Economic implications of disability in Sri Lanka: A household level analysis

Shadeepa Ranmini Vithanagama
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Declaration

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any University; and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Signature:

Candidate: Shadeepa Ranmini Vithanagama

Date: 30 January 2023

Approved for submission:

Signature:

Supervisor: Dr. Rajith W.D. Lakshman

Date: 30 January 2023

Signature:

Supervisor: Prof. Kopalapillai Amirthalingam

Date: 30 January 2023

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Dedication

Dedicated to the memory of my mother, my best friend and my other half. I miss you.

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Acronyms

ACE	Average Causal Effect
ADL	Activities of Daily Living
AIC	Akaike Information Criterion
ATE	Average Treatment Effect
ATET	Average Treatment Effect of the Treated
BDAL	Basic Activities of Daily Living
BIC	Bayesian Information Criterion
CA	Capacities Approach
CBM	Christian Blind Mission
CBSL	Central Bank of Sri Lanka
CDF	Cumulative Distribution Function
CKD	Chronic Kidney Disease
CPH	Census of Population and Housing
CWD	Children with Disabilities
DCS	Department of Census and Statistics
DHS	Demographic and Health Survey
DOFJ	Disability Organizations Joint Front
DSQ	Disability Screening Questionnaire
EIP	Early Intervention in Psychosis
ERCSSH	Ethical Review Committee for Social Sciences and Humanities
FE	Fixed Effects
FHH	Female-headed Household
FOSD	First Order Stochastic Dominance
FWER	Familywise Error
GCE	General Certificate of Education
GoSL	Government of Sri Lanka
GS	Goods and Services
GSR	Goods and Services Required
HIES	Household Income and Expenditure Survey
HILDA	Household, Income and Labour Dynamics in Australia
HH	Household
HR	Hazard Ratio
HOH	Head of the Household
ICF	International Classification of Functioning, Disability and Health
IDAL	Instrumental Activities of Daily Living
IDP	Internally Displaced Person
IPW	Inverse Probability Weighting
IPWRA	Inverse Probability Weighted Regression Adjustment
KM	Kaplan-Maier
LFP	Labour Force Participation
LFS	Labour Force Survey
LMIC	Low- and Middle-Income Countries

LTD	Long-Term Disability
LTTE	Liberation Tigers of the Tamil Eelam
MCA	Multiple Correspondence Analysis
MDG	Millennium Development Goal
MDS	Model Disability Survey
MHH	Male-headed household
MS	Multiple Sclerosis
NAPD	National Action Plan on Disability
NGO	Non-Governmental Organisation
NHREP	National Human Resources and Employment Policy
OECD	Organisation for Economic Co-operation and Development
PAE	Per Adult Equivalent
PCA	Principal Component Analysis
PFR	Principal Female Respondent
PH	Proportional Hazards
PKH	Program Keluarga Harapan
POM	Potential Outcomes Mean
PSM	Propensity Score Matching
PWD	Person with Disability
RA	Regression Adjustment
RCT	Randomised Control Trial
RDD	Regression Discontinuity Design
SDG	Sustainable Development Goal
SOL	Standard of Living
SUTVA	Stable Unit Treatment Value Assumption
TPCA	Tetrachoric Principal Component Analysis
UNCRPD	United Nations Convention on the Rights of People with Disabilities
UNISDR	United Nations International Strategy for Disaster Risk Reduction
VIF	Variance Inflation Factor
WG	Washington Group
WHO	World Health Organisation
WHS	World Health Survey
WP	Western Province

Abstract

Disability inclusion is integral to achieving the transformative commitment of the 2030 Sustainable Development Agenda of 'leaving no one behind'. Recent disruptions to social order with the outbreak of the COVID-19 pandemic, and the global economic slowdown have also underscored the importance of looking at the issue of disability more closely. However, by and large, disability continues to be a somewhat understudied phenomenon in social sciences compared to other drivers of vulnerability such as poverty, gender, education, conflicts and disasters. This is particularly true for developing and low-income countries. In Sri Lanka too, the empirical literature that explores the socio-economic aspects of disability is relatively scant.

This research study was motivated by the lacuna of empirical evidence on the economic implications of disability, especially at the household level in Sri Lanka. Using predominantly quantitative methods and a modest qualitative component, this research study attempts to contribute to closing this conspicuous gap in literature in the country, but also among developing countries in general. The quantitative analysis relies on secondary data from the Household Income and Expenditure Survey (HIES) (2016) and the Model Disability Survey (2014/15). The qualitative data consists of 10 in-depth interviews conducted with a purposively selected sample.

The central objective of this thesis is to unpack the economic implications of disability at the household level in Sri Lanka. The analysis is informed by Sen's Capabilities Approach and applies an intersectionality lens to account for the heterogeneity of disability experiences at the household level. The operationalisation of the CA is inspired by Zaidi and Burchardt (2005). The economic implications are measured by differences in household income (a proxy for resources) and the standard of living (a proxy for achieved outcomes). The qualitative component allows a more nuanced analysis of the unobserved and non-measurable economic implications of disability on households.

The contribution of this thesis is predominantly empirical in nature, and provides an in-depth analysis of the economic implications of disability at the household level in Sri Lanka. Two methodological contributions are also to be noted. While the data is cross-sectional in nature, the information available in the datasets, HIES in particular, have been used to add to the thin but growing corpus of evidence that use such datasets for survival analysis and quasi-experimental methods, which traditionally employ panel data. This contribution is particularly important, given that most developing countries do not have the rich and robust datasets panning several waves of data collection, that developed countries tend to have.

Overall, the findings confirm the idea that disability is indeed associated with lower economic outcomes among households with persons with disabilities (PWDs), and that these households tend to incur a non-trivial extra cost of disability, especially when disability is rather strictly defined. Disability is a greater deterrent for the labour force participation of men than women, and as a result, the presence of a male PWD tends to worsen economic disadvantages for households, especially among those headed by women. However, in general the economic situation is likely to be worse in households where the PWD is a female. A good education, formal sector employment, asset

ownership and access to formal credit benefit households with PWDs in improving their economic situations, although the degree of benefit tends to vary between female- and male-headed households. Differences in these factor endowments often tend to underpin the inequalities in the economic outcomes of households with and without PWDs. The evidence also supports the idea that disability has a larger negative effect on household income at its onset and in the long-run, in line with existing evidence. Importantly, the analysis has managed to establish, albeit with caution, the causal links between disability and the household economic situation. The findings suggest that disability causes households to achieve lower economic outcomes. The qualitative analysis shows that the pathways in converting resources to achieved outcomes are convoluted and complex. There are also many non-measurable and invisible economic implications of disability at the household level. The qualitative analysis also points to the misconception of disability as an individual-central problem, which has led them to submit to and accept the ways of the exclusionary external environment.

Several insights for policy and programmes can be gleaned from these findings. These include the importance of investing in inclusive and accessible education for PWDs and their household members, creating well-targeted social protection programmes that look beyond the individual, and at the household level, developing and rolling out livelihood support programmes that match the skills and capacities of households with PWDs, and devising a disability-inclusive overall development agenda. However, the success of these policies hinges on robust and up-to-date datasets, clear cut definitions of disability and poverty, and a strong institutional will to execute disability inclusion in practice. To this end, a fundamental shift in the approach to disability from a medical/charity model to a rights-based one is imperative.

Chapter One: Introduction

1.1 Introduction

The central objective of this thesis is to inquire into the economic implications of disability in Sri Lanka at the household level, using predominantly quantitative methods and available secondary data. More specifically, this research study attempts to quantify, using different statistical methodologies, the implications of disability on the household income and standard of living (SOL). This is accomplished by examining the differences in these two variables of interest between households with and without persons with disabilities (PWDs), their associational and causal links, and the factors that underpin such disparities.

While there is a growing body of evidence that attempt to measure the economic implications of disability on households, such studies are by and large from developed countries. The issue remains largely under-researched in developing countries, especially using quantitative methods. The literature on the topic is scant in Sri Lanka too. Thus, the primary contribution of this thesis is empirical in nature. Methodologically, the thesis expects to add to the body of work that use cross-sectional data to investigate research questions following methodologies that are traditionally expected to be carried out with longitudinal data.

1.2 Defining disability

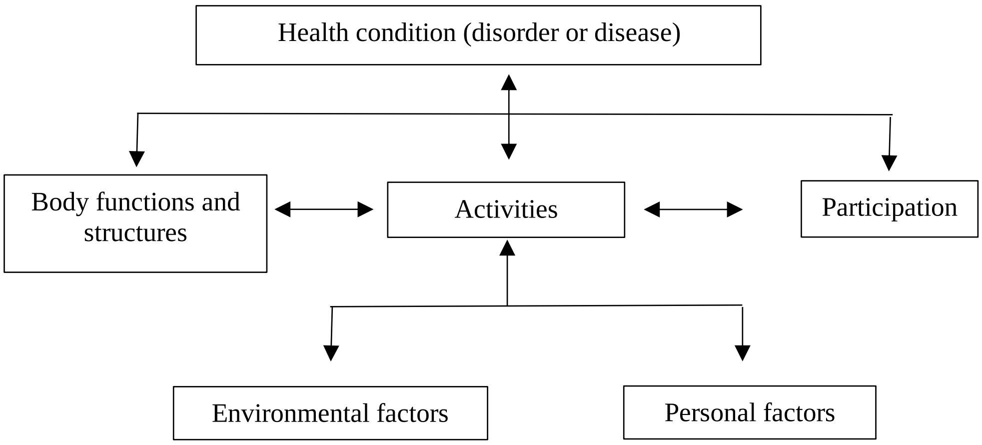
Disability is a dynamic, complex and nuanced human experience. As such, it can be a tricky concept to study, particularly using quantitative methods. Disability is also a sensitive concept to study, because it is a personal experience, as much as it is a larger socio-economic, political and cultural issue. Thus, disability is also a cross-cutting concept, as its implications straddle medical, social, economic, cultural and political spheres. This research study is limited to an investigation of the household level economic implications of disability, employing several constructs of SOL, and different variables that have been constructed to capture the disability status. The use of secondary data gives little control over how disability is defined in the survey instruments. Therefore, it is both important and necessary to unpack the concept of disability at the very outset.

The widely accepted definition of disability now has been formulated by the International Classification of Functioning, Disability and Health (ICF) in 2001. It identifies three domains within the overarching concept of disability (Figure 1.1) – the first is impairment, which refers to the deviation from (or a loss of) the body function and structure[1] in relation to certain generally accepted population biomedical standards; the second refers to activity limitations – where individuals may have difficulty in executing activities; and participation restriction, where individuals face difficulties in participating in life situations (World Health Organization [WHO], 2001). The contextual factors consist of personal factors that are not related to health – such as age, gender, ethnicity, religion (but are not classified in ICF) – and environment factors which encompass both the immediate environment such as home, school, place of work and the societal factors such as formal and informal institutional structures and services, including government services, transport and communication systems, laws, regulations and social norms. In effect, environmental factors envelope the physical, social and cultural context in which people live.

[1] The reference to body encompasses human organism as a whole and therefore also includes psychological functions as well, and are not limited only to physical functions

Thus, the ICF establishes that disability is the outcome of a complex process of interactions between an individual's impairment and his/her micro, meso and macro environment, as well as own personal characteristics. Put differently, the limitation of activities or constraints in participation that an impairment may cause are exacerbated by non-inclusive and discriminatory contextual factors. The ICF model does not attempt to provide a concrete definition of disability. Instead, it recognises and integrates the biological, individual and environmental level factors that create disability.

Figure 1.1: Interrelationship between components of the ICF



Source: WHO (2001)

For the remainder of the study, when the term disability is used, it primarily refers to an impairment as discussed in the ICF model, and not the whole experience of disability. The study in no way implies that disability is only an individual-centric issue. In summary, the term disability is used pragmatically, to reference a sub-population whose body structures and functions are different to the standards commonly accepted by biomedical standards.

The rest of this chapter is organised as follows. Section 1.3 discusses the significance of the study. The research problem is discussed next (1.4). The research objectives and questions are outlined Section 1.5, and is followed by a description of the data used and a brief discussion of the methodological procedures followed in the ensuing analytical chapters (1.6). The limitations of the data and the study are presented next (1.7). Finally, an overview of how the thesis is organised is presented (1.8), followed by a summary of this chapter (1.9).

1.3 Significance of the study

Disability is a complex human experience that possibly dates back to the origin of the modern human being. Yuval Noah Harari (2014) has written in his widely-read account ‘Sapiens: A Brief History of Humankind’ that there is evidence of prehistoric Homo Sapiens who had disabilities and were taken care of by their tribe members. The latest available estimates show that about 1 billion of the global population (15 percent approximately) have some form of disability, and this share is higher than the previous estimates of about 10 per cent in the 1970s (WHO & The World Bank, 2011). Of these, between 110 million and 190 million people suffer from severe functioning limitations (Ibid).

The topic of disability has become increasingly relevant over the recent years with outbreak of the COVID-19 pandemic situation, worldwide. At its outset, the pandemic may have started out as a health crisis, but it has quickly metamorphosed into a much larger human crisis, exacerbating existing inequalities and producing new forms of vulnerabilities, globally. Among those who were disproportionately affected by the pandemic situation were the PWDs. On the one hand, PWDs were more susceptible to contracting the virus, if their immune system, lungs and respiratory functions were compromised by the nature of the impairment. They were also at a heightened risk of facing serious complications, and death, if they contracted the virus (Kendall et al., 2020). However, the disproportionally higher deaths among PWDs due to the pandemic might not be directly related to their health-related vulnerability. Instead, such deaths might in fact be due to broader social inequalities and potential discrimination of PWDs in treatment (Ibid). Difficulties in accessing their usual healthcare services as resources are reallocated to pandemic-related priorities also put PWDs at a higher risk of illness and death. Moreover, pandemic prevention protocols such as lockdowns and social distancing tend to create serious disempowering effects on PWDs, both on their daily activities (for example, due to the inability to get paid caregiver help) and on their state of mind (amidst seclusion and social isolation) (Buonaguro & Bertelli, 2021; Goggin & Ellis, 2020; Karaye & Horney, 2020).

However, the greater long-term concern is how the well-being of PWDs will be affected in the aftermath of the pandemic, as countries grapple with economic crises it has brought about (Markt, 2020). The trickle-down effect of a global economic slowdown is likely to have a disproportionately larger effect on PWDs who are already over-represented among the poor. In this context, especially when the traditional understanding of vulnerability is called into question (The Lancet, 2020) [2], a study of household economic implications of disability is particularly relevant.

The unprecedented economic crisis that has unfolded in Sri Lanka since early 2022 is of a spectacularly greater magnitude than what was anticipated by way of a post-covid economic slowdown. Having contracted 3. 6 percent in 2020, the economy registered a modest 3.7 percent growth in 2021 (compared to 7.7 percent for the region) (Central Bank of Sri Lanka [CBSL], 2021). At the time of writing, Sri Lanka's estimated GDP

[2] The Lancet (2020) points out that the common taxonomy on vulnerability identifies elderly people, those with ill health and comorbidities, or homeless or underhoused people as vulnerable groups. However, there are also individuals from other socioeconomic groups who may struggle to cope financially, mentally and physically in a crisis situation such as the COVID-19 pandemic.

growth for 2022-2023 is only a meagre 2.3 percent (World Bank, 2022). The official poverty levels are projected to persist at over 10 percent (Ibid). Reflecting on the economic effects of COVID-19 on the local economy, Kidd et al. (2020) posit that while the relative income losses are likely to be highest among middle-income earners, a reduction in income among the low income earners will aggravate their vulnerability as well. These ramifications have increased in leaps and bounds amidst a series of staggering challenges that have unfolded since early 2022, including acute fuel and gas shortages, planned power cuts, hyperinflation, scarcity of food and essential medicine which have brought the economy to a near standstill. Heightened risks to personal safety as people resort to robbery and violence, and rising levels of anxiety and uncertainty are some of the unmeasurable effects of the economic crisis that many individuals grapple with.

Given the structural gaps in the existing social protection measures in Sri Lanka, an economic crisis of this nature is only likely to worsen the financial stress among PWDs and households that support them. Historical experiences of aberrations from normal social order suggest that, as a country shifts into survival mode, PWDs are among the groups that are set to bear the brunt of it[3]. Against this backdrop, it is imperative that the economic implications of disability on a household in Sri Lanka are systematically investigated and unpacked. If, in fact, households with PWDs face an additional set of economic challenges due to disability, they are even more vulnerable to poverty than otherwise-comparable peers without disabilities. In Sri Lanka, this has been found to be the case even before any extra costs of disabilities are accounted for (See Kumara & Gunewardena, 2017). However, to the best of my knowledge, there are no studies that

[3] See for example, Kett et al. (2005), Jayasooriya et al. (2020) and Mendis et al. (2020) for a discussion of the disproportione effects of disasters, disaster-prevention measures and post-disaster rebuilding initiatives

have attempted to estimate the additional cost of disability at the household level in Sri Lanka. Moreover, to the best of my knowledge, other than Kumara and Gunewardena (2017), there are no empirical studies that have interrogated the household economic implications of disability in Sri Lanka using quantitative methods.

Beyond these immediate and pressing factors, there are also more long-term and structural impetuses for this study. Not only do PWDs make up the largest minority in the world[4], but they are also over-represented in developing countries, and among vulnerable groups such as women, the poor and the elderly in all countries (WHO & The World Bank, 2011). Furthermore, the number of PWDs is on the rise amidst a rapidly ageing population[5], increasing prevalence of chronic illnesses such as cardiovascular diseases and diabetes, and also due to improvements in the measurement of disability (Ibid).

