with multiple disabilities is greater than that with single disability.

Relative to women, men are less likely to be free of any disability, and more likely to suffer from single and multiple disabilities. In absolute value, the probability of being free of any disability is highest, followed by lower values of suffering from single and multiple disabilities.

Relatively to the married, the never married, divorced/separated and widowed are more likely to suffer from a single and multiple disabilities.

Relative to largest household size of ≥ 6 persons, those living alone are less likely to be free of disability and more likely to suffer from single and multiple disabilities (with the first association largest in absolute value, followed by the second and then the third); a similar pattern is observed in households with 2 persons and larger households of 3-5 persons.

Relative to (adult) illiterates, those who are able to read and write display a positive association with no disability and negative associations with a single and multiple disabilities; those with 1-5 years of schooling display similar associations, as also those with 6-10 years of schooling. It is intriguing, however, that those with >10 years of education do not show any significant association. The never married, divorced/separated and widowed are more likely to suffer from a single and multiple disabilities.

Neither shocks nor injuries are associated with disabilities.

Rural Employment and Disability

Descriptive Statistics

A list of variables with their descriptive statistics are given in Table 9.

Here we examine associations between duration of employment and disability in rural Ethiopia. As in the previous section, rural employment estimates are for 2015/16 and factors associated with it are for 2011/12. As pointed out before, this intuitive but selective comparison allows us to circumvent reverse association between rural employment and disability.

Table 9: Rural Employment and Covariates

Variable	Mean	Std. Dev.	Min	Max
Hours Worked During Last 7 days	0.8918	0.8163	0	2
L.Disability				
1	0.0902	0.2865	0	1
>1	0.0430	0.2029	0	1
L.Per Capita Expenditue Tercile				
Poor	0.2908	0.4542	0	1
Middle	0.3162	0.4650	0	1
Shocks				
1	0.1692	0.3749	0	1
>1	0.2448	0.4300	0	1
L.Injuries				
Yes	0.0113	0.1056	0	1
L.Distance to Micro-finance Institution				
0.1-5.0 km	0.1168	0.3211	0	1
6-10 km	0.1454	0.3525	0	1
11-20 km	0.2084	0.4062	0	1
>20 km	0.2211	0.4150	0	1
L.Source of Drinking Water (dry)				
Tap Water	0.2543	0.4355	0	1
Protected Well	0.2778	0.4480	0	1
L.Source of Drinking Water (wet)				
Tap Water	0.2751	0.4466	0	1

Protected Well	0.2817	0.4499	0	1
Religion				
Muslim	0.3423	0.4745	0	1
Traditional/Pagan	0.0156	0.1238	0	1
Other	0.0058	0.0757	0	1
L.Household size				
1	0.0301	0.1709	0	1
2	0.0611	0.2395	0	1
3-5	0.4192	0.4934	0	1
Age Group				
31-50	0.3851	0.4866	0	1
51-70	0.1588	0.3655	0	1
>70	0.0303	0.1715	0	1
Schooling				
Others/read write	0.0555	0.2289	0	1
1-5	0.2074	0.4054	0	1
6-10	0.1343	0.3409	0	1
>10	0.0300	0.1707	0	1
Marital Status				
Never Married	0.1807	0.3848	0	1
Divorced/Separated	0.0437	0.2045	0	1
Widowed	0.0695	0.2544	0	1
Gender				
Male	0.4735	0.4993	0	1

1. Author's computations from ESS.

Rural employment by duration in 7 days is classified into ranges of hours worked: 0 hour, 1-25 hours, > 25 hours, and disabilities into none, 1 and > 1. The former refer to 2015/16 while the latter refer to 2011/12.

There is a low reduction in proportions of each disability group working 1-25 hours, with the highest propotion among those without disability, followed by those with a single disability and then among those with multiple disabilities. A similar pattern is observed among disability groups in longer duration of employment. Among disabled men, the highest proportion do not work, followed by those who work 1-25 hours, and then those working > 25 hours. Highest proportion of disabled women do not work (over 56.5 %), followed by half this proportion working 1-25 hours and then >25 hours. So, while the associations of duration of work vary between men and women, it is evident that proportion of disabled women not working is considerably higher and of those working considerably lower than that of disabled working men.

Among the non-disabled in 2015/16, over 40 % do not work in household agriculture, 35 % work 1-25 hours and under 25 % work >25 hours. Among the disabled, about 46.5 % do not work, about 32.5 % work 1-25 hours, and about 21 % work >25 hours. So, a larger proportion of disabled do not work

and lower proportions work 1-25 hours and >25 hours, as compared with non-disabled. About 21 % of the disabled work >25 hours, as compared with about 24% of the non-disabled.

Considering part-time, casual and temporary employment, comparison between non-disabled and disabled yields a pattern similar to the previous i.e. the proportion of disabled persons not-working is higher than that of the non-disabled, while of those working 1-25 hours and >25 hours are lower.

This is also the case for those working for wages, salaries and commission. The proportion of disabled not working is higher than that of non-disabled, while those of disabled working 1-25 hours and > 25 hours are lower than those of non-disabled.

Econometric Analysis

An ordered probit random effect specification is used with duration of employment in a week as the dependent variable and lagged explanatory variables such as disabilites, expenditure terciles, age, gender, education, marital status, location, religion, shocks, and injuries. Weekly employment is disaggregated into: 0 hour, 1-25 hours, and>25 hours. The overall specification is validated by the Wald test ($\chi^2 = 806.37$ significant at $\leq$ 0 .01 level) . As the marginal effects/associations are of greater analytical interest than the Oprobit coefficients, we confine our comments to the former. The marginal effects are given in Table 10. The comments are selective.

Table 10: Marginal Associations of Duration of Rural Employment and Disabilities

Variables	0 Hour(1)		1-25 Hours (2)		➢ 25 Hours(3)	
	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
L.Disability Count						
1	0.0293**	(0.0136)	-0.00397*	(0.0022)	-0.0253**	(0.0115)
>1	0.0755***	(0.0209)	-0.0133***	(0.0050)	-0.0622***	(0.0160)
L.Per Capita Expenditue Tercile						
Poor	0.0168*	(0.0097)	-0.00187*	(0.0011)	-0.0149*	(0.0086)
Middle	0.0210**	(0.0090)	-0.00241**	(0.0011)	-0.0185**	(0.0080)
Shocks						
1	-0.0144	(0.0101)	0.00149	(0.0010)	0.0129	(0.0091)
>1	0.00953	(0.0091)	-0.00121	(0.0012)	-0.00832	(0.0079)
L.Injuries						
Yes	-0.0368	(0.0334)	0.00299**	(0.0015)	0.0338	(0.0320)
L.Distance to Micro-finance Institution						
0.1-5.0 km	0.0116	(0.0128)	-0.00114	(0.0013)	-0.0104	(0.0115)
6-10 km	0.00506	(0.0119)	-0.000465	(0.0011)	-0.0046	(0.0108)
11-20 km	0.0536***	(0.0110)	-0.00740***	(0.0017)	-0.0462***	(0.0094)
>20 km	0.0107	(0.0107)	-0.00105	(0.0011)	-0.00968	(0.0097)
L.Source of Drinking Water (dry)						
Tap Water	-0.0329	(0.0237)	0.00365	(0.0024)	0.0292	(0.0213)
Protected Well	-0.018	(0.0209)	0.00225	(0.0025)	0.0157	(0.0184)
L.Source of Drinking Water (wet)						