Disability also features more prominently in the current international development agenda as a social issue to be confronted. For example, of the 17 Sustainable Development Goals (SDGs) unveiled by the United Nations in September, 2016, at least five can be associated with creating better opportunities for people with disabilities[6]. Even though the third sustainable goal on health and well-being makes no

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[4] See further details at: https://www.un.org/disabilities/documents/toolaction/pwdfs.pdf

[5] The United Nations (2017) estimates the population aged 60 or more would double to 2.1 billion by 2050 from an estimated 962 million in 2017, while those aged 80 or more is expected to grow three-fold from 137 million in 2017 to 425 million by 2050. Compared to 6 of every 10 older individuals living in less developed regions at present, by 2050 this will increase to 8 of every 10. Moreover, the oldest individuals will be living in less developed countries by 2050 (Ibid).

[6] Goal 04 - Guaranteeing equal and accessible education by building inclusive learning environments and providing the needed assistance for persons with disabilities; Goal 08 - Promoting inclusive economic growth, full and productive employment allowing persons with disabilities to fully access the job market; Goal 10 - Emphasizing the social, economic and political inclusion of persons with disabilities; Goal 11 - Creating accessible cities and water resources, affordable, accessible and sustainable transport systems, providing universal access to safe, inclusive, accessible and green public spaces; Goal 17 - Underlining the importance of data collection and monitoring of the SDGs, emphasis on disability disaggregated data.
(http://www.un.org/disabilities/documents/sdgs/disability_inclusive_sdgs.pdf)

direct reference to PWDs, its catch-all target on universal health coverage implicitly covers PWDs[7]. Moreover, the achievement of the overarching promise of ‘leaving no one behind’ in ‘Agenda 2030’ is unattainable without disability inclusion in development initiatives.

This is a significant improvement over the Millennium Development Goals (MDGs) which conspicuously lacked a mention of PWDs in either the goals themselves, or in the targets and indicators or in the Millennium Declaration itself (United Nations, 2011). In fact, a notable criticism of MDGs has been the oversimplification of health, and consequently not taking into consideration the issues faced by PWDs (Fehling et al. 2013), and the poor articulation and under-recognition of the link between disability and the MDGs (Thomas, 2005). Wolfensohn (2002) quite aptly noted that the achievement of MDGs such as the eradication of extreme poverty or universal primary education would be impossible without bringing PWDs into the development mainstream. In the light of these criticisms, the recognition of disability and its recurring importance in many of the SDGs is likely to draw attention to PWDs globally, and is indeed seen in the increased commitment among development agencies towards disability inclusion in their policies and programmes.

Despite the complex socioeconomic implications that disability creates on individuals and their households, by and large, such issues continue to be somewhat understudied in social sciences, in comparison to topics such as poverty, gender, education, conflicts, and disasters. This is particularly true among developing and low-income countries (Cherchas, 2014; V. Kumar & Dwivedi, 2017; Lord et al., 2016). The lack of clear

[7] However, Hashemi et al. (2017) point out that the lack of reliable data on disability, particularly from developing countries, poses a significant barrier to achieving equitable access to universal health care among PWDs.

definitions, the absence of and/or incompleteness of relevant up-to-date data, difficulties in collecting accurate data in the absence of clear-cut definitions, the complex and nuanced nature of disability itself, and its implications on different aspects of a person's life are some of the reasons why disability might be more challenging to study compared to phenomena such as poverty, gender, race or ethnicity. Although much has been written on the disability-poverty nexus, there still is not enough empirical evidence that establishes the causal link between the two variables (Pinilla-Roncancio, 2018).

In Sri Lanka too, the empirical literature that explores the socioeconomic aspects of disability is relatively thin. Even in the research studies that have probed into the socioeconomic ramifications of the war and natural disasters including the Tsunami, the issue of disability is only superficially dealt with. However, over the recent years, more and more qualitative research studies have taken up the issue of disability in Sri Lanka from a socioeconomic perspective (See for example, Samararatne and Soldatic, 2015; Kandasamy et al., 2017; Vanniasinkam and Vitharana, 2020). However, the qualitative nature of the findings of these studies makes it difficult to generalise them to the population at large. Their geographic focus is also largely on the former war-affected areas[8]. Quantitative empirical research is much more difficult to come by. As mentioned above, to the best of my knowledge, only Kumara and Gunewardena (2017) have conducted a quantitative study on the topic of disability and poverty in Sri Lanka. In effect, very little is known about the socio-economic impact of disability on PWDs and their households in Sri Lanka.

[8] However, Vanniasinkam and Vitharana (2020) conducts a comparative study using two sites – Kandy and Kilinochchi

Despite such a striking lacuna in knowledge about how disability shapes (and is shaped by) the socioeconomic realities of PWDs and their households, there are numerous services offered by the Government of Sri Lanka (GoSL) for PWDs and their households. Specifically, the National Council & National Secretariat for Persons with Disabilities and the Department of Social Services provide services such as financial aid for infrastructure, accessible entrance and bathroom facilities, water and water for low-income families, self-employment aid for low-income families (a one-off maximum payment of LKR 25,000) and training, financial support for surgeries (a one-off payment of LKR 20,000) and for the purchase of medicine (LKR 20,000)[9]. In addition, the Secretariat and the Department provide aid equipment such as wheel chairs, crutches, commodes, hearing aids and white canes for PWDs from low-income families. The Secretariat also pays a monthly allowance of LKR 5,000 to PWDs who are considered poor, and for Chronic Kidney Disease (CKD) patients[10]. These services are broad-based and cover a wide array of areas in which PWDs are likely to need assistance.

In addition, at the time of writing the Ministry of Education was in a process of revamping its special education programme to ensure that children with disabilities have an equal opportunity to access education. Some of the proposed measures to address various issues experienced by students with disabilities include the establishment of a screening system that allows to identify small children with disabilities, designing special education classrooms to have two teachers per class to

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[9] See further details: http://stateminsamurdhi.gov.lk/web/index.php?option=com_content&view=article&id=30&Itemid=151&lang=en# (National Council & National Secretariat for Persons with Disabilities) and https://www.socialservices.gov.lk/web/index.php?option=com_content&view=article&id=29&Itemid=137&lang=en (Department of Social Services)

[10] The allowance was increased from LKR 3,000 to LKR 5,000 in July, 2019 as proposed in the 2019 Budget.

minimise dropout rates among children with disabilities (CWDs), increasing the font size of school textbooks for students with dyslexia, and home visits by trained teachers for students with extreme mobility challenges[11]. Beyond education, increasingly more government policies recognise and include PWDs as a vulnerable group. For example, both of the most recent government manifestos are sensitive to the socioeconomic challenges faced by PWDs, and make recommendations for creating a more inclusive and empowering society for them[12].

Nonetheless, some of the drawbacks about the inclusion of PWDs within the policy documents, the institutional framework and services cannot be ignored. Firstly, the services offered to PWDs suggest that they are based on the perceptions of the state actors of what the needs of the PWDs might be, rather than on insights emanating from a ground level understanding of what might actually be the requirements of PWDs. Secondly, the values assigned to the monthly disability allowances (of LKR 5,000) appear to be rather arbitrary. Further, this allowance has remained static for over a decade at LKR 3,000 before it was revised up in mid-2019. More importantly, this allowance fails to take into consideration the different types and severities of disabilities. There is also an issue of generosity, by international comparison. The UNICEF (2020) estimates that, at LKR 5,000, the disability allowance works out to 8.5 percent of GDP, whereas an internationally comparable value of the allowance is around LKR 8,800 or 15 percent of GDP. However, note that both the internal and external value of the rupee has sharply depreciated since this publication.

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[11] Personal online communication with Officials from the Ministry of Education in May 2021. Colombo.

[12] Vision 2025: A Country Enriched (2017): In this document, the then-government has pledged to improve access to public services, education and employment opportunities for PWDs. National Policy Framework Vistas of Prosperity and Splendour (2020-2025): The current government's policy recognizes PWDs as a vulnerable group, among others and discusses measures of social protection for them.

Thirdly, the prescriptive nature of how different types of assistance has been designed alludes to an approach to disability informed by the medical model, where the focus is on the PWD who needs to be ‘fixed’, and fails to recognise the role of the external environment that contributes to creating barriers for PWDs to fully participate in society. For example, to obtain many of these services, the PWD has to provide a medical certificate confirming the individual’s disability, which reinforces the tenets of the outdated individual-centric approach to disability. Moreover, the discussion of the needs of PWDs within policy documents as well as the services themselves resonate with the views of a charity model where PWDs are perceived as a group that needs support and should be helped by a benevolent and able-bodied society.

Issues of poor coverage and targeting by social protection measures in Sri Lanka is another challenge for PWDs and their households. Many social protection programmes that target PWDs, the elderly and the poor cover only a small proportion of the eligible individuals (Tilakaratna, 2014; UNICEF, 2020; Wanigasinghe, 2022). Similar conclusions are drawn by Newhouse and colleagues (2016) who, however, point out that the problem has more to do with the generosity of Sri Lanka’s social protection programmes, than their targeting. They observe that not only is the size of Sri Lanka’s social protection budget relatively small (about 6.6 percent of GDP compared to a little over 10 percent in Pakistan, 20 percent in Peru, and Vietnam, and about 35 percent in Bolivia), but that too has been shrinking over the recent years. In any case, the non-availability of reliable and up-to-date data on PWDs is clearly likely to lead to poor targeting as well as problems in measuring how well the services and transfer payments reach PWDs and their households.

It is understandable why it might be easier to put in place measures that focus on impairments, than investing in interventions that aim to empower and enable PWDs which involves fundamental shifts in social norms and attitudes in relation to disability (Wickenden, 2013). While the latter is more likely to bring about long-lasting benefits to PWDs, even impairment-focused interventions could be designed better if the realities of PWDs are factored in, which does not seem to be the case in Sri Lanka.

Next, as in most other countries, many of the disability-related social protection programmes in Sri Lanka are too narrowly focused on the PWD, and fail to recognise that disability is also a household experience (Palmer, 2011). For example, a household with PWDs might have to spend more on transportation, medicine, healthcare and nutrition compared to other households. If paid caregiving is unaffordable, a family member may have to withdraw from the labour market to fulfil the caregiving role, resulting in lost income for the household. Moreover, stigma, prejudices and misconceptions attached to disability affects not only the PWD but also the entire household. Social protection programmes with a narrow mandate to support only the PWDs are thus clearly inadequate in addressing economic implications of disability at the household level.

Thus, an inquiry into the economic linkages of disability for households, measured both in income and non-income terms, is expected to be of relevance for several reasons. First, the study will generate empirical evidence in an area of inquiry where there is a dearth of evidence in general. Secondly, it is expected that this study will contribute to a significant and conspicuous gap in information about the economic implications of disability among households in Sri Lanka. By looking at households as the unit of analysis, the study will further highlight the importance of recognising disability as an experience that transcends the PWD. Thirdly, the findings of the study are expected to generate insights that are relevant for formulating socially inclusive development policies and strengthening existing social protection measures, particularly at a time of heightened socioeconomic vulnerability. Moreover, the study might also be of use in designing programmatic interventions aimed at improving the socioeconomic well-being of PWDs. It is also expected that this study will provide impetus to strengthen the data collection on PWDs that would encourage more empirical investigations and better information on the socioeconomic situation of PWDs in Sri Lanka. Finally, the findings of this study might encourage further inquiry on the matter, using both quantitative and qualitative research methods.

1.4 Problem statement

It follows from the preceding sections that disability has many complex implications on those who experience it, as well as on their households. Globally, PWDs are likely to be poorer and less educated, to be unemployed and come from low-income countries (WHO & World Bank 2011). Factors such as gender, ethno-religious identity, social class, conflict and displacement can add additional layers of jeopardy to PWDs. The disproportionately larger adverse effect the COVID-19 pandemic situation has placed on PWDs compared to non-PWDs is testimony to the multiple ways in which disability intersects with other forms of vulnerability to create inequitable outcomes for them. The economic crisis that has unfolded in Sri Lanka since early 2022 will most certainly play a phenomenal role in exacerbating the plight of PWDs.

The above discussion has also established that there is a significant lacuna in empirical evidence about the economic ramifications of disability in Sri Lanka at the household level, especially using quantitative methods. One may posit that this gap in evidence is to some extent reflected in the seemingly abstract and disjoined way in which social inclusion policies, frameworks and programmes have been designed to support PWDs. As explained earlier, the sense of urgency to unpack this disconnect is heightened by the possible disempowering effects that the economic crisis will create on households such as the loss of jobs and income, indebtedness, scarcity and the rapid increase of prices of essential items such as food, energy and medicine. The implications thereof on household economic situations are likely to be greater for PWDs and their households. In this context, it is important to examine and quantify the economic implications of disability among households with PWDs in Sri Lanka. Thus, the research problem that this study attempts to tackle is whether there are economic implications of disability at the household level in Sri Lanka, and if so, how they are revealed in differences in measures used to proxy a household economic status, and what factors could underpin such differences. More specific research objectives, and the corresponding research questions that will unpack this overarching goal are outlined in the next section.

1.5 Research objectives and questions

The main objectives of this thesis are as follows:

1. To examine whether there are differences in the economic outcomes between households with and without PWDs
2. To evaluate potential income handicap and conversion (of income to SOL) handicap faced by households with PWDs
3. To assess the implications of disability on a household economic situation
4. To understand what factors contribute to potential disparities in the economic outcomes between households with and without PWDs

The corresponding research questions are as follows:

1. Are the economic outcomes (measured in income and SOL terms) lower among households with PWDs?
2. Do households with PWDs have greater difficulty in converting their income into SOL?
   a. If so, what is the extra cost of disability that a household with PWDs has to incur to achieve the same SOL as a household without PWDs?
   b. How are these estimates sensitive to different constructs of the disability variable and the SOL variable?
3. What are the implications of disability on a household economic situation?
   a. What are the long-term correlations, and causal linkages between disability and the household economic situation?
   b. What are the factors that contribute to differences in the economic outcomes between households with and without PWDs?
   c. What are the factors help and hinder the economic outcomes of households with PWDs?
   d. What are the measurable and non-measurable factors that shape the economic outcomes of households with PWDs?
4. Are there disparities in the economic outcomes between households with and without PWDs, and what are the drivers and suppressants of such disparities?

As will be discussed at length later, the economic outcomes are proxied by household income and SOL in the quantitative analysis. The qualitative analysis will take on a broader view on economic outcomes, looking also at invisible and non-measurable factors (such as the psychosocial impact of disability on the PWD and other household members, the opportunity cost of income foregone, caregiver stress and burnout, effects on children) that cannot be captured in the quantitative analysis. The data that will be used to explore these research questions are discussed next.

1.6 Data and methodology

As mentioned at the outset, this study is predominantly quantitative in nature. It uses two secondary datasets, namely, the Household Income and Expenditure Survey (HIES) (2016)[13], and the Model Disability Survey (MDS) (2014/15) carried out by the World Bank. HIES has a schedule on health which collects some information on disability. Only the MDS has been carried out specifically with the purpose of studying the prevalence of disability in Sri Lanka, applying the ICF framework to such estimation.

The use of secondary data for exploring the economic ramifications of disability at the household level is quite common. In fact, nearly all studies that use the SOL approach to measuring the extra cost of disability use data that have not been collected specifically to study disability[14]. In Sri Lanka, Kumara and Gunewardena (2017) used HIES data from 2009/10 and 2006/07 to compare poverty levels between households with and without PWDs. However, to the best of my knowledge, no other studies have used any HIES dataset to investigate economic implications of disability among households in Sri Lanka. Furthermore, to the best of my knowledge, no HIES data has so far been submitted to an analysis of the extra cost of disability at the household level in Sri Lanka, which provides impetus to use the dataset for the purposes of this research

[13] The latest available HIES dataset is for 2016. The HIES 2020 dataset has not been made available by the Department of Census and Statistics at the time of the analysis.
[14] See for example Asuman et al. (2020), Palmer et al. (2019), Minh et al. (2015), Loyalka et al. (2014), Mont and Cuong (2011), Braithwaite and Mont (2009) and Zaidi and Burchardt (2005) use secondary data for estimating the extra cost of disability for Ghana, Cambodia, Vietnam, China, Bosnia, Vietnam and the UK, respectively.

study. A further justification for the use of HIES data is provided by Mont (2021). He explains that collecting disability data in household income and expenditure-related surveys is an inexpensive and effective way to gather timely data on disability in a country. It is expected that this analysis will bring to light ways in which the HIES survey tool can be strengthened to gather information on the disability status in Sri Lanka without incurring costs on additional surveys.

However, a survey that is not designed exclusively to look at disability might not be able to capture the complex relationships that result in disability. While the HIES data on disability is commendable for a survey that has not been designed for the purpose of measuring disability, one cannot ignore the possible pitfalls of collecting information about disability using broad and oversimplified questions. For example, the HIES (2016) does not differentiate between disability and chronic conditions[15]. Moreover, questions that elicit binary responses about disability, as found in the HIES questionnaire, are retrogressive because they ignore the extent/severity of disability (Diab & Johnston, 2004), thereby blurring the "the continuities of disability" (Shakespeare, 1999 p. 63), and constrains one's understanding of disability (De Schauwer et al., 2021). Moreover, the dominant category of any binary pair signifies what is normal (Ibid), and fails to look at what is different (Shakespeare, 1999). HIES data also does not collect information about the external environment characteristics that may be contributing to one's disability experience. The self-reported nature of the data may also lead to over-or-understatement of actual disability status, depending on how the respondents perceive their health situation[16].

[15] However, it is clear from the ICF definition of disability that the mere presence of a chronic condition does not constitute disability.

[16] The 2019 HIES questionnaire has a separate sub-schedule with questions on different types of impairment, but still retains most of the other weaknesses discussed.

The MDS has been designed explicitly to explore disability as an outcome of the medical, personal and environmental factors, in line with ICF's conceptualisation of disability. In fact, the questionnaire does not really ask whether a respondent has a disability or not. Instead, the prevalence of disability is investigated through an evaluation of the barriers that respondents face in navigating the external environment, one's own impairments, and their interaction. The MDS (2014/15) data have thus far not been used to analyse the disability situation in Sri Lanka, which provides a strong incentive and justification for its use in this research study.

On the other hand, several practical limitations also motivated the use of secondary data for this study. A quantitative survey tends to be prohibitively expensive and challenging to roll out without adequate logistical and administrative support. In this case, such challenges were exacerbated by the COVID-19 pandemic environment. The uncertainties associated with the outbreak of successive waves of the pandemic also made it difficult to plan a primary data collection survey. Ethical complexities of visiting households with PWDs during the pandemic was also a significant deterrent to the idea of primary data collection. These considerations also provided impetus to employ the HIES and MDS datasets for the quantitative analysis of this research study.

However, true economic implications of disability are much greater than what can be measured with available secondary data, or even primary data. Methodological rigidity also makes it impossible to probe into some of these implications using quantitative methods. Therefore, to ensure that the quantitative data analysis did not take place in a vacuum, or did not oversimply the true economic implications of a household's disability experience, a modest qualitative study was formulated to interrogate, triangulate and enrich the findings emanating from the quantitative analysis.

Accordingly, 10 in-depth interviews were conducted with the principal female respondents (PFR) from households with PWDs. A purposive sampling method was followed for respondent selection, and an equal number of respondents were selected from the Colombo and Jaffna districts in the Western and Northern Provinces, respectively[17], using 4 selection criteria for households[18]. Given the small sample size, the respondent selection was restricted only to households with PWDs with physical impairments to preserve some homogeneity in the disability experience of households. Households were selected with the support of grassroots level organizations in the two districts. A research assistant was recruited to conduct interviews in the Jaffna district, taking into account both language and logistical considerations. I myself conducted interviews in the Colombo district[19].

The conceptual framework of this thesis is informed by Sen's Capability Approach (CA) and its operationalisation with quantitative datasets, by Zaidi and Burchardt (2005), which will be discussed at length in Chapter 3 of this study. An intersectionality framework is applied in the qualitative analysis, and where possible, in the quantitative analysis. Each of the methodologies followed to investigate the research questions enumerated above are discussed in detail in each empirical chapter. For completeness, however, these analytical procedures are briefly outlined here. The CA posits that the

[17] Several considerations underpinned the choice of the two districts: 1) differences in the socio-economic characteristics, and the ethno-religious composition of the two regions; 2) differences in the regional labour markets, educational opportunities and other infrastructure facilities; and, 3) likely differences in disability experiences between the two provinces, as households in Jaffna have had a higher risk of acquiring a disability during the protracted armed conflict.

[18] (1) the PWD has a physical disability; (2) the gender of the PWD (equal proportions of male and female PWDs); (3) the age of the PWD and PFR (from 18 to 70); and (4) the sector of residence (urban and rural).

[19] The interview guide, including the consent forms and procedure to conduct the interviews were approved by the Ethics Review Committee for Social Sciences and Humanities (ERCSSH) of the University of Colombo in April, 2022.

ability of individuals and households to convert resources into capabilities, and capabilities into functionings is not homogeneous; this ability is mediated by conversion factors such as poverty, old age and disability. In fact, the presence of these conversion factors might make individuals and households more susceptible to income deprivation too. Thus, a central hypothesis being tested throughout the empirical chapters is whether disability has a retrogressive impact on a household acquiring resources (income) and transforming them into achieved outcomes/functionings (SOL). Zaidi and Burchardt (2005) have provided a pragmatic framework to operationalise the CA for this purpose, especially in relation to constructing variables to proxy resources and achieved outcomes (See Chapter 5 for details). They have argued that household income can be conceptualised as a resource, SOL as an achieved functioning, and disability as the conversion factor of interest. They have constructed an asset index to proxy SOL, which is unobservable. These variables are central to the empirical analytics of this thesis. For robustness, sensitivity analysis is conducted for almost all regression models, using alternative constructs of these key variables. The specific econometric procedures included in the empirical chapters include Ordinary Least Squares (OLS) regression, quantile regression, survival analysis, quasi-experimental analysis through the implementation of treatment effects, and the Oaxaca-Blinder decomposition. Chapter 9 employs a mixed methodology approach to data analysis using data both from the HIES and the in-depth interviews.

1.7 Limitations of the data

A few limitations pertaining to the data should be kept in mind. As mentioned above, the HIES has not been conducted for the purpose of gathering data on disability prevalence. As a result, the way in which the questions are framed to collect information on disability may result in an over or under-representation of disability, and may not accurately reflect the disability prevalence in the country. Separately, a bias in disability prevalence might exist because the sample selection in the HIES has not taken into consideration the distribution of the population in relation to disability prevalence. The disability prevalence rate depends on the objective of the survey, the definition of disability used in the survey, the methods and tools used to identify disability, and also on social beliefs and stereotypes of disability depending on respondents' culture and awareness levels on different types of disability (Trani and Bakhshi 2008). Furthermore, both HIES (2016) and MDS (2014/15) datasets are relatively outdated, and the situation might be different now than at the time of data collection. However, more recent data were not available at the time of the analysis. Next, the study would have benefited from a primary quantitative dataset designed specifically to elicit information related to disability. However, as discussed above it was not feasible for several reasons. Similarly, a larger number of in-depth interviews than the 10 that were conducted would have enriched the qualitative analysis. But, time and resource constraints as well as uncertainties and other complexities due to the COVID-19 pandemic made it necessary to limit the number of in-depth interviews to only 10.

1.8 Organization of the thesis

This thesis begins with an introduction that sets the backdrop for the ensuing empirical analysis and discussion. As disability is a vast topic with multiple, overlapping approaches that attempt to define it, a complex experience with many socio-economic implications, and a construct with numerous cultural, religious and social interpretations, it is important to engage with these aspects of disability before narrowing down the discussion to the research questions listed above. Chapter 2 is dedicated to this purpose. Next, in Chapter 3, the theoretical framework underpinning the overall analysis is presented and discussed. Chapter 4 provides a descriptive profile of PWDs in Sri Lanka, along with a brief discussion of the disability policy landscape. Chapters 5-9 are empirical papers. Chapter 5 presents the study on the extra cost of disability. Chapter 6 looks at the association between the duration of disability and household economic outcomes. Throughout Chapter 5, 6, 7, 8 and 9 household economic outcomes are measured in income and SOL terms. Chapter 7 makes a modest attempt to establish causal links between disability and household economic outcomes. Chapter 8 explores the factors underpinning the income and SOL inequalities between households with and without PWDs. Chapter 9 employs a mixed methods approach to unpack the factors associated with the household income and SOL among households with PWDs. Chapter 10 concludes with a synthesis of findings from the empirical chapters, reflects on the findings from policy and practice perspectives, and gives some directive for future research on the topic.

1.9 Summary

This research study attempts to unpack the economic implications of disability on households in Sri Lanka by exploring the linkages between disability, household income and SOL, and reasons underpinning these linkages. The bulk of the empirical analysis is quantitative in nature, and uses available secondary data, but is also informed by a modest primary qualitative data analysis. The main contribution of the study is empirical in nature. It expects to contribute to a research topic which has not been tackled in Sri Lanka before and on which there is a rather noticeable paucity of empirical evidence in South Asia and low-and middle income countries (LMIC) in general. It is also hoped that the findings of this study contribute towards creating stronger data on PWDs, devising effective social protection policies and programmes targeting PWDs and their households and an inclusive development agenda, overall.

Chapter Two: Literature review

2.1 Introduction

The main purpose of this chapter is to review the literature on the socioeconomic implications of disability on individuals and households. As the empirical investigations of the following chapters focus only on the economic effects of disability on households, it is important that a more nuanced analysis of disability-related topics is conducted earlier on, for completeness. Accordingly, this chapter will engage in a rapid review of the models of disability, the economic and social dimensions of disability, and its role as a driver of socioeconomic exclusion.

2.2 Models of disability

The layered and complex nature of disability has led to the development of different conceptual models that attempt to understand, explain and respond to it. Of them, the two dominant models in the disability discourse are the medical and social models. These models and several other commonly used models of disability are briefly discussed below [See Retief and Letšosa (2018) for a full discussion of the models of disability].

Chronologically, the moral/religious model of disability predates both the medical and social models. It interprets disability as a punishment from God for the sin(s) that the PWD has committed, a test of faith in God or a God-given opportunity for character development, or as a higher calling or purpose (Retief & Letšosa, 2018). In Buddhism and Hinduism, disability is viewed as part of the karmic cycle, and a consequence of one's past sins (Liyanage, 2017; Miles, 2002). Although the religious/moral model of disability is no longer a part of the formal disability discourse, the conflation between religion and disability very much continues to permeate social perceptions of disability.

The medical model which was predominantly used to understand disability in the 20th century considers disability to be a physical or mental limitation that is internal to the individual. Accordingly, disability is an aberration from what is considered to be normal. Social or environmental factors surrounding the individual are not considered (Officer & Groce, 2009; Retief & Letšosa, 2018; Scullion, 2010). As such, policy measures that look to support PWDs are limited to programmes of rehabilitation, vocational training for employment and provision of aid and equipment. The individualist view of disability that this model upholds promotes the idea that disability is a personal problem, creates a dichotomy of able and disabled bodies (and lives), and catalyses institutionalised disablism and the abuse of PWDs (Galvin, 2005; Scullion, 2010). The charity model is in many ways a moralistic extension of the medical model, where PWDs a vehicle for the kindness, compassion and charity of a benevolent community (Schuelka, 2013). The impairment is the identity of the individual and the able-bodied society is responsible for arranging care and services for PWDs (Al Ju'beh, 2017). Yet, such care is often limited to basic survivalist needs such as food, clothing and shelter, and ignores or undermines the human rights of PWDs (Liyanage, 2017).

The emergence of the disability movements in Europe and North America in the 1960s and 70s which were increasingly dismissive of the individualist approach to disability in the medical model led to the development of the social model of disability, which shifted the burden of disability from the individual to the society. The social model posits that the it is due to the barriers created by society – economic, political, institutional or infrastructural – that PWDs are excluded from the full participation in society (Al Ju'beh, 2017). The social model makes an important distinction between impairment and disability. The 'Fundamental Principals of Disability' (UPIAS, 1976) has explained that disability was imposed on top of impairment, by way of society excluding individuals from the full participation in every area of life such as employment, education, housing etc. While an impairment refers to having a defective organ or limb or lacking one, disability is the disadvantage or restriction of activity caused by living in a society that does not take into account the requirements of such individuals, thereby excluding them from full participation in society (Ibid).

The social model of disability has been instrumental in producing positive outcomes for PWDs on policy and advocacy levels, both nationally and internationally. For example, the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) is informed by the social model (Palacios, 2015). In its Preamble, the UNCRPD recognises that "disability is an evolving concept and that disability results from the interaction between persons with impairments and attitudinal and environmental barriers that hinders their full and effective participation in society on an equal basis with others"[20]. Moreover, many countries have in place anti-discriminatory acts and policies against PWDs, and disability-inclusive provisions.

However, the social model has also attracted criticism for its oversimplistic representation of disability. Shakespeare (2013) has described four weaknesses in the social model. First, the idea that people are disabled by society implies that impairment is not a problem. Secondly, the model assumes that all PWDs are oppressed i.e., disability itself is an oppression and therefore the question is not whether PWDs are

[20] Available at https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities/preamble.html

oppressed or not, but to what extent they are oppressed. Thirdly, the social model attempts to make a crude and unrealistic separation of impairment from disability, whereas in reality the two elements are intricately intertwined. Finally, the barrier-free utopia implicit in the social model is unrealistic. There is a disadvantage associated with having impairments which no amount of adaptation by the external environment can eliminate (See also Owens, 2015; Retief & Letšosa, 2018; Shakespeare & Watson, 2001). The social model also places greater emphasis on physical impairment, for which the external social environment can be adjusted more easily than for learning or intellectual difficulties (Owens 2015). Disabled feminists have also been critical of the overemphasis of the social model on social barriers, and not the personal and experiential aspects of disability (Cameron, 2014).

The rights-based model of disability builds on and complements the social model. It recognises the rights of the PWD to participate in all spheres of society on an equal basis with their non-disabled peers, and is particularly important as a model of disability policy (Lawson & Beckett, 2020). It goes beyond the social model in explaining the societal creation of disability and provides a framework for disability policy that emphasises the dignity and equality of PWDs (Retief & Letšosa, 2018). Moreover, unlike the social model, the human-rights model also pays greater attention to identity politics such as minority and cultural identifications (Ibid).

The economic model perceives disability as a deficit in the human capital that limits the labour force participation (LFP) among PWDs, and proposes to overcome these deficits through individual enhancements (Scotch & Schriner, 1997). Put differently, it assesses the degree to which a person’s impairment affects his/her productivity, and its implications on the firm (lower productivity, lower profits) and the state (welfare payments) (Amponsah-Bediako, 2013). Its main criticism is the reduction of disability into a cost-benefit analysis, dehumanising a PWD as someone with missing parts (Retief & Letšosa, 2018).

The identity/affirmation model of disability rejects presumptions of personal tragedy, and prejudices of the non-disabled community about the dependency and abnormality of PWDs. It embodies a positive identity of disability, and challenges the mainstream notion of normality (Swain & French, 2000)[21]. Although the social model is conceptually more aligned with the identity model in that the former does not perceive disability to be a personal tragedy, the social model still perceives disability as a ‘problem’ (Ibid). In contrast, the identity model calls for a non-tragic view of disability, embracing, celebrating and recognising it as an aspect of human diversity, and not just a consideration for social inclusion (McCormack & Collins, 2012).

In summary, disability is created by the intersection of an individual impairment with exclusionary environmental and institutional conditions. Disability is therefore neither a mere medical condition that needs to be fixed, nor is it only a result of an exclusionary society. Instead, disability is a phenomenon that exists on an individual-environmental continuum (Owens, 2015), and is not to be universally perceived as a tragic human experience (Swain & French, 2000).

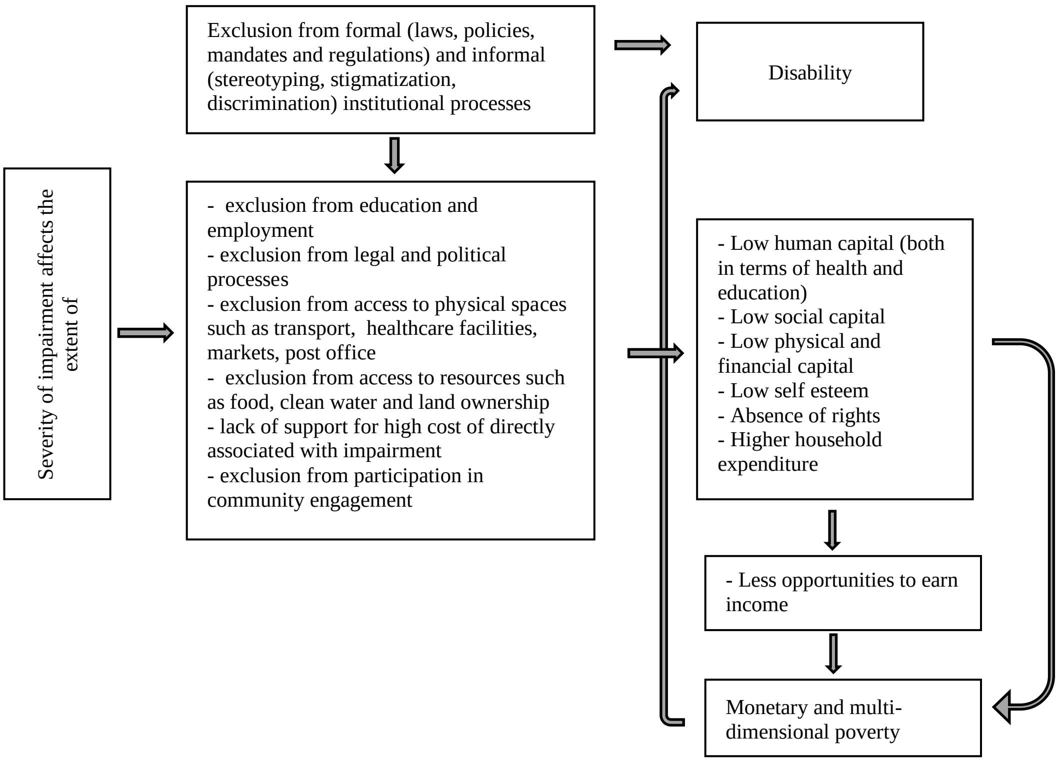
2.3 Economic aspects of disability

The shift in the disability discourse from the hegemonic medical model to a social model has lent the concept to a gamut of research inquiries within development studies

[21] See also Albrecht and Devlieger (1999) for a discussion of the “The disability paradox” which discusses the ‘secondary gains of disability’ that might not be understood by external observers.

and social sciences. An extensively researched issue is the association between poverty and disability. A large body of empirical studies supports the general hypothesis that PWDs tend to experience poverty more than non-PWDs. As to why is not very difficult to understand – on the one hand, disability exacerbates a person's risk of falling into poverty because the systematic exclusion of the PWDs initiates a vicious cycle of reduced work, low income, and limited opportunities to accumulate productive assets, and social capital, as well as to acquire human capital (Pinilla-Roncancio, 2015; Takasaki, 2020; Yeo, 2001) (Figure 2.1).