Tap Water	0.0399*	(0.0234)	-0.00507	(0.0033)	-0.0348*	(0.0202)
Protected Well	0.0128	(0.0210)	-0.0013	(0.0022)	-0.0115	(0.0188)
Religion						
Muslim	0.0079	(0.0088)	-0.000964	(0.0011)	-0.00693	(0.0077)
Traditional/Pagan	-0.0701**	(0.0300)	0.00291**	(0.0013)	0.0672**	(0.0310)
Other	-0.0325	(0.0516)	0.00267	(0.0026)	0.0299	(0.0491)
L.Household size						
1	-0.0319	(0.0253)	0.00362	(0.0022)	0.0283	(0.0231)
2	-0.0139	(0.0178)	0.00181	(0.0022)	0.012	(0.0156)
3-5	-0.0297***	(0.0086)	0.00343***	(0.0010)	0.0262***	(0.0076)
Age Group						
31-50	-0.00759	(0.0103)	0.000573	(0.0008)	0.00702	(0.0096)
51-70	0.0883***	(0.0144)	-0.0147***	(0.0029)	-0.0737***	(0.0116)
>70	0.287***	(0.0269)	-0.0906***	(0.0129)	-0.196***	(0.0146)
Schooling						
Others/read write	-0.00774	(0.0178)	0.000853	(0.0019)	0.00688	(0.0160)
1-5	-0.00462	(0.0111)	0.000524	(0.0012)	0.0041	(0.0099)
6-10	0.0215	(0.0138)	-0.00298	(0.0021)	-0.0186	(0.0118)
>10	-0.0597**	(0.0239)	0.00338***	(0.0007)	0.0563**	(0.0239)
Marital Status						
Never Married	0.105***	(0.0131)	-0.0185***	(0.0032)	-0.0863***	(0.0101)
Divorced/Separated	0.00304	(0.0203)	-0.000251	(0.0017)	-0.00279	(0.0186)
Widowed	-0.00511	(0.0178)	0.000379	(0.0012)	0.00473	(0.0165)
Gender						
Male	-0.203***	(0.0087)	0.0220***	(0.0019)	0.181***	(0.0079)
Number of Observations	12856					
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1					

Associations between duration of employment in a week and disabilities are highly significant. Relative to no disability, those with a single disability display a higher probability of not working (or, 0 hour), and lower probabilities of working 1-25 hours and > 25 hours. In absolute value, the likelihood of not working is highest, followed by that of working >25 hours and then working 1-25 hours. A similar set of associations is observed between duration of employment and persons suffering from multiple disabilities (>1). The absolute values are, however, much larger than in the previous case-especially for not working and working >25 hours. Injuries, however, show a significant positive association with working 1-25 hours.

Associations between duration of employment and expenditure terciles are highly significant too. Relative to the third (affluent), those in the first tercile show a higher probability of not working and lower probabilities of working 1-25 hours and >25 hours. A similar set of associations is observed between duration of employment and the second tercile (middle-class). The probability of not

working is higher, and of working 1-25 hours and >25 hours are lower. The absolute magnitudes do not vary much.

Age and employment are significantly related. Relative to 15-30 years old, those in the age-group 51-70 years are more likely to not work, and less likely to work 1-25 hours and >25 hours. The oldest (>70 years) are more likely to not work, and less likely to work 1-25 hours and >25 hours. It is striking that the absolute magnitudes for the oldest of not working and working > 25 hours are much larger than in the previous case. But in both cases, the absolute magnitudes of associations are higher for not working than working >25 hours.

Associations between employment and schooling are not so robust. Relative to illiterates, only those with >10 years of education are less likely to not work, and more likely to work 1-25 hours and >25 hours. A conjecture is that schooling does not matter as much in rural employment as in urban employment.

Men are less likely to not work and more likely to work 1-25 hours and >25 hours, relative to women. Whether this reflects a bias against women and/or their lower ability to participate in outside employment (because of a severe time constraint) needs further investigation.

Relative to the married, the never married are less likely to be engaged in short and long duration employment.

In brief, disabilities are associated with lower probabilitiesof short and long duration (weekly) employment; the extremely poor show lower probabilities of being in short and long duration employment; the oldest are less likely to be in short and long duration employment; disabilities and schooling are weakly associated; men are more likely to be in short and long duration employment; and the never married are less likely to be in short and long duration employment.

Rural Poverty and Disability

Descriptive Statistics

A list of variables used and their descriptive statistics are given in Table 11.

Table 11: Rural Poverty and Its Covariates

Variable	Mean	Std. Dev.	Min	Max
Per Capita Expenditure Tercile	2.123	0.822	1	3
L.Average Disability HH				
>0-1	0.242	0.428	0	1
>1	0.037	0.188	0	1
L.Shocks				
1	0.176	0.380	0	1
>1	0.240	0.427	0	1
L.Type of toilet facilities				
Flush Toilet	0.017	0.128	0	1
Other	0.432	0.495	0	1
L.Source of drinking Water (dry)				
Tap Water	0.277	0.447	0	1

Protected Well	0.297	0.457	0	1
L.Proportion of Females in HH				
0	0.031	0.172	0	1
0.1-.49	0.268	0.443	0	1
>0.5-.99	0.228	0.420	0	1
1	0.114	0.317	0	1
L.Highest Schooling - Male				
Others/read write	0.066	0.248	0	1
1-5	0.289	0.453	0	1
6-10	0.230	0.421	0	1
>10	0.053	0.223	0	1
L.Highest Schooling – Female				
Others/read write	0.036	0.187	0	1
1-5	0.246	0.431	0	1
6-10	0.163	0.370	0	1
>10	0.030	0.170	0	1
L.Household size				
1	0.062	0.240	0	1
2	0.092	0.290	0	1
>5	0.394	0.489	0	1
L.Terrain Roughness				
Plains	0.151	0.358	0	1
Mountains	0.295	0.456	0	1

1.Authors' computations based on ESS.