Figure 2.1: Causality from disability to poverty



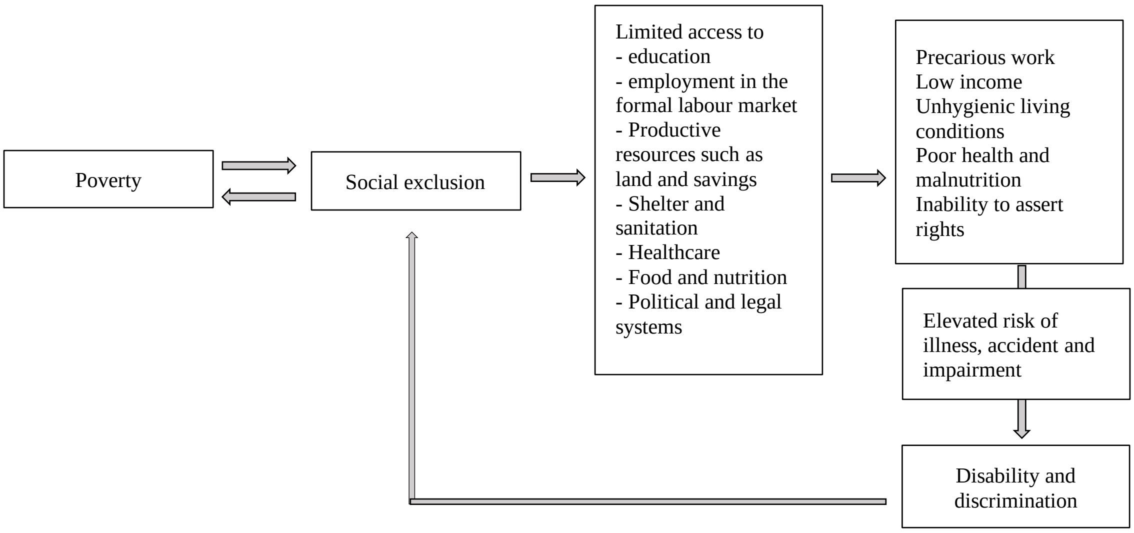
Source: Adapted from Pinilla-Roncancio, 2015 and Yeo, 2001

But disability is not just an individual experience. It is also a household experience (Palmer, 2011). Glendinning and Baldwin (1988) cited in Palmer (2011) have traced three channels through which disability drives poverty in a household. First, PWDs may have lower earnings capacity because of difficulties in securing gainful employment.

Secondly, disability can result in additional expenses in a household (such as for paid care, medication, travel), which might have to be funded by cutting down on other household expenses. Thirdly, if household members have to care for PWDs, such unpaid care work can lead to lost income (See also Burchardt, 2003). In some instances, a child may have to give up school to assume the caregiving role to the PWD or to take up work to support household expenses (Pinilla-Roncancio, 2015). Thus, disability both increases the risk of sliding into poverty and lowers the probability of escaping the existing poverty situation (Chowdhury & Foley, 2006).

Disability might also increase a household's vulnerability to indebtedness if households have to rely on high-cost borrowings to meet disability-induced extra expenditure (Mohanan, 2013); and lead to an intergenerational transmission of poverty if it adversely affects a child's human capital development (Farahani et al., 2013; Pinilla-Roncancio, 2015; Takasaki, 2020).

Figure 2.2: Causality from poverty to disability



Source: Adapted from Pinilla-Roncancio, 2015 and Yeo, 2001

Although many countries have in place disability allowance programmes to support PWDs which can be an important source of income, especially for poor households, such allowances are often insufficient to pull households out of poverty (Hameed et al., 2021; Hanass-Hancock & McKenzie, 2017; Oakley, 2021). Many of these programmes fail to account for the nuanced and complex nature of disability, and the resultant economic implications on the PWD and the household (Hanass-Hancock & McKenzie, 2017). Moreover, in many countries, PWDs will qualify for such social protection only if their household income has falls below a given threshold (Oakley, 2021). Thus, many households with PWDs tend to live in poverty even when the government provides them disability benefits (Ibid).

Conversely, poverty increases the risk of disability due to a number of reasons (Figure 2.2). People living in chronic poverty tend to live in substandard and unsanitary housing conditions, are less likely to have access to clean drinking water and basic sanitation, or afford nutritious food or healthcare services; they are more likely engage in precarious work and live in areas of violence (Elwan, 1999; Groce et al., 2011; Rohwerder, 2015; Vallas & Fremstad, 2014).

These factors increase the predisposition of the poor to disability. For example, women's malnutrition before and during pregnancy is a primary cause of low birth weight (LBW) (Ramakrishnan, 2004); LBW children in turn are more likely to become malnourished which increases their susceptibility to acquiring physical, intellectual and emotional impairments (Rahman et al., 2016). That over half of LBWs are reported from South Asia (Ramakrishnan, 2004) alludes to the role poverty plays in LBWs and, thereby disability. Separately, the inability to pay for healthcare services, pay for transport expenses, or afford simple assistive devices such as spectacles, hearing aids or walking aids can turn manageable/curable medical conditions into permanent disabilities (Elwan, 1999; Ingstad & Eide, 2011).

2.3.1 Compounding factors of poverty among PWDs

Poverty, however, is not experienced homogeneously among PWDs, and is shaped by a number of compounding factors (Groce et al., 2011). A first is the age at which disability is acquired. Disability at birth or acquired during childhood reduces the probability of a child accessing education, and disability at working age limits the opportunities to find employment, especially in the formal sector (Pinilla-Roncancio, 2015). Thus, becoming disabled at a young age has serious ramifications on how a person experiences social exclusion and poverty. For example, Tinson et al. (2016) use secondary data from the Department for Work and Pensions in the UK and estimate that while PWDs in the UK are poorer than non-PWDs across all age groups, the poverty level is highest among PWDs aged 25 to 64. More children with disabilities (CWD) are also poorer than non-disabled children. However, pensioners with disabilities have much lower poverty rates compared to younger PWDs and have the lowest poverty rate gap with their non-disabled peers.

In contrast, Mitra and colleagues (2013) who used internationally comparable World Health Survey (WHS) data from 15 countries to study the economic profile of PWDs, observed that in most countries, PWDs aged 40 or above had a higher risk of being poor compared to PWDs under 40. This is particularly concerning given that disability is more likely to be prevalent among older people (Burchardt, 2003). Yet, if individuals acquire disabilities only as they reach a more advanced age, then it is possible that they have a better financial standing to protect themselves from sliding into poverty, compared to those who have acquired disabilities earlier in life, and therefore have been subject to exclusion most of their lives (Banks et al. 2017; Pinilla-Roncancio 2015).

Having a child with disabilities (CWD) can have dire economic implications on a household as well. Such households are more likely to experience persistent and recurring poverty, less likely to escape an episode of poverty and more likely to slide into poverty (Shahtahmasebi et al., 2011). As a result, CWDs are more likely to grow up in poorer households compared to children without disabilities (Parish et al., 2012). The high medical and care costs of raising a CWD, the higher out-of-pocket expenses such as transportation, limited opportunities for parents to work both due to care responsibilities and difficulties of obtaining leave, the reduction in household income when parents leave the workforce or reduce hours of paid work to care for the CWD all contribute to creating and aggravating the financial strains on the household (Boat & Wu, 2015; Parish et al., 2012). These households are also more likely to be vulnerable at times of economic hardship (Boat and Wu 2015). In fact, childhood disability is often considered to be ‘a trigger event’ for poverty because the birth and the diagnosis of a CWD may lead to additional costs in the household, psychological and emotional stress, family break-ups, family members leaving the labour force etc (Every Disabled Child Matters Campaign, 2007).

Childhood disability can have a significant impact on siblings too, although there is little knowledge as to their needs (Naylor & Prescott, 2004). Children living with siblings who have disabilities often acquire ‘a disabled identity’ i.e., disability by association which can lead to negative experiences for them such as discrimination at school or in the neighbourhood (Burke, 2004). They might also harbour resentment towards their disabled siblings, as parents tend to spend more time with them, and might even have to share the care burden of the disabled sibling with parents (Burke, 2010). These challenges in turn can have a negative effect on their self-esteem, quality of life and social interactions (Naylor & Prescott, 2004).

The prospects of acquiring formal education and skills are generally lower among CWDs compared to non-disabled children, particularly when they come from poor households (See for example, Kuper et al., 2014; Trani & Loeb, 2012; UNESCO Institute for Statistics, 2018; WHO & The World Bank, 2011). Nonetheless, how disability affects a child's opportunity to acquire an education varies depending on a number of factors. For example, Kuper et al. (2014) found that children with learning or communications impairments were the least likely to attend school compared to children without disabilities. But among CWDs, those with visual and hearing impairments were generally the most likely to attend school. They also found that CWDs were at lower levels of schooling for their age compared to children without disabilities. Parents and adults may be reluctant to invest in the education of CWDs, because they have lower expectations about their success (She & Livermore, 2009). A lack of awareness and knowledge about different types of disabilities (such as intellectual and learning disabilities) may affect the opportunity for education among CWDs (Thompson, 2017).

Many PWDs are unable to participate in the labour force because they cannot work, especially when they have severe or several disabilities (Oncel & Karaoglan, 2020). But limited opportunities to acquire a formal education or skills training further impedes a PWD's ability to succeed in the labour market. PWDs are often at the risk of low pay and cycling between low pay and no pay (Schmuecker, 2014). For example, a study conducted by Lechner and Vazquez-Alvarez (2003) using the German Socio

Economic Panel data (1984-2001) to measure the impact of disability on people's labour market participation found that non-PWDs were 9.6 percent more likely to become employed than PWDs. Among those who were employed, PWDs earned about 16 percent less than those without disabilities, in terms of annual earnings. Importantly, the study observed that, even for those individuals who were full-time workers at the beginning of the period under consideration, and acquired a disability while being employed full-time, the probability of being out of work after becoming disabled was as high as 8.5 - 9.2 percent. Moreover, their annual earnings were as much as 20 percent less compared to the earnings of non-PWDs, while their per capita disposable income declined by about 6.1 percent after they became disabled. These findings suggest that the disadvantages that PWDs face in the labour market are stemming not only from supply side limitations such as their lower educational attainments.

In fact, Mitra and Sambamoorthi (2006) who looked at the employment of PWDs in India using data from the disability schedule of the National Sample Survey of 2002 found that the level of education had a limited impact on the probability of being employed among PWDs. Instead, they found that household and individual characteristics (such as size of household, individuals' age, its square and gender) had a greater impact, as did whether PWDs lived in urban or rural areas, on the probability of employment among PWDs. The study also found that the type of disability also affected the employment of PWDs – while people with intellectual impairments were more likely to be unemployed, people with hearing, speech and locomotive impairments were more likely to be employed. Similar observations were drawn by Trani and Leob (2012) for Afghanistan and Zambia, and Jones et al. (2003), and Meager and Hill (2005) for the UK. However, unlike Mitra and Sambamoorthi (2006), Trani and Leob (2012) observed a significant positive association between education and the probability of employment among PWDs (but not so much among non-PWDs).

Gender often compounds the effects of disability on the economic well-being of PWDs. For example, Mitra and Sambamoorthi (2006) observed in their study that men with disabilities were three times more likely to be employed than women. Jones et al. (2003) who looked at the impact of the disability on the LFP by gender in the UK based on 2002 Labour Force Survey have shown that the 'penalty' of disability was higher for women than for men, as reflected in a large unexplained wage differential, which is traditionally interpreted as discrimination. Parker et al. (2007) who also used several secondary datasets to compare labour market outcomes among fresh graduates with disabilities in the UK saw similar results. They found that the gender differences in employment outcomes among male and female graduates persisted even after controlling for other factors which may affect employment outcomes (such as ethnicity, family status, region of residence and health status). They also noted that care responsibilities often limited women's employment to part-time and poorly paid jobs. Importantly, the authors found that irrespective of whether they were in full-time or part-time employment, women with disabilities were less likely to take up higher-ranking or better-paying jobs compared to their male counterparts.

Misconceptions about disability also profoundly contribute to deepening the socio-economic inequalities PWDs experience. For example, beliefs that PWDs cannot contribute productively to the economy, that they are unable to have normal human relationships, and that they are a source of embarrassment to their families can lead to discrimination and exclusion experienced by PWDs, and affect their quality of life (De Schauwer et al., 2021; Rohwerder, 2018). For example, PWDs may take up a passive and victim-like role, or withdraw from interacting in the community due to anticipated prejudice (Bedini, 2000). In fact, discriminatory attitudes towards disability are a major deterrent to creating an inclusive environment for PWDs. One example is how laws and institutional values that are informed by traditional models of disability, have resulted in a weak, passive and slow implementation of the UNCRPD (Hoffman et al., 2016; Hussey et al., 2016; Lang et al., 2011). Poverty, political disruptions and a lack of resources have also played a role in the slow implementation of the UNCRPD (Bratan et al., 2020; Colvin, 2021). This is particularly worrisome, given that it is a disability-inclusive environment that is likely to give PWDs a more level-playing field to live an independent and empowered life (Eide et al., 2003; Mizunoya & Mitra, 2013).

2.3.2 Intersection of disability with crisis situations

It follows from the preceding sections that the adverse effects of disability are exacerbated when combined with other markers of marginalisation such as poverty, gender or low education. Such adverse effects are often deepened in situations where the normal social order is disrupted – such as disasters, wars and pandemics. The challenges of survival, displacement, and recovery are made difficult not just by PWDs' own impairment, but also through social norms and attitudes which discriminate against them (Hemingway & Priestley, 2006). For example, many humanitarian organisations tend to have misconceptions about the needs of PWDs – either as a group in need of very specialised care or as a group whose needs will be covered in the general aid distribution, or worse, as a group who may not survive a disaster (Kett & van Ommeren, 2009). Moreover, the lack of awareness among the crisis responders about the needs of PWDs in general, and especially of individuals with intellectual disabilities, implies that there seems to be little consideration for PWDs within the humanitarian assistance policy and practice, even though they are recognised as an at-risk group (Rohwerder, 2015). A survey carried out by the United Nations Office for Disaster Risk Reduction (formerly United Nations International Strategy for Disaster Risk Reduction [UNISDR]) in 2013 on 5,717 respondents globally showed that PWDs are often side-lined in disaster management and risk reduction programmes in their communities. Even worse, most of the disaster preparedness and evacuation procedures and protocols are not sensitive to the requirements of PWDs (UNISDR 2014). Therefore, PWDs are marginalised from even before the outbreak of a disaster.

Armed conflicts can create even more complex situations for PWDs. Not only are victims subjected to the risk of physical disability, but the trauma of experiencing a conflict may create long-term psychological disabilities. Moreover, where information systems break down, the reality of disability may go underreported (Biel Portero & Bolaños Enríquez, 2018), which in turn adversely affects PWDs because they may not get the required attention or resources of intervening agencies. PWDs are often marginalised from the peace-building and reconciliation processes too (Ibid), and consequently may experience further discrimination during post-conflict recovery.

The COVID-19 pandemic situation has also proved to exacerbate the inequalities faced by PWDs. In addition to the risk of facing greater complications if infected with the virus, the preventive measures that have been put in place to control its spread tended to worsen their well-being. Pineda and Corburn (2020) point out that PWDs living in urban areas are four times more likely to be injured or die from "every day emergencies" during the COVID-19 pandemic response due to the absence of inclusive community planning, healthcare policies and practices. They argue that measures such as social distancing can create life-threatening conditions for individuals who rely on personal assistance. In addition, social isolation and distancing may affect household income which in turn can put a strain on the ability to spend on the care and health expenses of PWDs. On the other hand, the health and social services available to these individuals might not be available in the crisis situation as resources are diverted to addressing issues related to the pandemic (Jesus et al., 2020). There is also anecdotal evidence from different parts of the world where PWDs infected with the coronavirus received discriminatory treatment when accessing emergency services.

2.4 Disability in Sri Lanka: A rapid review of literature

The latest statistics from the HIES (2019) estimates the disability prevalence in Sri Lanka at 4.4 percent. The 2012 Census of Population and Housing (CPH) estimated a disability prevalence rate of 8.7 percent. This was a significant upward revision from a disability rate of 1.7 percent reported in the 2001 CPH which excluded parts of the Northern and Eastern Provinces due to the war. The World Health Survey (WHS) has estimated Sri Lanka's disability prevalence rate at 12.9 percent, which is considered to be the best available estimate of disability in Sri Lanka (Christian Blind Mission [CBM] Australia, 2014)[22]. However, these disability prevalence statistics from different years are not comparable due to both differences in definitions, survey objectives and geographic coverage.

The common contributors to disability in Sri Lanka include road accidents, non-communicable diseases, especially as the share of elderly population increases, maternal and child malnutrition as well as the armed conflict (Asian Development Bank [ADB] 2005). Although there are no reliable statistics on the disabilities caused by the

[22] See Chapter 4 for a detailed descriptive statistics analysis of PWDs in Sri Lanka

conflict, it is estimated that over 100,000 people have sustained physical disabilities due to the conflict (Ibid). In the Northern Province alone, there are about 20,000 individuals who have been disabled in the conflict (A. Perera, 2015). In addition, there is also some evidence that natural disasters such as the 2004 Tsunami disaster had created psychological disabilities among victims (Siriwardhana et al., 2013; Wickrama & Kaspar, 2007). Additionally, there is some information available on the post-traumatic stress disorder among individuals who were exposed to the conflict both as civilians and combatants (Kanagaratnam et al. 2005; Soysa and Azar 2016; Lambert et al. 2019). According to the statistics from the Sri Lanka Police, mental and physical disabilities are a key contributor towards suicide among both men and women in Sri Lanka (DCS 2014). More men than women are likely to commit suicide due to physical disability/chronic illness while more women are likely to commit suicide due to mental disability (Ibid).

In the recent years, particularly following the end of the war, there has been a growth in the body of work that tackles the topic of disability in Sri Lanka. The issue has been investigated from medical (See Murthy et al. 2018; Weerasinghe et al. 2015; Siriwardhana et al. 2013), psychological (See de Zoysa and Wickrama 2011; Malhotra et al. 2010; Gunawardena et al. 2007), educational (See Hettiarachchi and Das 2014; Abeywickrama et al. 2013; Furuta 2009), sociological (See Liyanage 2017; Higashida 2016), gender (Kandasamy et al., 2017; Samararatne & Soldatic, 2015; Vanniasinkam & Vitharana, 2020) and economic (Kumara & Gunewardena, 2017a) perspectives. The bulk of the studies that research disability from a non-medical perspective is qualitative in nature. Thus, the findings of such empirical studies are often context-specific and cannot be generalised.

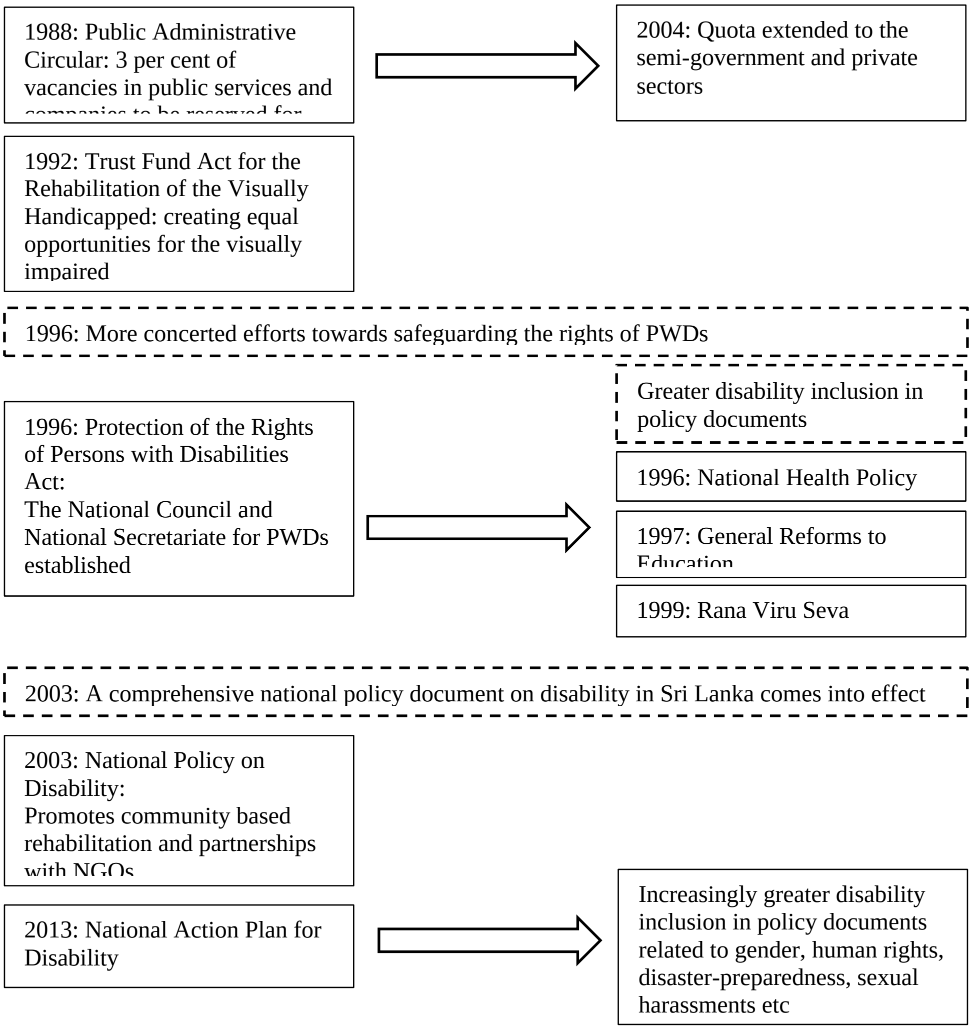
2.5 Disability policy landscape in Sri Lanka: A brief overview

Sri Lanka has in place a plethora of policies that are aimed at generating and promoting the socioeconomic inclusion and empowerment of PWDs. The Constitution of the Democratic Socialist Republic of Sri Lanka (1978) enshrines values of equality[23] (Clause 12(1)), and stipulates that people will not be discriminated due to their "race, religion, language, caste, sex, political opinion, place of birth or any one of such grounds (Clause 12(2)) (Ibid). However, there is no specific provision with regards to the rights of PWDs, nor is disability identified as a marker of discrimination in the Constitution.

Among the earliest policies to have espoused disability inclusion is the 1988 Public Administrative Circular (Figure 2.3). It has stipulated that 3 percent of the vacancies in Public Services and Public Corporations should be filled by disabled persons "possessing the requisite qualifications and whose disabilities would not be a hindrance to the performance of duties" (Ministry of Public Administration, 1988). In 2004, this quota was extended to the private and semi-government sectors as well. The Rehabilitation of the Visually Handicapped Trust Fund Act, No. 9 of 1992 was aimed at providing educational and vocational training and employment opportunities for visually handicapped persons, improve their welfare and to take action to eliminate conditions of discrimination and inequality for them (Parliament of the Democratic Socialist Republic of Sri Lanka, 1992).

[23] See Chapter III: Fundamental Rights: 12(1) All persons are equal before the law and are entitled to the equal protection of the law (Government of Sri Lanka [GoSL], 1978, p. 4) available at https://www.parliament.lk/files/pdf/constitution.pdf

Figure 2.3: The policy framework on disability inclusion in Sri Lanka



Source: Author

The Protection of the Rights of Persons with Disabilities Act, No. 28 of 1996 was more specifically targeted towards protecting, advancing and promoting the rights of PWDs in Sri Lanka through the establishment of the National Council for Persons with Disabilities (Parliament of the Democratic Socialist Republic of Sri Lanka, 1996). The Bill for its enactment was passed unanimously by the Government and the Opposition which was a significant indication of the national support for the Act (Mendis, 1997). However, the rights of the PWDs stipulated in section 23(1) of the Act are limited only to equal opportunities in education, employment and physical access to public places.

Moreover, the definition of disability used in the Act[24] places the burden of the disability with the individual, and is yet to be revised in line with UNCRPD's conceptualisation of disability.

A growing commitment for disability inclusion is reflected in the 1996 National Health Policy, 1997 General Education Reforms and the 1999 Rana Viru Seva Authority Act that have addressed inequalities in some domains. For example, the 1996 health policy recognises disability as a priority area that needs attention; the 1997 educational reforms included a section on access to special education by CWDs (Hettiarachchi et al., 2018); and the 1999 Rana Viru Seva Authority Act is a comprehensive framework to support the welfare of the disabled members of the armed forces and their families. However, the most comprehensive framework to address the rights of PWDs in Sri Lanka is the 2003 National Policy on Disability for Sri Lanka which was prepared through a consultative and participatory processes that included PWDs representing all types of disabilities, all age groups, the Government, Non-Governmental Organizations (NGOs), experts in law, human rights and gender (Ministry of Social Welfare, 2003). The first part of the policy document provides a comprehensive backdrop on the issue including the barriers faced by PWDs and the resources available for the proposed policy implementation. The second part covers the policy principles, sector-specific strategies (covering employment, education, health, housing and different demographics of PWDs) and holistic implementation guidelines to address the issue of exclusion and vulnerability of the PWDs in Sri Lanka.

[24] "any person who, as a result of any deficiency in his physical or mental capabilities, whether congenital or not, is unable by himself to ensure for himself, wholly or partly, the necessities of life" Section 37.

The 2013 National Action Plan for Disability (NAPD) was formulated for the implementation of the 2003 National Disability Policy across seven thematic areas, namely, the empowerment of PWDs, their health and rehabilitation, education, work and employment, external environment, data and research and social and institutional cohesion (Ministry of Social Services & Ministry of Health, 2013). The Action Plan upholds the values of the social model of disability in that it recognises and lists out recommendations on how the external environment should be enabling towards, and inclusive of, PWDs.

Additionally, increasingly more policy documents related to human rights, sexual and gender-based violence, and disaster management recognise disability as a driver of social exclusion and vulnerability. To elaborate with an example, the National Action Plan for the Protection and Promotion of Human Rights 2011-2016[25] has subsumed the discussion of the rights of PWDs within the chapter on civil and political rights. It mentions disability only six times in the 137-page document. This is particularly striking, given that there are separate chapters on the rights of women, children, workers, migrant women and Internally Displaced Persons (IDP). However, the same policy document for 2017-2021[26] has an entire chapter dedicated to the rights of PWDs. Similarly, PWDs as a vulnerable group have gained increasingly more recognition in disaster management policy documents. For example, compared to its predecessor[27], the Sri Lanka Comprehensive Disaster Management Programme (2014-2018)

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[25] Available at https://www.ohchr.org/Documents/Issues/NHRA/NPASriLanka2011_2016.pdf
[26] Available at https://drive.google.com/file/d/1q1NE4cD39E53TMn7Ew-bcFvgstjxCp5e/view
[27] The Disaster Management Act No. 13 of 2005 Available at http://www.dmc.gov.lk/images/DM_Act_English.pdf

(Ministry of Disaster Management, 2014) makes a more concerted effort to address the needs of PWDs[28].

2.5.1 Policy implementation

Despite the impressive body of policies and frameworks in place for disability inclusion in Sri Lanka, there are significant gaps in their uptake, which has created a general apathy towards the rights of the PWDs, and resulted in a persistence of infringement of their rights. For example, making polling booths accessible to PWDs and creating accessible election material (e.g., in Braille) is listed out as an activity in the 2013 NAPD in the 'political rights' focus area. However, these recommendations are yet to be implemented, although some progress has been made on improving accessibility in the recent elections[29]. Similarly, although disability is included in the Community Based Disaster Risk Management component under Sri Lanka Comprehensive Disaster Management Programme (2014)[30], the early warnings systems do not appear to be inclusive of formats supporting deaf people.

Separately, the government has stipulated guidelines to increase physical accessibility through the Disabled Persons (Accessibility) Regulations, No. 1 of 2006 and its amendments in 2009, by proclamation in the Gazette of the Democratic Socialist Republic of Sri Lanka. A Supreme Court ruling was issued in 2011 that mandated design features of new buildings to be compliant with those stipulated in the 2006 Act,

[28] The document recognizes disability as a cross-cutting issue in relation to disaster management, and the need to mainstream disability (and gender) into disaster management. Disability is referenced 28 times in the document, as opposed to zero mention in the 2005 Disaster Management Act.

[29] For example, the circular number PE 164/2015 issued by the Commissioner of Elections in May 2015 advised all the Assistant Commissioners to ensure that 'reasonable access' is provided for voters living with a disability (Centre for Monitoring Election Violence, 2017)

[30] Available at http://www.disastermin.gov.lk/web/images/pdf/slcdmp%20english.pdf

a failure to which would constitute a punishable offence[31]. Yet, the accessibility design requirements continue to remain unenforced, and certificates of conformity continue to be issued to non-compliant buildings (Disability Organizations Joint Front [DOJF], 2017; A. C. S. Perera, 2018).

Furthermore, despite the rights to employment being upheld by the 1996 Disability Act, the large majority of PWDs in the country (approximately 71 percent) continue to remain economically inactive (DCS 2015). The LFP among PWDs is about half of that of non-PWDs, and even if they are gainfully employed, the large majority of them are employed as own account workers or unpaid family workers (Arunatilake, 2016; Arunatillake, 2017a). Thus, the majority of PWDs tend to work in the informal economy which falls outside the purview of labour laws in the country. Despite the 3 percent employment quota allocated for PWDs in the public, private and semi-government sectors being in force for several decades, there is no convincing evidence that this commitment is being taken up in the formal labour market.

In addition to issues of implementation, the processes have been slow as well. For example, the delay of nearly a decade between the signing the UNCRPD in March 2007 and its ratification in February 2016 has also slowed down taking up a rights-based approach to disability within the policy and institutional framework of the country. Sri Lanka is also yet to ratify the Optional Protocol [32]of the UNCRPD, which is aimed at establishing a mechanism of independent oversight of the implementation of the CRPD. Next, the draft Disability Rights Bill prepared in 2006 has still not come into effect.

[31] See *Dr. Ajith C.S. Perera v. Attorney General and Others*, 2009

[32] The Optional Protocol allows individuals to petition to the Committee on the Rights of Persons with Disabilities on breaches of their rights, and for the Committee to inquire into grave and systematic violations of the CRPD

The bill prepared specifically to safeguards the rights of PWDs was approved by the Cabinet of Ministers in 2008, but then was amended over five times and redrafted again in 2016. However, this draft was criticised by the community of PWDs because it was missing a robust state coordination mechanism and an independent monitoring mechanism (DOJF 2017). The formulation of the Disability Rights Bill with public participation and in line with the UNCRPD and its enactment by the Parliament by 2020 is listed as a commitment in the Second National Action Plan 2019-2021[33]. However, there are no updates on the status of this draft Bill at the time of this writing.

Cefis (2018) posits that a lack of coordination among ministries, a lack of institutional memory within ministries and a lack of awareness about disability rights are main contributory factors to the policy-implementation gaps in Sri Lanka. Moreover, because the Ministry of Social Empowerment takes so much control over the implementation of disability rights, the cross-cutting nature of disability is overlooked. Instead, disability tends to be treated as more of an issue of welfare. Cultural attitudes towards disability as well as institutional norms and values also contribute to perpetrating social closure (deliberate or implicit discrimination) towards PWDs (Ibid; See also Kabeer & Kabir, 2009).

2.6 Summary

As this chapter has reviewed a substantial amount of literature, the salient takeaways are quickly summarised here. The central theme that permeates the chapter is the ways in which disability and poverty are connected and the different pathways through which disability can lead to poverty, and vice versa. Yet, how disability increases the odds of

[33] Available at https://www.opengovpartnership.org/documents/sri-lanka-action-plan-2019-2021/

falling into poverty are also determined by other confounding factors which also tend to share vicious causal links. For example, childhood disability can be far more disempowering than acquiring disability at an advanced age, as it significantly limits the opportunities available for a CWD's human capital development. Although education is an important factor that can lead to gainful employment among PWDs, some studies suggest that this association is not that simple.

Numerous compounding factors such as the type of disability, gender, household variables, and institutional norms about disability affect PWDs' ability and opportunity to engage in paid work and earn income. Women with disabilities often have to grapple with the challenges imposed upon them by both their gender and their impairment. This double jeopardy is often reflected in their lower educational attainments, and if employed, are in lesser jobs than men. However, misconceptions about disability, and the discriminatory attitudes towards PWDs entrenched within formal and informal institutions are perhaps the most retrogressive, because such ideologies make it difficult to support and create an external environment that is inclusive of, and empowering to PWDs. In fact, such misconceptions play a deterministic role in further exacerbating the vulnerabilities of PWDs during crisis times.

In the Sri Lankan context, quantitative studies that have investigated the economic implications of disability are difficult to come by. But there is a growing body of qualitative studies that has explored this topic. The findings concur with the global evidence on the disempowering effects of disability on individuals and how its intersection with other markers of discrimination such as gender, war, displacement worsens their socioeconomic vulnerability.

A rapid review of the disability policy environment in Sri Lanka highlights the gaping gaps between policy and implementation. Over the years, there has been significant progress in disability inclusion and a rights-based perspective in policy documents. But the processes of policy uptake and implementation appear to be ambivalent, limited, slow and lacklustre. The failure to capture the cross-cutting nature of disability both within policy realms and in institutions, limitations in institutional capacity, and culturally-informed attitudes towards disability play a role in creating these weaknesses.

Chapter Three: Theoretical framework

3.1 Introduction

This chapter presents the overarching conceptual framework that informs the empirical analyses that follow. The literature review has established that while disability is a source of socioeconomic exclusion, it is not experienced homogeneously by all PWDs. The degree to which the adverse socioeconomic effects of disability are experienced by individuals and households is shaped by numerous other factors. Therefore, like all markers of exclusion, disability is complex and nuanced in how it affects PWDs and their households. Its interplay with numerous individual and household demographics, socio-economic and institutional factors tend to produce different outcomes to different individuals and households.

As models that attempt to explain disability, both medical and social models are incomplete on their own. The artificial dualism between individual and social factors of the two models may in fact lead to an incomplete conceptualisation of disability (Terzi, 2005), and its socioeconomic impacts on PWDs. In contrast, the open-ended, and the accompanying malleable nature of the Capabilities Approach (CA) pioneered by Amartya Sen offers a more useful alternative to exploring the socioeconomic vulnerabilities that PWDs and their households might experience. The next section provides an overview of the CA. Its empirical application, use in relation to investigating the economic implications of disability, and strategies for using the CA with secondary quantitative data are discussed next. The last section provides an overall summary.