There are two issues in rural poverty analysis: one is its persistence, and the second is movement into and out of it over time. We examine these issues using a cross-tabulation of expenditure terciles in 2015/16 by expenditure terciles in 2011/12 . Just under one-half of extremely poor in 2011/12 remain so during this period, a lower proportion of middle class remains in it, and more than half remain affluent. About 30 % of extremely poor in 2011/12 move up into middle-class and a little under a quarter into affluent in 2015/16. From middle-class under 30 % descend into extreme poverty and about 33 % become affluent. From affluent, about 29 % decend into middle-class and a much smaller proportion become extremely poor. Hence high persistence of poverty coexists with considerable upward economic mobility.

As a vast majority of the Ethiopian rural population does not suffer from any disability, it is not surprising that they constitute largest shares of extremely poor, middle class and affluent in 2011/12. Their proportion of extremely poor is lowest and of affluent highest. The proportion of disabled who are extremely poor is lowest but higher than among non-disabled, and higher in middle class and affluent but again lower than among non-disabled.

Comparisons of non-disabled and disabled with different levels of schooling (of adult males) yield striking contrasts. Consider, for example, illiterates and above high school (>10 years). Proportion of illiterates among non-disabled is highest among extremely poor and lowest among affluent. This is

similar to the distribution of disabled illiterates except that proportion of illiterates who are extremely poor is higher and of middle class lower, relative to the non-diabled. Non-disabled above matriculation show a rising proportion from extremely poor (about 9.5 %) to affluent (about 71 %) while disabled show a similar distribution but with two striking differences: proportion of extremely poor is considerably higher (about 15.5 %) and of affluent considerably lower (over 46 %). Similar results are obtained when adult female education is used. So, despite high school education, the disabled are more likely to be extremely poor and much less likely to be affluent. For more definitive associations, we use an ordered probit random effect specification, as given below.

Econometric Analysis

An ordered probit panel with random effects is used in which the dependent variable is per capita expenditure deciles. The first decile represents extremely poor, the second middle class and the third affluent. The explanatory variables include time invariant variables (eg, religion, gender) and time varying variables (eg, disability, household size, shocks, marital status)[n]. The overall specification is validated by the Wald test ($\chi^2 = 475.84, \text{significant at } \leq 0.01 \text{ level}$). As Oprobit marginal effects/ associations are of greater analytical interest than the coefficients, our comments are confined to the former in Table 12. The comments are selective.

Table 12: Associations between Rural Poverty and Its Covariates

Variables	Tercile (1)		Tercile (2)		Tercile (3)	
	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
L.Average Disability HH						
>0-1	0.00377	(0.0107)	0.00051	(0.0014)	-0.00428	(0.0121)
>1	0.0600**	(0.0269)	0.0038***	(0.0009)	-0.0638**	(0.0269)
L.Shocks						
1	-0.0199*	(0.0117)	-0.00319	(0.0021)	0.0231*	(0.0138)
>1	0.0143	(0.0111)	0.00161	(0.0012)	-0.0159	(0.0123)
L.Type of toilet facilities						
Flush Toilet	-0.0525	(0.0336)	-0.00951	(0.0087)	0.062	(0.0422)
Other	-0.0190*	(0.0100)	-0.00251*	(0.0014)	0.0215*	(0.0113)
L.Source of drinking Water (dry)						
Tap Water	-0.0327***	(0.0121)	-0.0054**	(0.0022)	0.0380***	(0.0142)
Protected Well	0.00927	(0.0113)	0.000979	(0.0012)	-0.0103	(0.0125)
L.Proportion of Females in HH						
0	-0.0732**	(0.0304)	-0.0190*	(0.0115)	0.0922**	(0.0418)
0.1-.49	0.0069	(0.0117)	0.000939	(0.0016)	-0.00784	(0.0133)
>0.5-.99	0.0232*	(0.0127)	0.00265*	(0.0014)	-0.0258*	(0.0140)
1	-0.00873	(0.0190)	-0.00138	(0.0032)	0.0101	(0.0221)
L.Highest Schooling - Male						

[n] As the solution did not converge with lagged expenditure terciles, we were forced to omit them.

Others/read write	-0.0269	(0.0218)	-0.00148	(0.0017)	0.0284	(0.0234)
1-5	-0.0417***	(0.0144)	-0.0031**	(0.0013)	0.0448***	(0.0155)
6-10	-0.0956***	(0.0156)	-0.014***	(0.0032)	0.110***	(0.0182)
>10	-0.203***	(0.0204)	-0.071***	(0.0143)	0.274***	(0.0336)
L.Highest Schooling – Female						
Others/read write	-0.00941	(0.0258)	-0.00087	(0.0027)	0.0103	(0.0284)
1-5	-0.0155	(0.0126)	-0.00156	(0.0014)	0.0171	(0.0140)
6-10	-0.0783***	(0.0149)	-0.015***	(0.0040)	0.0934***	(0.0187)
>10	-0.198***	(0.0221)	-0.087***	(0.0204)	0.285***	(0.0418)
L.Household size						
1	-0.0950***	(0.0195)	-0.035***	(0.0106)	0.130***	(0.0299)
2	-0.0577***	(0.0155)	-0.017***	(0.0058)	0.0746***	(0.0212)
>5	0.0865***	(0.0114)	0.0070***	(0.0015)	-0.094***	(0.0121)
L.Terrain/ Roughness						
Plains	-0.0356**	(0.0142)	-0.0091**	(0.0042)	0.0447**	(0.0184)
Mountains	0.0955***	(0.0129)	0.0067***	(0.0015)	-0.102***	(0.0133)
Number of Observations	6484					

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

There are significant associations between expenditure terciles and disabilities. Relative to no disability, those suffering from multiple disabilities are more likely to be in the first tercile (extremely poor) and in the second tercile (middle-class) and less likely to be in the third (affluent). The highest absolute magnitude is observed for the third tercile, followed closely by that for the first tercile.

Schooling years in a household are recorded separately for adult males and females. Relative to illiterates, households with adult males with 1-5 years of schooling are less likely to be extremely poor and middle-class and more likely to be affluent. Those with 6-10 years of schooling as well as with >10 years of schooling replicate similar patterns of association. So it follows that more years of schooling among male adults are associated with lower probabilities of being extremely poor and middle class and higher probabilities of being affluent. Among adult females with 6-10 years of schooling and more yield similar associations with expenditure terciles. In either case, the (absolute) magnitudes for being affluent are larger than for being extremely poor.