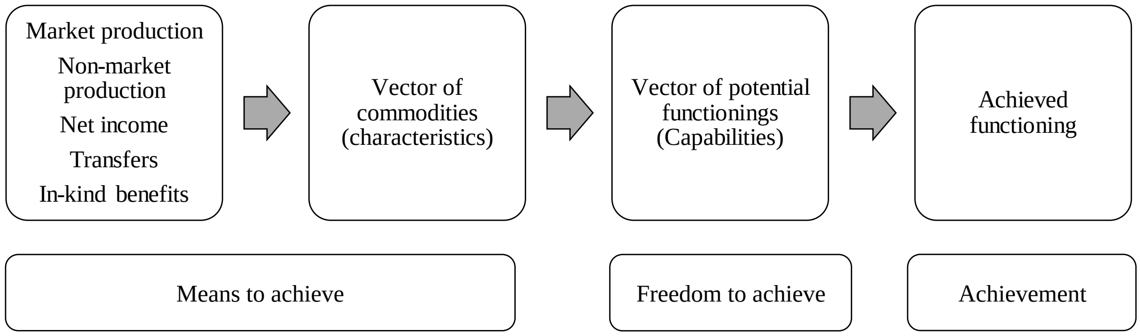
3.2 Sen's Capabilities Approach: An Overview

The CA was originally conceived as an alternative to the neoclassical economic analysis of human welfare, and takes on a more expansive take on human welfare than traditional methods by focusing on people's capabilities, or what people can do and can be. The neoclassical framework looks at opulence (real income) or utility to examine human welfare; people are perceived to consume goods and services (commodities) and derive satisfaction (utility) from them. Therefore, a person's SOL is strongly linked to his/her income which determines the level of consumption and utility. But, the CA argues that people's SOL depends on what they can be and do (beings and doings, also called functionings) from a vector of potential functionings (capabilities) available to that person, using the goods and services they purchase (which will bring about utility to them). To illustrate, a person can own a bike (commodity), but what s/he can do (and be i.e., functionings) with the bike will depend on the owner's personal characteristics, and whether the bicycle can be adjusted for those characteristics[34]. A PWD may not be able to go as fast or as far on the bike as a person without a disability.

Therefore, the CA focuses on the functionings, and not the commodity, to evaluate one's SOL (Basu & López-Calva, 2011; Craig, 2006; Sen, 1984). The CA also resonates with Kabeer's definition of empowerment because it recognises that an individual chooses from an available vector of potential functionings. As Kabeer (1999) has explained, the availability of choice is an important element of empowerment, because a person's agency is realised through his/her ability to make strategic life choices. The non-availability of choice is in effect disempowerment.

[34] For example, if a person has paralyzed legs, s/he will not be able to ride an ordinary bicycle. However, with the use of technology, such a bicycle might be modified, within certain limits, to meet the needs of such an individual (Oosterlaken, 2009).

Figure 3.1: Sen's Capabilities Approach Framework



Source: Robeyns 2003a

While the CA provides an insightful normative conceptual framework to study human welfare, it is underspecified as a theory because it does not really prescribe a methodology to measure poverty or inequality (Robeyns, 2003b). What it really does is to advocate that the evaluative space for inequality analysis or issues of social justice should be capabilities, but does not stipulate as to what capabilities should be taken into consideration or how different capabilities should be aggregated to measure poverty or inequality (Ibid). In fact, Sen has expressed reluctance in listing out capabilities, particularly "one pre-determined canonical list" that is "emanating entirely from pure theory" (Sen, 2005: p. 158), and therefore not context-specific. However, Nussbaum who has also written extensively on the CA was a proponent of specifying a definite set of capabilities in order for the framework to provide a useful and adequate conception of justice (Nussbaum, 2003). Thus, she has listed out ten "central human capabilities"[35] (Nussbaum, 2000, 2007) that she has considered to be requirements of a "life with dignity" (Nussbaum, 2003: p. 40), where dignity in turn is associated predominantly with the notions of respect, agency and equality (Claassen, 2014). The

[35] Life, Bodily Health, Bodily Integrity, the Development and Expression of Senses, Imagination and Thought, Emotional Health, Practical Reason, Affiliation (both personal and political), Relationships with Other Species and the World of Nature, Play, and Control over One's Environment (both material and social)

methodology proposed by Robeyns (2003b) to choose relevant capabilities can be thought of as positioned somewhere in the middle of the notions of capabilities as being open-ended and a definite list[36].

The CA is also a relatively subjective methodology, given its radically underspecified nature. As a result, operationalising the CA for empirical analysis can be quite daunting. Not only is the outcome of an analysis grounded in the CA dependent on which set of capabilities is considered to be relevant, but also on how the different capabilities are weighted (Dang 2014; Robeyns 2003b). Then, there is also the larger issue of the choice between capabilities (the freedom to choose beings and doings) and functionings (beings and doings) (Robeyns, 2006).

By looking at capabilities, one stays true to the essence of the CA as one of social justice and human rights. This is because capabilities reflect whether a person has the freedom (opportunity) to choose the functionings (achievements), or not. Thus, the CA encompasses many ways of participating in society, and is not prescriptive of one way of life over another (Gopinath, 2018; Robeyns, 2006). Functionings on the other hand do not necessarily reflect the differences in the capabilities that underpin such functionings. Sen's (2005) example of Mahatma Gandhi's fast during India's struggle for independence is useful here. In terms of the functioning of being well-nourished, Gandhi did not differ from a starving famine victim. But, what the functioning of being

[36] As she has explained the process of choosing relevant capabilities involves four steps – starting with unconstrained brainstorming (in her study, in relation to gender inequality), then engaging with a wide variety of relevant literature, and more formally, comparing with other lists of capabilities devised by other academics and practitioners and finally, debating the list at seminars, conferences, informal discussions and within activist networks. However, clearly this methodology can be time-consuming and expensive to operationalise, and might lend itself more effectively to qualitative than quantitative studies. This method is also difficult to implement in studies that use secondary data which is already given, allowing little flexibility on the methodology of selecting capabilities.

well-nourished in this situation does not reflect is the very likely differences in the freedom they had towards achieving the state of being well-nourished.

3.3 Operationalising CA

Despite its conceptual appeal, the implementation of the CA framework can be practically difficult, especially in quantitative studies, due to several reasons. Available secondary data is limited in terms of the information on people's capabilities because such data are not based on surveys that have been designed to measure capabilities (or even functionings) (Dang, 2014; Robeyns, 2003a, 2006). Moreover, even if data focusing specifically on capabilities was collected, it may not be possible to capture all relevant information through quantitative surveys. Some information may require different (qualitative) data collection methods (such as in-depth interviews or ethnographic studies) to capture the dynamic nature of social and contextual factors that influence an individual's capabilities and functionings (Zimmermann 2006; Robeyns 2003a). As such, an assessment of capabilities based only on quantitative methods naturally tends to have limitations (Ibid).

The many practical challenges in the use of capabilities as the evaluative space in empirical investigations, particularly using existing datasets, are recognised by Sen who has advocated for a practical and flexible use of the framework (1992, 1999 cited in Dang 2014; 2009 cited in Gopinath 2018) i.e., using functionings as the evaluative space, and not capabilities. In fact, Sen has discussed three alternative practical approaches to the empirical application of this framework: 1) the direct approach (examining and comparing vectors of capabilities and functionings themselves), 2) the supplementary approach where traditional income comparison is supplemented by incorporating considerations in relation to capabilities, and 3) the indirect approach where incomes are adjusted for capabilities (Comim, 2001). The CA has a value and an application that is independent of, and additional to, its empirical applications (Alkire, 2005). Thus, choosing a practical way to operationalise the CA is a much more productive use of this framework rather than not using it altogether because of its abstract, underspecified nature.

3.4 Empirical application of the CA

Given the multi-disciplinary nature of the CA, the corpus of empirical studies that employs this framework pans across many research fields from economics, and development studies to education, mental health, behavioural sciences and information technology. The following discussion, however, is only limited to a survey of economic literature that has used the CA, employing quantitative research methodologies.

The economic quantitative studies that use the CA can be divided into two categories – those that employ primary data collected specifically for the purpose of measuring capabilities and/or functionings, and others that use existing secondary data, collected from surveys that have not been designed for measuring capabilities. A look at these two types of studies is important to compare and contrast how the CA is operationalised in variable selection and construction for analysis, and what limitations apply, depending on whether one uses primary or secondary data. It is particularly important to explore this distinction, given that this research primarily draws on available secondary data. A few studies that have employed data from surveys designed to operationalise the CA are presented below.

Table 3.1: A summary of quantitative studies that operationalise CA using primary data

The Development of Capability Indicators Anand et al. (2009)	To understand the association between capabilities and life satisfaction Primary data collected from 1,000 respondents in the UK, using a questionnaire developed specifically to measure 60+ capabilities across multiple life domains	The study observed the multi-dimensional nature of subjective well-being (or life satisfaction). The findings corroborate the idea that it is individuals' own freedom of choice that is valued in the CA; evidence in psychological literature on happiness which shows that many domains are important for happiness; and, economic literature on poverty that shows welfare is multi-dimensional. However, the main contribution of this study is methodical in nature, as it has attempted to operationalize the philosophically-oriented CA using a quantitative survey instrument to apply in empirical work.
Determinants of Empowerment in a Capability-Based Poverty Approach: Evidence from The Gambia Trommlerová et al. (2015)	To understand what factors, have empowered people in the Gambia to change their own lives (i.e., individual empowerment) and affect changes in their communities (i.e., communal empowerment) A special schedule included to collect data related to the CA, in a baseline survey conducted by a World Bank project. This schedule on self-reported capabilities is designed to complement the socio-economic and demographic characteristics of respondents relevant for own and communal empowerment	The analysis shows that self-reported capabilities among individuals are in fact much more strongly related to individual empowerment than their socio-demographic characteristics or their economic situation. The results also indicate that individual empowerment (feeling that they are the biggest agents for change in their lives) is higher among people with severe disabilities (and other groups), while those with lesser health limitations rely more on the government and families for support.
Disability as deprivation of capabilities: Estimation using a large-scale survey in Morocco and Tunisia and an instrumental variable approach	To understand the effects of impairment on the deprivation of capabilities among PWDs in Tunisia and Morocco Primary data collected using in a case control survey the Primary Data collected in a case control	Results show that disability in both countries is strongly related to an absence of opportunities – in health and economic participation in particular, not necessarily in education – which in turn results in lower agency among PWDs and a deprivation of basic functionings

Trani et al. (2018)	survey from 6,000 households in the two countries, using the Disability Screening Questionnaire with 34 items (DSQ-34) developed by Trani et al. (2015)[37] based on the CA.	such as a job, good health or a good quality of life. The study also establishes that the relationship between impairment and poverty defined by the deprivation of capabilities is causal, and not only associational – i.e., impairment leads to poverty.

Source: Author

Although developing specific survey instruments to create better indicators of capabilities might produce more insightful results (Hasan, 2009), the process of collecting primary data this way can be a time-consuming and costly exercise, and therefore not a feasible option in many situations. In fact, as Robeyns (2006) has pointed out, most of the available empirical studies that have employed the CA have been done using existing secondary data sets, which are most likely drawn from surveys that have not been designed to capture even functionings, let alone capabilities. Therefore, it is important to examine how such empirical studies have operationalised the CA using existing secondary data, and what challenges these investigations have had to address in working with datasets that potentially had limited information on capabilities and functionings.

A useful starting point is Leßmann (2012) which provides a synthesis of empirical studies on labour that have operationalised the CA using secondary data and various methodologies[38]. Although all the studies discussed there are from developed countries where the secondary datasets are generally rich and comprehensive, the different

[37] The DSQ-34 was developed by Trani et al (2015) as a measure of activity limitations and functionings difficulties in everyday life for persons living in LMICs. This questionnaire was developed on Sen's capabilities approach with the flexibility of contextual adaptation that Sen advocates.

[38] Krishnakumar (2014) also has discussed the different quantitative methodologies that have been used in empirical research to operationalise the CA, although the literature the author has reviewed is not necessarily limited to economics.

methods used in them (from descriptive statistics, factor analysis, indices and fuzzy-sets analysis to logit, probit and Ordinary Least Squares (OLS) regressions) provide good insights into how the CA has been applied empirically. To understand more about these different methodologies, I turn to two specific studies that are briefly discussed in Leßmann's (2012) analysis.

Burchardt and Le Grand (2002) studied to what extent people's employment status was affected by the opportunities available to them or the constraints they faced. In order to address the issue of the unobservability of opportunities, they began with the premise that all non-participation in the labour force is voluntary. Then they added possible constraints as explanatory variables in 4 layers, ordered from clearly those that are beyond control through an individual's life time (such as age, gender, ethnicity), to those constraints where respondents may have greater flexibility in changing (in this particular study, the hours of care work). The results showed that the extent of opportunity available for respondents to take up paid work depended on the degree to which factors were considered to be beyond their control i.e., constraints. For example, if the only constraints were age, gender, ethnicity and parental class, the authors have estimated 35 and 50 percent of unemployed men and women, respectively, would have not taken up opportunities that were within their grasp. But when more constraints such as health, labour market experiences, education, family circumstances and locality characteristics were introduced, this share dropped to 20 and 25 percent respectively, for men and women.

In another study, Poggi (2008) investigated the determinants of job satisfaction in EU countries using the 2005 European Working Condition Survey (EWCS) data which has detailed information on the quality of work in Europe. Drawing on the CA, the author treated objective working conditions of the respondents as functionings (i.e., experienced by individuals), and capabilities as the alternative sets of working conditions available in the society for a given kind of job, and individual characteristics (such as education). People observe these capabilities (i.e., alternative working conditions and individual characteristics) and form expectations about their working conditions which in turn can shape their perception of job satisfaction. However, these expectations about working conditions are unobservable. Therefore, to understand how the expectations can impact job satisfaction, the author introduced a two-tiered stochastic frontier methodology where the composite error term can capture the effects of both high and low expectations on worker job satisfaction. In relation to the role of expectations on job satisfaction, the author found that there was a downward bias in the self-reported levels of job satisfaction where respondents expected better working conditions than the real working conditions, and vice versa.

These two studies are examples of how secondary data has been applied to a CA framework. These studies, among others, showcase that although the operationalisation of the CA is challenging, and the available secondary data may not be optimal for proxying capabilities and functions that are central to the CA framework, it can still be done (Leßmann, 2012). The use of the CA in the study of the economic implications of disability is discussed next.

3.5 CA Framework and Economic Implications of Disability

According to the CA, disability can be interpreted as a form of capability deprivation (the definition Sen uses to define poverty as well), or as Dubois and Trani (2009) have posited, a lack of capabilities. To elaborate, a PWD's freedom to achieve (capabilities) a given functioning might be less than that of a person without disabilities. For example, the freedom to obtain a formal school education is likely to be lower for a PWD than an otherwise comparable non-PWD, given the same level of resources (means to achieve). A PWD will likely require additional resources and an inclusive socioeconomic environment to achieve the functioning of obtaining a school education. Thus, an equal amount of resources does not necessarily translate into equal capabilities, or functionings for a PWD (Toboso, 2011). In Sen's own words "…we must take note that a disabled person may not be able to do many things an able-bodied individual can, with the same bundle of commodities" (Sen, 1985, p. 7). For the purposes of this study, this hypothesis is extended to the household. Accordingly, for a given level of resources, a household with a PWD might find it difficult achieve the same functionings as one without. This is because the process of translating resources into capabilities and functionings is not straightforward, and is in fact mediated by conversion factors such as illness, old age, or in this case disability. More importantly, such a household might not even have as many resources as a household without PWDs to begin with. In this regard Sen (1993) has explained that:

> "…there may actually be some accentuation of inequality due to the 'coupling' of (i) income inequality and (ii) unequal advantages in converting incomes into capabilities, the two together intensifying the problem of inequality in terms of opportunity-freedoms. Those who are disabled, or ill, or old, or otherwise handicapped may have, on the one hand, problems in earning a decent income, and on the other, also face greater difficulties in converting incomes into capabilities to live well" (p. 536).

In a forward to Kuklys (2005), Sen has also pointed out that the "bigger problem is not in [the] 'income handicap' but the 'conversion handicap'" (p. viii).

Although Sen has contested the use of income as a measure of human well-being, he has recognised its importance for a household because income gives “the corresponding opportunities to purchase goods and services and to enjoy living standards that go with those purchases” (Sen, 2001, p. 291). However, a capability deprivation transcends income deprivation, and is symptomatic of economic inequalities, which traditional approaches to human welfare often oversimply when they investigate only income inequality. Income inequalities fail to recognise the role of conversion factors such as disability that play a role in creating economic inequalities for a household, i.e., how an individual/household converts income into capabilities and functionings. Looking only at income inequalities can therefore give “a very inadequate and biased view of inequality” (Sen, 1997, p. 385). Put differently, the “real poverty” reflected in capabilities deprivation can be significantly more intense than what appears at face value in the income space (Sen 2001, p. 88)[39]. Shifting the focus away from the means (income) to ends (functionings) and freedoms to achieve them (capabilities) is therefore important for enhancing one’s understanding of the root causes of poverty and deprivation (Ibid).