An aspect of sanitary and hygienic living is access to potable drinking water in the dry season . Relative to water from unprotected wells and local pond water, households with tap water are less likely to be in the first tercile and the second tercile and more likely to be in the third.

Source of drinking water in the wet season is not associated with a plausible tercile outcome. In particular, relative to others (including local ponds, unprotected wells), tap water is associated with a higher probability of being in the first tercile (or, being extremely poor), weakly associated with a lower prbability of being in the second tercile (significant at 0.11 %), and a lower probability of being in the third tercile (affluent).

Location in terms of terrain/roughness yields interesting results. Relative to plateaus, those living in plains are less likely to be extremely poor and middle-class, and more likely to be affluent. In sharp contrast, those living in mountainous areas are more likely to be extremely poor and middle-class and less likely to be affluent.

In sum, there is a robust association between extreme poverty and disabilities. Those suffering from multiple disabilities are more likely to be extremely poor and less likely to be affluent. Higher levels of schooling of adult males are associated with lower probability of extreme poverty, as also higher levels of schooling of adult females. Households with access to tap water in the dry season are less likely to be extremely poor. Finally, those living in the plains are less likely to be extremely poor, while those living in mountainous areas are more like to be so.

(6) Discussion

Here we discuss the significance of our findings from the broader perspective of the experience with disabilitities in LMICs.

(6 a) Significance of the Present Study in the Context of LMICs

The contributions of the present study are two-fold: one is synthesis of the recent literature on poverty and disability in LMICs-data constraints do not allow an exclusive focus on rural poverty and disability but with a few exceptions; the second is econometric applications designed to throw light on the links between rural poverty and disability in India and Ethiopia, based on panel surveys.

For India, there is confirmation of a two-way relationship between rural poverty and disability. Although there are a few corroborative studies for rural areas in LMICs, based on panel data and rigorous econometric models, there are none that analyse rigorously the sequence followed here: first, factors associated with rural disabilities; second, links between duration of rural employment and disability; and, finally, between rural poverty and disability. Unravelling of these links is important for policy purposes. That disability is associated with rural poverty through (implied) restricted employment and livelihood options lends considerable credibility to our analysis. It must, however, be emphasised that this is one important mechanism that links disability and poverty. Our literature review summarised above suggests that out-of-pocket expenses involved in accessing medical care and assistive technologies (eg,wheelchair) are a huge financial burden on low income households and often result in cuts in food expenditure and malnutrition and impoverishment.

Elaborating the two-way link between rural poverty and disability, our India analysis shows that, relative to the first asset quartile (least wealthy), single and multiple disabilities are lower among wealthier households[o]. In a *reversal* of this relationship, we find that in India (lagged) disabilities are

[o] We could not use (lagged) expenditure terciles as the solution to the ordered probit did not converge. Hence these were substituted with asset quartiles. Nor could we use IV regression as its implementation in an ordered probit specification is difficult. Also, in the Ethiopian analysis, the solution did not converge in the poverty-disability analysis with lagged expenditure terciles. Hence these were dropped.

robustly associated with extreme poverty. This is consistent with an important study[37] which shows that in China there are substantial differences in income between households with persons with different types and severity of disabilities and those without disabilities.

As stated earlier, disability is neither a pure medical problem nor a social one. It is a result of their interplay. Our India analysis corroborates this as disabilities are robustly associated with NCDs as well as gender. Women are more prone to disabilities than men mainly because they lack financial independence and access to medical care and are often subject to sexual violence and abuse. Even if employed, they have to make do with short spells of employment and denial of equal wages. Although men are more likely to be disabled than women, the latter are less likely to be engaged in long-duration employment in Ethiopia. A detailed analysis of poverty and disability in Indonesia[32]confirms that the burden of disability is much higher among older people, women and in rural areas. Besides, disability represents a barrier to labour supply and thus affects the amount of income the household can rely on for a living. Some of these findings resonate with a UN Report[7].

Another stark relationship is between disability and marital status. Relative to the married, the unmarried are more vulnerable to single and multiple disabilities in both India and Ethiopia. They also experience shorter spells of employment. Although marital status is not disaggregated by gender, it is plausible (and generalisable from other evidence reviewed here) that the unmarried/never married and disabled women face more social stigma, restricted employment options and sexual violence in workplace.

Discrimination takes multiple forms-for example, lower castes in India. Relative to OBCs, although the SCs/Dalits and STs/Adivasis are at the lowest rungs of social heirarchy and the latter most isolated too, their vulnerability to disabilities is lower but exclusion from long duration employment is higher. As a result, their probabilities of being extremely poor are higher. This is despite mandatory quotas for them in education and public employment. As elaborated later, some of the disparity between SCs and STs and Others is in part (i) because of historical discrimination (ie, they had restricted access to education over a long period), (ii) current discrimination (ie, even with the same endowments, say, education, their returns are lower); and (iii) identity and motivation are closely related.Salience of caste and tribal affiliations, together with mistrust of the reward system, undermine the motivation of these groups to perform[46, 47].

Disabilities rise with age in both India and Ethiopia. Afflicted with disabilities, working age and older persons (but capable of working) with disabilities face discrimination in the labour market, forced to work in conditions without any special support and lower wages. The loss of human capital is enormous, and it is compounded by loss of dignity and self-respect. As noted earlier, although most countries have ratified UN's Convention on the Rights of Persons with Disabilities (CRPD), in some countries more than 50 % of persons with disabilities have experienced discrimination[7].

A specific form of human capital is schooling. In India, relative to illiterates, even few years of schooling is asociated with lower vulnerabilities to single and multiple disabilities. However, higher

levels of schooling, that is, those with 10 years of education and others with > 10 years of education, are associated with higher probabilities of long duration employment. But in the poverty regression, relative to 8-10 years of schooling, the illiterates are more likely to be extremely poor; but those with 11-14 years of education as also Graduates are less likely to be extremely poor and more likely to be affluent. Thus (different levels of) schooling are associated with different vulnerabilities to disability, positively associated with long duration employment and a lower probability of extreme poverty. Analyses of Ethiopia yield similar findings: relative to illiterates, few years of schooling are associated with lower vulnerabilities to single and multiple disabilities; those with higher levels of schooling, >10 years, are more likely to be engaged in long duration employment; households with a few years of schooling or more of adult men and women are less likely to be extremely poor and more likely to be affluent. These findings resonate with the extant literature except that our contribution lies in validating these relationships in the rural contexts[p]. That education imparts better awareness of how to prevent disabilities and more rewarding employment opportunities is unexceptionable but whether it also helps overcome discrimination against lower castes and women with or without disabilities needs further investigation.

Sanitation and hygiene do not show any significant association with vulnerability to disability in India or Ethiopia. This is surprising given the wealth of evidence corroborating this association. The only evidence we have is from Ethiopia (apart from a few counter-intuitive findings) that, relative to water from local ponds and unprotected wells, households with tap water in the dry season are less likely to be extremely poor. Our results may not be as implausible if we go by a desk review[48.]. It is reported that toilets/latrines with steps or raised above ground are often inaccessible to people with physical impairments. Latrines are often very small to enable people with a wheelchair or crutches to enter and close the door behind them. Floors made of wood, tile or other materials can be too slippery for people with walking or balancing impairments. In such cases, millions of people with physical impairments end up crawling on the (often filthy) floor to reach the latrine.

Lacking data on terrain/roughness in IHDS 2015, we analysed the associations between extreme poverty and terrain/roughness in Ethiopia. Relative to plateaus, those living in plains are less likely to be extremely poor and middle-class, and more likely to be affluent. In sharp contrast, those living in mountainous areas are more likely to be extremely poor and middle class, and less likely to be affluent. As in the case of STs/Adivasis who are confined to remote mountainous areas, those in Ethiopia living in such areas are out of the mainstream of economic activities and lack access to schooling and health. More importantly, they are more vulnerable to natural disasters (eg, landslides) that impoverish and kill many. Commercialisation of agro-forestry products has rapidly eroded forest cover and thus heightened the risk of natural disasters. FAO (nd) corroborates that mountain

[p] At the individual level, in most of the countries, persons with disabilities have lower schooling attainment and lower employment rates than persons without disabilities[29].

communities are among the poorest and most affected by hunger in the world. Some 245 million mountain people live in rural areas in developing and transition countries and are threatened by food insecurity.

Yet another significant finding is the association of print and visual media in India (such data are not available for Ethiopia) with economic status (captured through expenditure terciles). Relative to not listening to radio, listening regularly by men does not possess significant associations with any of the three expenditure terciles. Nor by women. However, relative to not reading newspapers, reading newspapers regularly by men yields lower probabilities of being extremely poor and higher probabilities of being affluent. In an almost similar pattern, relative to women not reading newspapers, women reading newspapers regularly are less likely to be extremely poor, and (weakly) less likely to be in the middle class but more likely to be affluent in 2012. Regular watching of tv by women makes them less likely to be extremely poor and more likely to be affluent. These are interesting results but it is not self-evident why women regularly exposed to visual media are more susceptible to information than men. Mass media perform several important functions: add to awareness, enable sharing of lived –in experiences of the poor, give them voice, and above all enable them to access basic services[49]

Conflicts (between castes, inter-religious marriages, rapes of lower caste women, communal hatred, sharing of scarce natural resources) spread rapidly, and harm physically and destroy livelihoods, depending on their severity. Our India analysis shows that, relative to no conflict in 2005, a conflict is associated with higher likelihood of extreme poverty and lower likelihood of affluence in 2012. Absence of state and weak rural institutions (such as weak village councils and enforcement of the rule of law) are contributory factors, as vividly illustrated by the long-drawn armed conflict in Colombia[29].

(6b) Limitations

A limitation of our analysis is that the data on injuries is patchy and that is the reason for our failure to obtain significant associations with disability, employment and poverty (with one exception). This is a glaring gap in our India and Ethiopia analyses-especially because detailed studies of Vietnam, and Bangladesh, and elsewhere, point to grim and brutal consequences of injuries. Ironically, despite the fact that deaths from injuries among LMICs worlwide are higher than from TB, Malaria and HIV combined, and most being preventable, there is comparatively little funding[8]

Another limitation of our study is that nothing is added to climate change related disabilities, poverty and malnutrition. As some of these effects are likely to be disastrous for LMICs –especially because they lack the understanding of and capability to adapt to them- updating of the evidence is necessary. Climate change directly affects sensitive sectors such as agriculture, forestry and fisheries. Thus food shortages are exacerbated and risks of malnutrition are heightened for women, children, older persons and those with disabilities. Worse, many disabled persons are left behind when others migrate[19,10]. .

Let us now examine the policy challenges from the perspective of the UN-CRPD, and its close links to SDGs.

Section 7: Concluding Observations

Much of the inspiration to protect the disabled and promote their equality and autonomy stems from the United Nations (UN) Convention on the Rights of Persons with Disabilities (UN-CRPD) which was adopted in 2006. Its guiding principles are respect for inherent dignity, individual autonomy including the freedom to make one's own choices, non-discrimination, full and effective participation and inclusion in society, equality of opportunity, and accessibility[q]. The central concerns of CRPD underlie the overall vision of SDGs.

Guided by CRPD, several LMICs have legislated to protect and mainstream the disabled. In fact, there is no dearth of legislation that encompasses a range of penalties against discrimination in access to health care, employment, education, and violence against women, elderly and tribes/castes at the lower rungs of socio-economic hierarchy[7].

It suffices to give a few illustrative examples of legislation in conformity with CRPD in India and Ethiopia, and their failures.

India enacted the Rights of Persons with Disabilities Act, 2016 (the "New Act") and the rules thereunder (the "Rules") in 2017. The New Act replaced the Persons with Disabilities (Equal Opportunity Protection of Rights and Full Participation) Act, 1995 (the 'previous Act'), which covered only seven disabilities. The New Act covers more than 15 disabilities including dwarfism, acid attack victims, intellectual disability and specific learning disability. It defines a 'person with disability' as someone with long term physical, mental, intellectual or sensory impairment which, in interaction with barriers, hinders his / her full and effective participation in society equally with others. This definition under the New Act has been formulated using the text included in Article 1 of the Convention.

The New Act makes it unlawful for an establishment to discriminate against a person on the ground of his or her disability unless it can be proved that the discriminating act in question is a proportionate means to a legitimate objective. This Act, however, requires a complete overhaul. It must be recast to comprehensively provide for all the rights recognized under the Convention. For example, a Supreme Court judgment In India enlarged reservation scheme to all educational institutions in all disciplines, reading non-compliance of the law for providing accessibility facilities in educational institutions as an act of discrimination and proposing the in-house body to supervise the well-being of PWDs in educational institutions. But discrimination against the disabled persists in multiple other forms: in employment, access to financial services, health services-specifically, against women, elderly and tribals[50].

[q] The following draws heavily upon a recent UN Report[7].

Ethiopia has a plethora of legislation, some preceded the signing of the CRPD in 2010. A short list includes (i) A Proclamation to Provide for the Right to Employment of Persons with Disability 2008; (ii) Labour Proclamation, No. 377/2003, amended by Labour Proclamation No. 494/2006; (iii) Ethiopia's Growth and Transformation Plan (2010-2015); and (iv) National Plan of Action of Persons with Disabilities (2012-2021). Their salient features are given below *seriatim*[51].