The incompleteness of Sen’s CA gives the flexibility to apply it to this research study in a heuristic manner. What constitutes resources, capabilities and functionings can be adapted to the issue under consideration (Mitra, 2006), which is particularly beneficial as the datasets used in this study are secondary. Three variables are particularly relevant for the remainder of this thesis – disability, household income and SOL. The

[39] Sen (2001) has presented three arguments in favour of applying CA, instead of a traditional income perspective, to measure poverty. First, poverty can be sensibly identified as a deprivation of capabilities than simply low income. Low income is instrumental in driving poverty because it can lead to capacity deprivation. In contrast, capability deprivation is intrinsic to poverty. Secondly, factors other than low income can influence one’s capability deprivation. Thirdly, the instrumental effect of income on capabilities is contingent and conditional on a number of factors such as one’s age, gender, social roles, location, and disability.

construction of disability is discussed at length in Chapter 5 and will not be dealt with here. Income is also rather straightforward in that it is an observed variable[40]. The same cannot be said of SOL, however.

Although Sen's idea of SOL is broader than one which looks at a list of household possessions, many empirical studies following the seminal work of Zaidi and Burchardt (2005) have used a bundle of household assets as a proxy in situations where SOL is unobserved. The fluidity of the concept of functionings makes the case for constructing such a variable. An index of assets can be hypothesised as an achieved capability of a household, provided it meets the criteria that makes such as assumption realistic (See a detailed discussion in Section 5.4 of Chapter 5). Employing both these variables in the analysis allows to explore 'the coupling of disadvantages' of income and conversion handicaps that households with PWDs are found to experience, within the local context. Next, I turn to a brief discussion of the intersectionality framework which has great utility along with the CA in bringing to light the economic implications of disability among households with PWDs.

3.6 CA Framework and Intersectionality lens

As mentioned at the outset, disability is a complex human experience, and should not be considered as universally disempowering to everyone who lives with it. Rather, the effects of disability on an individual's day-to-day life and the lives of their household members, socioeconomic activities, and the overall participation in society is shaped by its interplay with numerous other socioeconomic, cultural, and institutional factors

[40] However, different functional forms of the income variable which represent the different hypothesized association between income and extra cost of disability can be specified (Burchardt, 2005), but this is only relevant when disability is defined as a continuous variable.

(See Chapter 2). The intersectionality framework pioneered by Crenshaw (1989) is a useful analytical tool to parse such factors that shape how the conversion handicap is experienced by households with PWDs.

Crenshaw (1989) developed the intersectionality framework in order to study the oppression of Black women in the US. She wrote:

> "Black women sometimes experience discrimination in ways similar to white women's experiences; sometimes they share very similar experiences with Black men. Yet often they experience double-discrimination—the combined effects of practices which discriminate on the basis of race, and on the basis of sex" (p. 149).

In other words, the intersectionality framework recognises that different markers of social exclusion do not exist on a single categorical axis. Instead, they often overlap and are intertwined. An intersectionality lens can be a very useful analytical tool to decode the ways in which conversion costs are shaped and influenced by the concurrence of several markers of social exclusion. Factors that affect a household's ability to convert resources into capabilities and functionings consist of both internal (personal characteristics such as age, gender, skills, bodily/psychological condition) and external variables (including social and environmental characteristics) (Trani et al., 2011). The interaction of disability with other conversion costs might further aggravate the economic implications of disability on households. For example, households with a PWD and a female head might face more severe economic ramifications than those with a PWD but male heads, or those with female heads but no PWDs. Thus, the intersectionality framework allows us to look beyond the surface, and untangle the layered nuances that drive income and conversion handicaps among households living with different realities.

As an analytical tool, the use of an intersectionality framework is predominantly found in qualitative research studies. It has been used rather extensively to explore the effects of disability when it intersects with gender, race/ethnicity, class, age and poverty (Erevelles & Minear, 2010; Moodley & Graham, 2015; Schneider et al., 2016; Vanniasinkam & Vitharana, 2020). Its use in quantitative research is rather limited, but has been growing over the recent years, although some of them tend to use the framework at a rather superficial level (Bauer et al., 2021).

Econometric strategies for incorporating an intersectionality framework include the use of decomposition methods to unpack differences in inequalities (Bauer et al., 2021; Jackson & VanderWeele, 2019); the use of interaction terms in model specification (Scott & Siltanen, 2017); and, an examination of the sample as a whole, and subsequently as sub-samples along the relevant markers of intersectionality (Etherington, 2015). Running regression models for sub-samples or using interaction terms in the model specification are strategies that are often found in quantitative work, but without specific reference to the intersectionality framework. Thus, it can be posited that a greater number of quantitative studies than would appear on a keyword search, might in fact have operationalised the intersectionality lens using these simple methods. Such studies are perhaps guilty of a superficial application of the framework (Bauer et al. 2021), but its utility nonetheless cannot be ignored, especially where the results are obtained through robust methodologies, with credible assumptions, and using large datasets with enough observations in the sub-samples.

3.6 Strategies for using CA with secondary datasets

It follows from the discussions above that a researcher who analyses quantitative secondary data using the CA framework should exercise a significant level of judgement in choosing proxy variables for functionings and/or capabilities. Yet, as Sen has recommended such proxy variables still are preferred to traditional income-based analysis (2001, 2005). Therefore, it is important to discuss what measures can be undertaken which use CA sensibly, within the contours of available secondary data.

The step-by-step guide to the application of the CA in empirical analysis prepared by Chiappero-Martinetti and Venkatapuram (2014) is quite useful. They explain that once the dataset is selected, the next step is to prepare an ideal set of variables and to identify their proxies from the questionnaire. Such proxy variables can then be subjected to statistical analysis to finalise a "practical list of variables" (Ibid, p. 715). This list, obviously, will be informed by the specific issue under inquiry. A similar approach is proposed in the Alkire-Foster method to measuring multi-dimensional poverty (Conconi, 2016).

Another strategy is to apply different techniques to understand how the outcome variables are affected by the choice of methodology (Robeyns 2003a). For example, Lelli (2001) who investigated this issue using data from the Panel Study of Belgian Households (PSBH) found that, by and large, both factor analysis and fuzzy sets employed used to measure individuals' functionings yielded similar results. Moreover, the results of regression analysis employing the functionings variable constructed based on both methods produced a substantially equivalent picture. Another significant observation that Lelli (2001) made is how consistently the effects of monetary resources are relevant in relation to different indicators of functionings in both methodologies, and therefore the importance of supplementing income-related data with other variables in a multidimensional approach to welfare, rather than completely ignoring it.

3.7 Summary

This chapter discussed at length the conceptual appeal of the CA in looking at the economic implications of disability at the household level. The CA clearly argues that looking at traditional income measures to examine the economic well-being among households with PWDs is misleading because disability affects not only a household's ability to earn income, but also its ability to convert such resources into capabilities and functionings. Instead, it is important to look at a household's capabilities and functionings in order to fully recognise the extent of the economic implications of disability faced by households with PWDs.

Nonetheless, given the abstract nature of the framework, an application of CA can be tricky, especially in quantitative studies, and even more so when using secondary data. Most surveys have not been designed to gather information on capabilities, and sometimes even functionings, and even when they are, quantitative surveys may not be able to capture all aspects of these concepts. As a result, the CA framework prompts the researcher using secondary datasets to exercise a significant level of judgement in choosing proxies for functionings and/or capabilities. However, the underspecified nature of Sen's CA framework, and his blessing to use it even in a limited manner rather than not use it at all when the most ideal data are not at the researcher's disposal, has encouraged its application in this study. Its operationalisation is accomplished by adopting strategies proposed and used by quantitative empiricists who have used the framework within contours similar to this study. The utility of an intersectionality lens to enrich the analysis cannot be ignored. The framework will be particularly integral to the analysis of the qualitative data of the study, but will also be integrated into the quantitative analysis where possible through simple econometric procedures.

Chapter Four: Disability Profile in Sri Lanka - A Descriptive Analysis

4.1 Introduction

The Department of Census and Statistics (DCS) does not conducted surveys that are designed specifically to measure disability prevalence in Sri Lanka. However, its Census of Population and Housing (CPH), HIES, Demographic and Health Survey (DHS) and Labour Force Survey (LFS) conducted about every 10, three and six[41] years and annually (and quarterly), respectively, gather some data on disability. DCS's annual school census also has some rudimentary information on CWDs. The MDS (2014/15), on the other hand, was designed specifically to study disability. The ensuing discussion on Sri Lanka's disability profile draws on the HIES (2016) and MDS (2014/15) datasets. As mentioned earlier, these are the two datasets that are utilised for econometric analysis in the empirical chapters that follow. However, for completeness, the data from the HIES 2019 report which is now publicly available are also presented and discussed.

4.2 Disability profile based on HIES data

The 2016 HIES questionnaire has not been designed to collect data on disability, but its schedule on health includes a question about self-reported disability, as follows: "Do you suffer from Chronic illness / Disability?"[42]. The descriptive analysis that follows is based on the data gathered in relation to this particular question. However, clearly this question is limited in its ability to generate a reasonable picture of disability

[41] From 1987 to 2016, five rounds of the DHS have been carried out, averaging about 6 years between surveys.
[42] See Section 3A in the HIES – 2016 questionnaire. p. 7

prevalence in the country. The lumping together of disability and chronic illness which are in fact two conditions that are distinct from each other also makes the data rather redundant from a policy analysis perspective (See Chapter 5 for further details). The 2019 HIES questionnaire has retained this question, but the expanded health schedule gathers additional information about different types of impairments, and degrees of severity of impairment (DCS, 2022)[43]. As a result, the HIES 2019 report has been able to come up with a definition of disability, a dedicated chapter for health, and a separate section on persons with functional disabilities in it, all of which were missing in the 2016 report[44]. This is a noteworthy improvement in the data collection on disability from 2016. The descriptive statistics of HIES data from both 2016 and 2019 are presented and discussed next.

The 2016 data estimates a national disability/chronic condition prevalence of 17.0 percent (DCS, 2018) (Figure 4.1: Panel A). The prevalence is higher among women (18.4 percent) than men (15.4 percent). The overall prevalence has increased slightly to 17.8 percent in 2019 (DCS, 2022) (Figure 4.1: Panel B). However, the gendered patterns of prevalence are preserved; more women (19.7 percent) than men (15.8 percent) are estimated to have a chronic condition/disability, nationally. The sectoral break-down for both years shows that the disability prevalence is highest in the urban sector, and lowest in the estate sector, the poorest of the three[45]. These observations are somewhat counterintuitive, considering the widely accepted positive correlation between poverty and disability. Note, however, that these statistics need to be

[43] See Section 3B in the HIES – 2019 questionnaire. p. 8

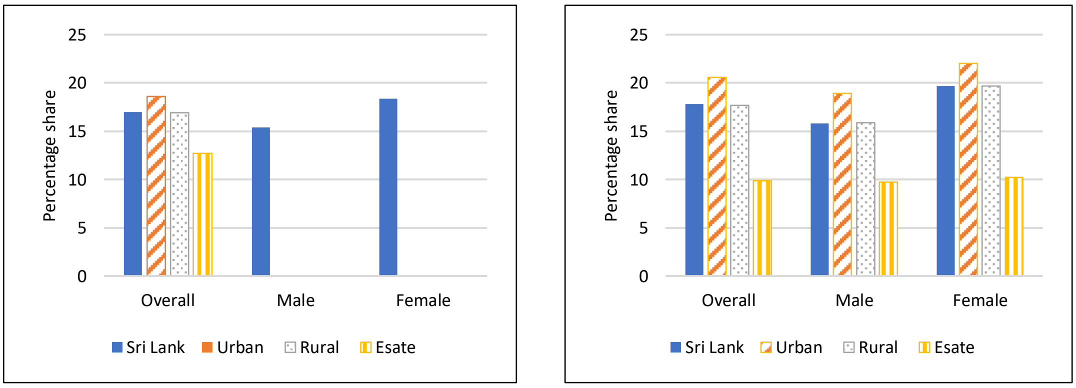
[44] An individual is considered to be a PWD if s/he indicates “a lot of difficulty” or “unable to do” in any of the six functional domains – seeing, hearing, mobility, self-care, cognition and communication.

[45] Poverty headcount index is 29.6 percent in the estate sector, compared to 4.4 per cent and 12.6 percent respectively in the urban and rural sectors (DCS, 2022)

interpreted with caution, given that they capture both chronic conditions and disabilities[46]. Furthermore, given the self-reported nature of this data, the respondents' assessment of their health would depend on their grasp of the concepts of disability and chronic illness, which in turn might be related to their level of education.

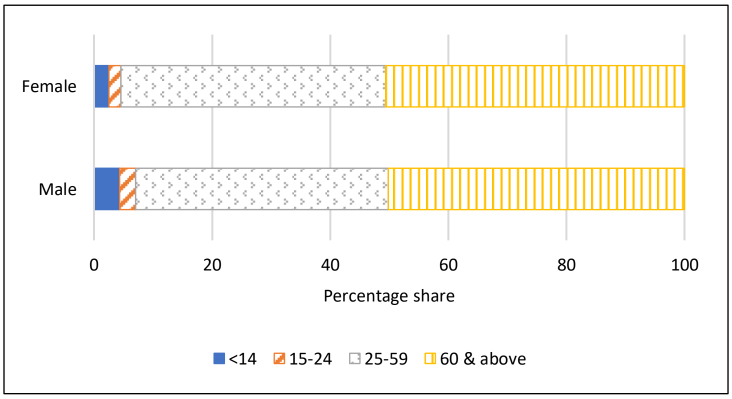
Figure 4.1: Prevalence of disability/chronic illness by sector

Panel A: 2016 Panel B: 2019



Source: DCS, 2018, 2022

Figure 4.2: Disability/chronic illness prevalence by gender and age group



Source: DCS, 2022

HIES 2019 provides gender-disaggregated data of disability prevalence, by sector, and by age-group. The disability prevalence is higher among women across all sectors, but the gendered differences are lowest in the estate sector (Figure 4.1: Panel B). The age-

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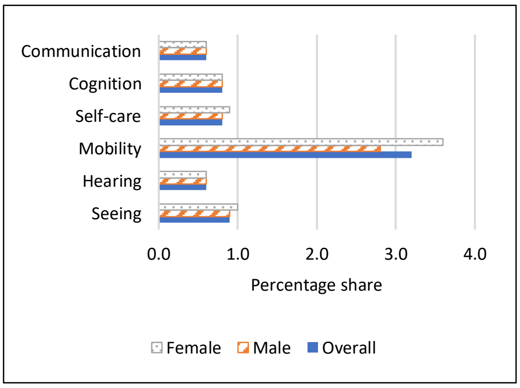
[46] For example, 2016 HIES data on whether an individual has had to stop usual activity due to disability/chronic condition shows that this share is highest in the estate and rural sectors (about 8 percent) compared to 5.6 per cent in the urban sector. This pattern is more in line with the common hypothesis that poverty and disability are positively correlated.

wise data indicate that disability prevalence increases with age, as expected (Figure 4.2). While the male disability/chronic illness prevalence is higher among respondents aged 24 or less, women's prevalence is greater in the older cohorts. For both men and women, the highest prevalence is reported from the oldest age cohort.

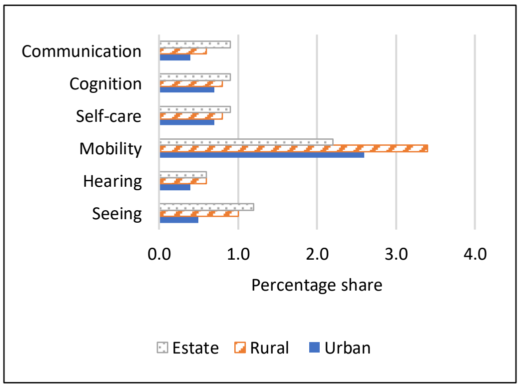
The district-wise distribution in 2016 is characterised by a higher prevalence of disability/chronic illness in Vavuniya (21.6 percent), Jaffna (21.4 percent), Colombo (19.9 percent) and Gampaha (19.9 percent) districts (Figure I-1: Panel A). There are some changes to the district-wise prevalence in 2019 (Figure I-1: Panel B). The highest prevalence rate is reported from Colombo (22.3 percent). Other districts with high prevalence include Polonnaruwa (21.6 percent), Galle (20.4 percent), and Vavuniya (19.9 percent).

Figure 4.3: Functional impairment prevalence (HIES 2019)

Panel A: Overall



Panel B: Sectoral

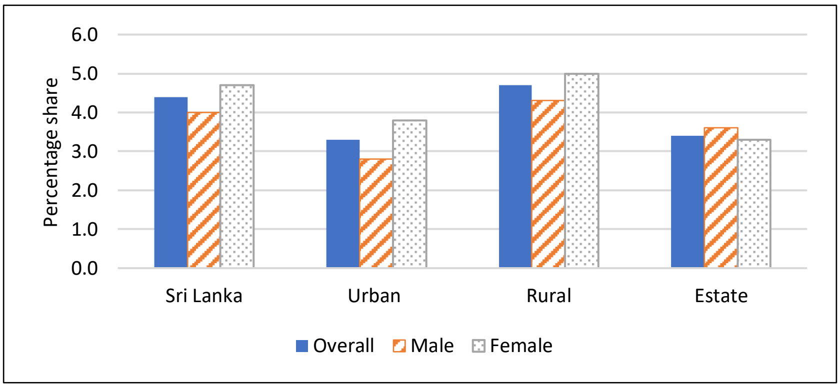


Source: DCS, 2022

As explained above, data on functional limitations are available only for 2019. The female prevalence rate across all enumerated functional domains is higher than or on par with the rates observed for men across all functional domains (Figure 4.3: Panel A). Mobility impairment is the most prevalent compared to impairment in other domains, and is particularly high in the rural sector (Figure 4.3: Panel B). Self-reported disability generally tends to be higher in rural areas compared to urban areas because of issues related to access and infrastructure (Iezzoni et al., 2006; von Reichert & Berry, 2019)[47].