(i) A Proclamation to Provide for the Right to Employment of Persons with Disability 2008 makes null and void any law, practice, custom, attitude and other discriminatory situations that limit equal opportunities for persons with disabilities. (ii) Labour Proclamation, No. 377/2003, amended by Labour Proclamation No. 494/2006 makes it unlawful for an employer to discriminate against workers on the basis of nationality, sex, religion, political outlook or on any other conditions. This provision is applicable to government offices only.

(ii) Ethiopia's Growth and Transformation Plan (2010-2015) identifies disability as a crosscutting development issue. It focuses on education and training, rehabilitation and equal access to services and opportunities for persons with disabilities, as well as strategies to prevent disability. (iii) National Plan of Action of Persons with Disabilities (2012-2021) aims at making Ethiopia an inclusive society. It addresses the needs of persons with disabilities for comprehensive rehabilitation services, equal opportunities for education, skills training and work, as well as full participation in the life of their families, communities and the nation.

Both India and Ethiopia, along with several LMICs, have failed to implement UN-CRPD in letter and spirit. While various measures intended to protect the disabled-children, women and the elderly –have been legislated, they are either flawed or incomplete and/or not implemented satisfactorily. Even though most countries have ratified the CRPD, discriminatory laws and policies still exist in some countries, especially in the areas regulating the right to marry, legal capacity and political participation. Specifically, only 36 per cent of countries have no legal restrictions for persons with disabilities to marry, only 13 per cent have no restrictions to vote and only 9 per cent have no restrictions to be elected for public office[7].

Another major priority is climate change adaptation and building of resilience of small farmers. Climate change can accelerate ecosystem degradation and make agriculture more risky. Smallholder farmers, who are critical to national food security, are facing more frequently extreme weather. Small-scale farmers are affected by droughts, floods and storms, at the same time as they suffer the gradual effects of climate change, such as water stress in crops and livestock, coastal erosion from rising sea levels and unpredictable pest infestations.

To build resilience, the focus has to be on mainstreaming of climate change adaptation in smallholder agriculture across its investment programmes. Through loans and grant-funded interventions, IFAD is addressing declining crop yields and similar issues caused by changes in temperature, rainfall and sea level rise due to climate change. A coordinated strategy with FAO with its vast technical capability as well as the World Bank and other multilaterals (eg, WHO) is likely to have a greater pay-off.

Implementing sustainable agricultural practices is more important now than ever. as managers of land, water and forests, smallholder farmers do have an important role to play in mitigation measures[52]

There are numerous initiatives by IFAD towards these goals. Some illustrations from IFAD's strategies for India and Ethiopia suffice[r]. Undoubtedly innovative, these could be complemented by the efforts of other multilaterals (eg, World Bank, WHO, ILO, FAO) to broaden the focus to engage with the disabled and deal comprehensively with barriers to ensure better access to quality healthcare and assistive technologies, and participation in economic, social and political activities as equal citizens.

Building on sustainable community institutions, IFAD-supported projects in India are increasingly investing in making smallholder agriculture business-oriented and building farmers' capacity to seize market openings to improve their incomes. Women's empowerment is central to all of IFAD's work. IFAD-supported projects have strengthened women's access to financial services and markets while also building their social capital and enhancing their role in decision-making. IFAD also works with tribal communities, typically located in the most remote, poorest areas of the country. These projects have helped them improve their livelihoods by enhancing local natural resource management, access to land, agricultural production and vocational skills.

IFAD's project co-financed by Government of India (GOI), *Integrated Livelihoods Support Project* targets small rural producers, women, designated caste households and young people living in the hill districts of Uttarakhand State. The project builds livelihoods by improving technologies for the production of traditional food crops and livestock, and develops supporting services for input supply and marketing surpluses. Besides, it contributes to watershed development in order to conserve water and soil resources. Another IFAD project co-funded by GOI, *Andhra Pradesh Drought Mitigation Project* focuses on smallholders in the Rayalseema region and the Prakasam area of Andhra Pradesh who are affected by drought and depletion of groundwater in a context of climate change and climate variability. It aims to improve the use and production of drought-tolerant crops by farmers and to enhance soil fertility and moisture. A third IFAD project co-funded by GOI, *Fostering Climate-Resilient Upland Farming Systems in the North-East (Mizoram and Nagaland States),* aims to familiarize farmers with *jhum* cultivation/shifting cultivation methods that are not only more productive and sustainable but also increase resilience to climate change and improve incomes. Support for improved market access and value chain development is provided as farmers become more market-oriented. IFAD fielded a design mission in Maharashtra, in September 2019, in collaboration with the Government of Maharashtra (GOM). This mission is driven by two concerns: (i) targeted productive investments are required in the rural areas to increase resilience of poor households, through diversification of livelihoods and ensuring household food and nutrition security; (ii) the success of the preceding *Tejaswini* project, exclusively dedicated to empowerment of poor

[r] These examples are based upon IFAD's India and Ethiopia portfolios[53,54].

rural women, and particularly successful in establishing strong institutions and financial discipline and well-functioning micro entrepreneurial activities for poor women organized in SHGs that can be leveraged for successful smallholder woman farmer and woman micro-entrepreneur integration within commodity value chains.

A striking feature of these projects is close collaboration between IFAD and GOI (including state governments) in designing and implementing these projects. While these projects are periodically monitored and their impact is assessed, these are unlikely to be precise as some of the goals (eg, resilience to climate change, empowerment of women, drought resistance) are difficult to quantify. Another major concern is scaling up of these projects. If there are discontinuities in scale and multiple thresholds, successful scaling up is a daunting challenge. As most of these projects were designed before SDGs were framed and disability rose to prominence, they do not address the concerns of the disabled-especially their exclusion from the mainstream of economic activities, and social and political spheres as equal citizens.

There are significant contextual differences between India and Ethiopia, for example, agriculture contributes a much larger share to national income in Ethiopia than in India; and agriculture is subject to greater environmental fragility in Ethiopia with higher frequency of extreme weather events including drought, flooding, heavy rains, strong winds, frost, and heat waves. Hence the strategic concerns also differ.

IFAD's engagement in Ethiopia aims at enhancing access by poor rural households to: (i) natural resources (land and water); (ii) improved agricultural production technologies and support services; and (iii) a broad range of financial services. Increasing opportunities for off-farm income-generation – particularly for the ever-growing number of landless young people – cuts across the entire IFAD country programme. Salient features of selected IFAD investments are given below[s].

IFAD's co-financed project by European Union, Alliance for a Green Revolution In Africa, European Investment Bank, and Government of Ethiopia (GOE), *Rural Financial Intermediation Programme III (RUFIP III),* was signed in January, 2020. RUFIP III will build on the lessons and experiences of the first two phases of the programme, and will scale up delivery of rural financial services tailored to the needs of the most vulnerable smallholder farmers, particularly women and young people. These include insurance products to enable small farmers to mitigate the risks related to climate change. Besides, it will promote nutrition awareness through campaigns and demonstrations, targeting the areas most vulnerable to food insecurity due to climate change. The objective of *Pastoral Community Development Project (PCDP III)*, co-funded by IFAD and World Bank: International Development Association, is to improve access to community-driven social and economic services for Ethiopia's pastoralists and agro-pastoralists. Pastoralists account for 13-16 per cent of the population, yet they occupy 63 per cent of Ethiopia's agricultural land and produce approximately 40 per cent of national

[s] This draws upon IFAD's Portfolio[54].

livestock output. This initiative is expected to improve their livelihoods by increasing and stabilising incomes, improving nutrition, health and education, and expanding the target population's decision-making authority in local development planning. Based on the success of the first phase of the programme completed in 2015, best practices will be scaled up during the second phase of *Participatory Small-Scale Irrigation Development Programme II (PASIDP II),* co-funded by IFAD and GOE. It envisages the development of about 18,400 hectares of small-scale irrigation schemes in four Ethiopian regions. Particular attention will be given to women, young people and vulnerable groups. In addition to increasing agricultural productivity, incomes and resilience of ecosystems and the rural population, the programme is expected to create 15,000 new jobs. It will improve the access of farmers to a secure irrigation production system and enhance water efficiency through climate-smart agriculture in the adjacent watersheds. In addition, the programme will support linkages to markets and services so that smallholder farmers can increase their productivity, competitiveness and incomes.

These strategies (including IFAD's strategy in India) are impressive in their commitment to eradication of rural poverty through promotion of sustainable agricultural technologies by small farmers (for example, water conservation), sustainable use of forestry, and fisheries, financial inclusion of small farmers, tribal groups, women, and youth, diversification of rural economies, facilitating market access, community awareness and participation, disaster relief, and micro insurance. Although there is careful monitoring of the investment projects and their evaluation, little is known about their impact on rural poverty, resilience of pastoralists and small farmers against natural disasters and sustainability of agriculture, forests and fisheries. Of particular importance is the collaborative efforts of the RBA-likely to be enhanced and encompass other UN agencies such as WHO, ILO, and the World Bank and donors such as Bill and Melinda Gates Foundation and LMICs themselves-in the struggle against deprivations and the scourge of disability. An illustration suffices. The joint mission of heads of RBA in 2018 reports that in Danan- Woreda, one of the hotspots of frequent droughts in the Somali region (Ethiopia), the impact of a combination of humanitarian assistance, emergency relief and long term development investments by them is not just complementary but also has impact. These investments have addressed the immediate needs of pastoral communities worst hit by drought, and supported the enhancement of the resilience of sedentary population – including lactating mothers and the older, ageing populations. On a much broader scale, given that disability is a socio-medical problem, WHO could focus more on the health needs of the disabled and revamping of health systems to serve their needs better in consultation with LMICs, World Bank could provide funding for the revamping of the health infrastructure, provision of better sanitary and hygienic conditions and fund sustainable development of agriculture, forestry and other non-renewable natural resources, ILO could offer advice on decent and rewarding employment for the disabled, and a regulatory framework for preventing discriminatory practices against their employment-especially disabled women and old- while RBA could concentrate on

fighting hunger during emergencies, nutrition, rural livelihoods, sustainable rural development, and empowerment of women, with a special focus on the disabled. Innovative and coordinated solutions to the many impediments that the disabled confront every day are likely to be more cost-effective

In light of SDGs and the imperative of mainstreaming of the disabled, protection of their rights and elimination of discriminatory laws and practices, much more needs to be done. We have already commented on the lacunae in national legislations following UN-CRPD and identified the priorities in overcoming them. Strategies followed by IFAD need to be recast to incorporate disability explicitly in their design of projects as a major impediment to achieving SDG Goal 1 of eradicating poverty in all its forms by 2030. The focus here is of course on rural poverty. But, again, synergies between multilaterals and LMICs have considerable potential in translating the vision of UN-CRPD into concrete policies. Donors could add to their collective pressure for not just adoption of UN-CRPD and legislating against discrimination comprehensively but also for rigorous implementation of anti discrimination legislation. Both mass media and social networks have considerable potential for sustaining campaigns against discriminatory practices in healthcare, employment and education.

Rural youth are a major concern in both India and Ethiopia and elsewhere where they are a large majority[t]. Diversification of economic activities coupled with the rising literacy rate provides ample opportunities for diversifying the talents of youth[u]. In fact, there is evidence of reverse migration of the youth from urban to rural areas as opportunities for their gainful employment expanded in the Somali region[42].

An environment that induces their gainful employment is necessary. This comprises (i) development of modern and appropriate technologies and innovations that have the potential for large-scale adoption in rural areas; (ii) skilling of rural youth to make them capable of adopting those modern technologies; and (iii) development of an appropriate ecosystem in the rural areas so that the skilled youth are encouraged to establish own enterprises. Illustrative evidence from a few countries in the Asia Pacific Region are helpful[55].In Korea and Singapore, for example, training content is selected to be relevant not only to a specific job but also to the transfer of jobs. Thailand encourages the private sector to provide technical and vocational training (TVET). Bangladesh has introduced national skills standards to improve the quality of TVET. Public institutions play an important role in TVET in Malaysia, where the National Vocational Training Council coordinates the entire certification and standards process. Adaptation of these to serve the disabled youth may help realise the 'demographic dividend" faster[v].

Growing importance of horticultural and dairy production and its processing *per se*, as well as food processing in general, especially in rural areas, hold considerable promise for the rural youth.

[t] See, for example, Niger, Uganda, Mali and Malawi.

[u] Although much of this discussion is focused on India's rural youth, it is also relevant to other LMICs including Ethiopia[56].

[v] A term coined by David Bloom of Harvard University[57].

Moreover, harvesting of solar energy as the third crop on the farmer's field is also gaining ground. Technologies may be developed to convert the by-products to other economic products. Further, mobile infrastructures such as biorefineries/phyto-refineries can be developed to provide processing support. Similarly, solar light refrigeration units can be set up in rural areas in order to increase the shelf life of perishable commodities such as fish, vegetables, and so on. All of these have a huge potential for job creation. However, solar energy faces several barriers including its high cost[w].

Furthermore, a lot of the rural youth lack "soft skills," such as the ability to experiment with new ideas, spot business opportunities, sales and marketing skills, and so on, which could make them more productive and employable. The thrust on the skill development of rural youth should be capability-based, and the focus should go beyond agricultural occupations and traditional courses, such as in the areas including data analysis, paramedical fields, and so on.

Given the rapid diversification of rural economy in recent period, opportunities have expanded for engaging youth in non-farm activities. A major obstacle to this is the skill shortage that needs to be addressed through appropriate policy measures aimed at improving the quality of vocational training and apprenticeship programmes. If various stakeholders, including industries and facilitating agencies do not take proactive role, their potential would remain unutilised.

Although non-discrimination laws exist that prohibit exclusion of disabled youth from employment in both India and Ethiopia, evidence suggests the contrary. Not only are their employment prospects restricted in rural areas but they are also paid lower wages. The prospects of gainful employment for disabled girls/women are even grimmer. As observed earlier, their access to education and health care remains restricted. Failure to utilise this huge talent fully indicates substantial loss of human capital.

Another glaring gap in anti-discrimination laws is neglect of the elderly suffering from various disabilities –impaired vision, speech, hearing, and mobility. As life expectancy has risen and fertility has reduced, it is not surprising that the share of the aged (60 years or more) has risen rapidly. The co-occurrence of NCDs and disabilities poses a considerably higher risk of mortality. Yet more than moderate proportions of the elderly work as self- employed, book-keepers and in other physically less demanding occupations. But their well –being is threatened by younger members of the family migrating to urban areas for more rewarding employment opportunities, leaving them behind to fend for themselves. Given the stigma of disability, their restricted ability to access health care and doubts about their employability, social networks (eg, self-help groups, women's associations, religious

[w] Compared with energy from fossil fuels, solar energy systems are flexible, low maintenance and environmentally benign, but they have their limitations. Most disadvantaged subsistence farmers will generally not be able to afford solar systems, observes a recent FAO report[58]. Furthermore, batteries to store solar electricity can be costly and problematic: A backup system is required for night-time and days with little sunlight, and disposal of the batteries poses an environmental threat. More problematic are the institutional barriers: high start-up costs coupled with lack of financing mechanisms lead to low volumes of sales, and the relatively long chain from the producer of the solar panels to the end user results in high transaction costs. These are key reasons for the lack of infrastructure and political commitment. This vicious circle has tended to make solar energy systems unattractive both to the rural user and to many investors.

groups, charities, producers' groups) could help both financially and informationally as well as in overcoming the social stigma against them[59]. While old-age pensions, pensions for widows and health insurance are potentially helpful, the amounts paid and persons covered are miniscule. However, if our analysis has any validity, larger amounts of pensions and grants could also act as a disincentive to engage in job search and remunerative employment.

Injuries and disabilities are inter-related. Death and disability from injury are often avoidable through prevention schemes, simple emergency procedures at the scene, and timely access to good quality trauma care systems with safe surgery and rehabilitation. Yet public funding for prevention and mitigation of losses from injuries remain underfunded, or, worse, neglected.

Estimates for selected countries indicate that on average 64 per cent of persons with disabilities who needed rehabilitation services could not get them, from 28 per cent in South Africa to 82 per cent in Nepal. Community-based rehabilitation (CBR) programmes aim to enhance social inclusion for persons with disabilities and their families while reversing the vicious cycle of poverty and disability.

One of the most ambitious health insurance schemes launched in India in 2018, *Ayushman Bharat Yojana*, also known as the *Pradhan Mantri Jan Arogya Yojana (PMJAY)*, aims to help economically vulnerable Indians who are in need of healthcare facilities. It covers disability. However, without assured funding and with exclusive focus on secondary and tertiary health care, it is unlikely to make a significant difference to the lives of the poor and disabled. Much will depend on whether an integrated primary health care is made an important component of PMJAY. In a cogent critique[60], attention is drawn to other flaws in PMJY. A functioning health insurance system requires that patients are neither under-treated nor over-treated nor over-charged. Ensuring this requires adaptive price setting, third-party monitoring, strict regulation, and, quality improvements in public sector hospitals. All of which requires massive investments in state capacity which seem to be conspicuous by their absence.

Paradoxically, cooperation today depends on whether cooperative action was successful in the past.The latter may be associated with shared norms of fairness, reciprocity and trust in a community. Whether such norms will be observed in vertical social networks (as observed in horizontal ones, involving people of similar status and power) is debatable[61]. In the Indian context, for example, caste hierachies act as a barrier to cooperative or collective action. Such barriers are often compounded by economic inequalities.Some evidence, however, suggests that if the prospective gains are large, the disadvantages of a socially heterogeneous membership (including the disabled) may be overcome[62].

Extreme natural hazards, particularly the hydro-meteorological disasters, are emerging as a cause of major concern in the coastal and other regions of India, Bangladesh and many other developing countries. These have become more frequent in the recent past, and are taking a heavy toll of life, assets and livelihoods. Low level of technology development in the rural areas together with social, economic and gender inequities enhance the vulnerability of the largely illiterate, unskilled, and resource-poor fishing, farming and landless labour communities. However, more accurate weather

forecasts and early warning systems-in the local vernacular-can reduce substantially disabilities and fatalities[10]

Access to ICTs is recognized as crucial for the independent living and inclusion of persons with disabilities and is thus imperative for achieving all SDGs. Access to education is crucial to increase access to ICTs among persons with disabilities. Moreover, there are a number of initiatives, projects and organizations worldwide carrying out innovative practices to enhance access to ICTs for persons with disabilities, the majority of which are based in developed countries. Many developing countries lack basic ICT infrastructure for persons with disabilities. Considering the vast potential of Internet technology to improve the lives of persons with disabilities and to contribute to the realization of various SDGs for persons with disabilities, wider Internet access is a priority[7].

In order to break the link between rural poverty and disability, one important finding is the key role of print and visual media. Not just regular reading of newspapers by both men and women but regular watching of tvs by women are robustly associated with lower prospects of extreme poverty in India. Whether mass media build awareness of unfairness of discrimination against the disabled is plausible but needs further investigation.

Attitudes and behavioural changes take time to evolve when there is a systematic campaign against discrimination. However, one recent analysis[63] argues that the experience of being employed could also help a woman and her family members realize that working is compatible with a satisfying family life and brings unanticipated benefits. While the majority of teachers reported that when they accepted the job their families were concerned about their working, they also reported that these concerns had diminished over time. If replicated in a different context, this may help overcome stigma against disability.

To conclude, there are formidable challenges in breaking the link between rural poverty and disability in LMICs, but, if we go by the evidence in this study, there are grounds for optimism.

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