The overall disability prevalence rate calculated using functional limitations in these six domains is 4.4 percent, and is marginally higher among women (4.7 percent) compared to men (4.0 percent) (Figure 4.4). According to this construct, the sector-wise prevalence is highest in the rural sector. There is also an aberration from the gendered patterns of disability prevalence observed thus far. Now, the disability prevalence is higher among men, compared to women, in the estate sector. The provincially disaggregated data shows that the highest prevalence is reported from the North Western province (6.0 percent), followed by North Central (5.5 percent), Southern (5.1 percent) and Central (4.9 percent) provinces. The lowest is reported from the Uva Province (3.2 percent). The male disability prevalence rates range between 2.8 percent (Uva) and 5.5 percent (North Western province). The female prevalence rate is between 3.5 percent (Eastern province) and 6. 5 percent (North Western province).

Figure 4.4: Disability prevalence (HIES 2019)



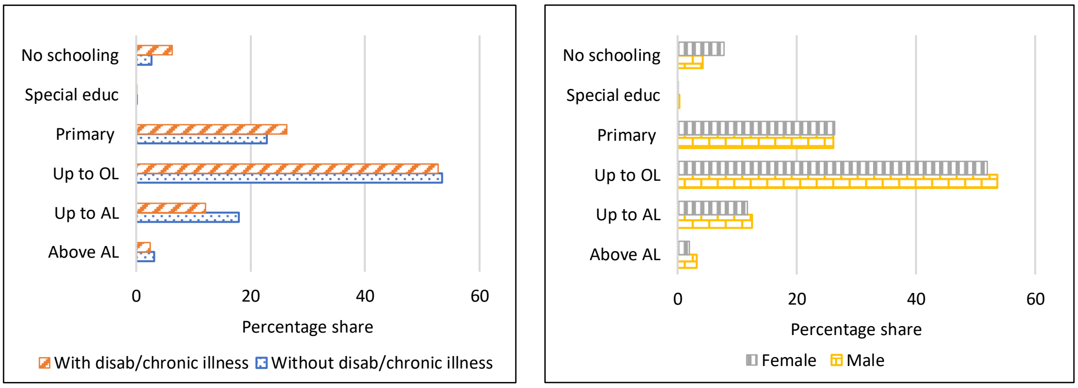
Source: DCS, 2022

[47] However, it is quite likely that infrastructure and access related barriers are worse in the estate sector compared to the rural sector. The age group composition of the 2019 HIES sample (DCS, 2022, p. 84) shows that the estate sector is characterised by a lower share of individuals aged 60 or more (16.5 percent only, compared to 18.2 percent and 18.0 percent in the urban and rural sectors, respectively). The estate sector also has a higher share of children aged 0-14 (24 percent) compared to urban (21.2 percent) and rural (23 percent) sectors. The lower age profile of the sample from the estate sector might explain why the mobility impairment is lower in the estate sector than in both rural and urban sectors.

The published HIES report does not provide information pertaining to the educational attainments and usual activities of people living with disabilities/chronic conditions. This information is, however, available in the HIES 2016 dataset, and is used to explore the patterns of educational outcomes and usual activities among PWDs.

Figure 4.5: Educational attainments of individuals with and without disabilities/chronic conditions

Panel A: Overall   Panel B: By gender

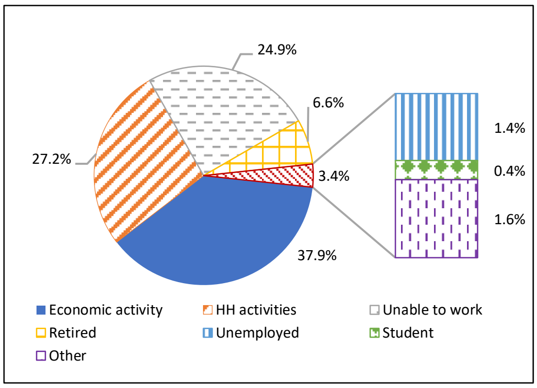


Source: Author estimates based on HIES (2016) data using STATA SE/14

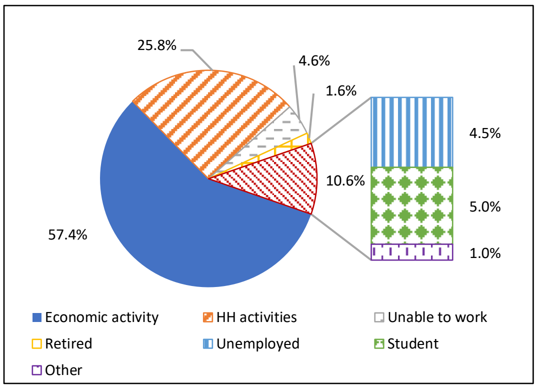
As expected, the educational levels are lower among people with disabilities/chronic conditions than those without (Figure 4.5: Panel A). Within the sub-sample of people with disabilities/chronic conditions, women appear to have lower educational attainments than men (Figure 4.5: Panel B). These observations underscore the double burden of gender and disability that women grapple with (discussed in Chapter 2).

Figure 4.6: Usual activity among individuals with and without disabilities/chronic conditions[48]

Panel A: With



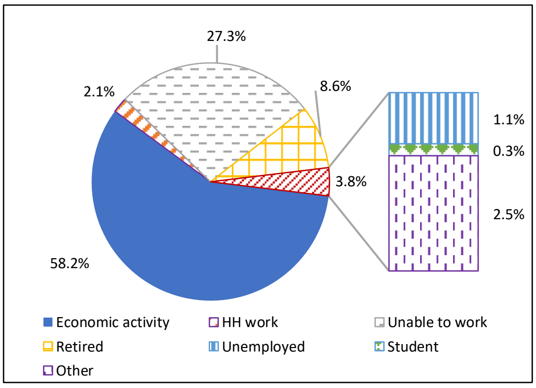
Panel B: Without



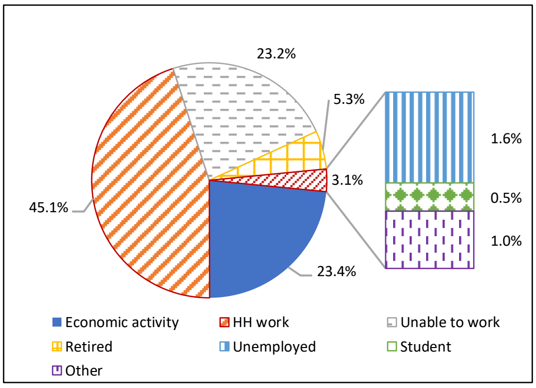
Source: Author estimates based on HIES (2016) data using STATA SE/14

Figure 4.7: Usual activity among men and women with and without disabilities/chronic conditions

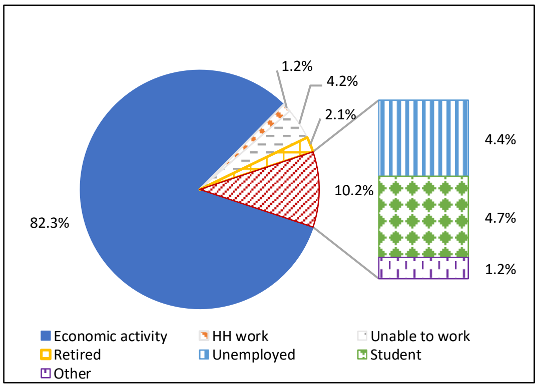
Panel A: Male (with)



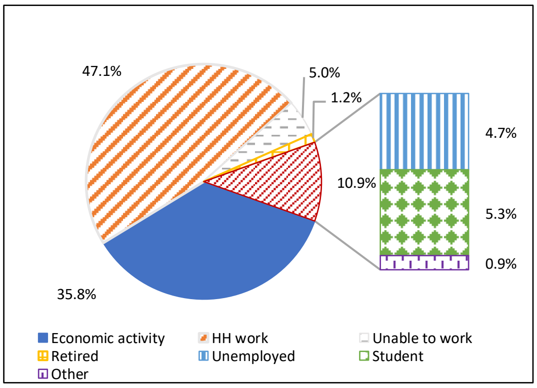
Panel B: Female (with)



Panel C: Male (without)



Panel D: Female (without)



Source: Author estimates based on HIES (2016) data using STATA SE/14

48 Only individuals aged 18 or more are considered for usual activity

Close to 60 percent of individuals with disabilities/chronic conditions are economically inactive (Figure 4.6: Panel A). Most of them are either unable to work (24.9 percent) or are engaged in household work only (27 percent). Only about 38 percent are economically active compared to about 61.9 percent of those without such conditions (Figure 4.6: Panel B). A gendered comparison the subsamples with and without disabilities shows that such conditions are more of a barrier for the economic participation among men than women (Figure 4.7). To elaborate, the disparity of economic participation between the two groups is more pronounced among men (82 vs 58 percent for non-PWDs and PWDs, respectively; Figure 4.7: Panel A and Panel C) than women (36 and 23 percent for non-PWDs and PWDs, respectively; Figure 4.7: Panel B and Panel D). The descriptive analysis based on the MDS data is presented and discussed next.

4.3 Disability profile based on MDS data

The World Bank's MDS (2014/15) which uses a nationally representative sample of 3,408 households gathers data on disability in line with the ICF definition of the term. Therefore, obviously this survey captures the prevalence of disability more comprehensively. The MDS questionnaire does not really ask whether a respondent has a disability or not. Instead, the prevalence of disability is investigated through an evaluation of the barriers that respondents face in navigating the external environment, the need for and the use of personal assistance and assistive devices, difficulties in performing day to day activities, attitudes of and support from their social networks, as well as their health conditions. Each of these domains that make up one's disability experience are discussed briefly below.

4.3.1 Environmental barriers – physical space

The MDS collects information on the extent to which respondents find it easy or challenging to access places such as health facilities, places of worship, use of public transport (Table 4.1). Clearly, the large majority of the respondents have no difficulty navigating the external environment, especially their own home. In contrast, more respondents find it difficult to access health facilities, community spaces, market and public spaces, and public transport. A little below a tenth finds the climate and temperature in where they live to be difficult or very difficult.

Table 4.1: Extent of difficulty in navigating the external physical environment

Degree of difficulty	**Very easy**	**Easy**	**So so**	**Hard**	**Very Hard**	**NA**
Health facility	1.05	66.78	15.28	7.06	5.52	4.30
Community spaces	0.10	69.14	15.56	6.26	5.04	3.90
Shops, bank, post office	0.03	71.20	13.77	5.87	4.61	4.52
Place of worship	0.15	78.40	11.73	3.86	2.98	2.88
Transport	0.00	72.49	13.12	5.21	4.81	4.37
Dwelling	0.00	82.77	10.57	3.04	2.08	1.53
Toilet in Dwelling	0.03	81.60	9.88	3.36	2.80	2.33
Climate and temperature	0.00	75.11	13.92	6.09	3.06	1.81
Light, noise and crowd	0.21	78.31	13.22	4.10	2.27	1.89

Source: Author calculations using MDS (2014/15) on STATA/SE 14

An aggregate score estimated using these variables (range: 9-45[49]; higher the worse) shows that, overall, there are no significant gendered differences in environmental accessibility barriers (Table I-1). As expected, the physical accessibility barriers are most severe for those aged 60 or more. The environmental challenges are highest among respondents in the North Central (15.4), Eastern (14.6) and Northern (14.1) Provinces, as reflected by their higher-than-average score.

[49] Aggregated score for all 9 enumerated spaces; from 1 (very easy) to 5 (very difficult).

The greater difficulty of navigating physical spaces from poorer regions, including the former war-affected regions allude to possible deficiencies in infrastructure such as subpar road networks and conditions, weak transportation systems, and fewer buildings that are designed with accessibility features. Additionally, residents of these regions might not have access to their own transport methods, which may also adversely affect the ability to navigate the physical environment.

4.3.2 Personal Assistance

Next, the survey collects data on the need for and the availability of personal assistance to respondents. About 15 percent of the respondents have a caregiver; this share is slightly higher among men (16 percent) than women (13 percent). Of such help, about a third is paid for, or provided by a charity organisation. However, by and large, assistance for day-to-day activities is sourced from an unpaid caregiver in the family (92.2 percent). Of the respondents who already have a caregiver, 43 percent need additional assistance to carry out daily activities. The aggregate score created for personal assistance (range: 0-3[50]; higher the worse) indicates that the need for care is highest in the North Central and Northern Provinces (Table I-2).

The excessive reliance on unpaid care is partly attributable to the cultural values in which caring for elders is a family obligation (Siriwardhana et al., 2020). At the same time, the greater need for personal assistance from the oldest age cohorts alludes to the care-related challenges that Sri Lanka is set to face with an aging population. The higher demand for such care that was observed in poorer parts of the country shows that the issue of affordability of care is an important consideration. As traditional value systems

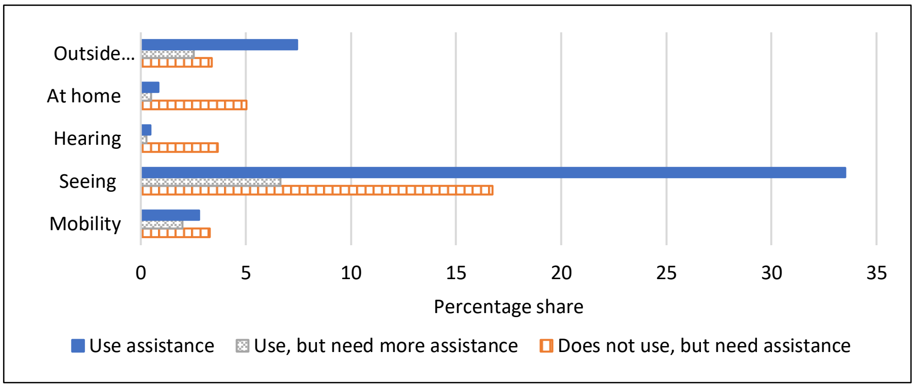
[50] Don't need a caregiver (0); Already has caregiver (1); Doesn't have a caregiver but needs one (2); Has a caregiver and needs more help (3)

are challenged with shifts in the family composition from extended to nuclear, there is a rising need for more formal care systems to support older adults (Siriwardhana et al., 2020).

4.3.3 Assistive devices

The third sub-component is the need for, and the availability of, assistive devices. Most of the respondents do not require assistive devices for mobility, seeing, hearing or to go about day-to-day life inside home or outside. Of the functions for which assistive devices are used and needed, those related to sight are the most common (Figure 4.8). In relation to support at home, mobility, self-care and hearing, there are more respondents who need, but do not have, access to supportive devices than individuals who actually have such assistance. A little below 4 percent of respondents need, but do not have, access to barrier free physical spaces outside home.

Figure 4.8: Share of respondents who use and need assistive devices



Source: Author calculations using MDS (2014/15) data

The aggregate score estimated for devices (0-15[51]; higher the worse) indicates no significant gendered patterns, but increases markedly for the two older cohorts. The

[51] 0 – no assistance needed; 1 – have assistance; 2 – don't have, but need assistance; 3 – have assistance and need more, across the 5 enumerated situations

device score is highest for Northern and Eastern provinces, followed by the Central Province (Table I-3). The particularly low use of and perceived need for hearing aids could be due to a number of reasons such as those related to affordability, the non-availability of proper assistive technology, difficulties of repair and maintenance of the devices, a lack of awareness and knowledge about them, and the stigma associated with their usage (Gunarathna, 2017; Rob et al., 2009; Weerasinghe et al., 2015) .

4.3.4 Attitudes and Access to Information

The soft components of the environmental barriers are captured by way of the support from family and friends, social attitudes and access to information. The large majority of respondents have close relations with family, friends and neighbours, and no significant gendered patterns can be delineated. However, the age-wise disaggregation of the support score (0-15[52]; higher the worse) shows a marginal decline in the support that older respondents get (Table I-4). Most respondents do not face attitudinal barriers in participating in society and day-to-day activities, and have access to information that they want. The aggregate scores of attitudes (0-50[53]; higher the worse) and information (0-5[54]; higher the worse) show no significant gendered differences (Table I-5 and Table I-6, respectively). However, there is a gradual decline in access to information as the age group advances.

In sum, while issues of family support and attitudes are not a significant problem for respondents, the regional disparities in access to information are of importance. The poorer and the former war-affected regions are characterised by low access to

[52] 0 – no response, not applicable; 1 – most positive to 5 – most negative enumerated in 3 questions
[53] 0 – no response, not applicable; 1 – most positive to 5 – most negative enumerated in 10 questions
[54] 0 – no response, not applicable; 1 – most positive to 5 – most negative

information, which in turn may create inequitable socioeconomic opportunities for the residents in these regions.

4.3.5 Functioning

The MDS collects data on activity limitations (due to both external barriers and health conditions) across 10 domains of functionings[55]. The large majority of respondents have no difficulty in performing the activities enumerated under each domain (Table 4.2 and Table I-7). Reported functional difficulties are highest in the domains of mobility, energy and drive, and seeing and hearing (Figure 4.9). The gendered differences are particularly marked in relation to mobility and pain, where women report much higher difficulty levels than men. Expectedly, the mobility and pain scores increase sizeably as the age group advances (Figure 4.10).

These observations suggest that individuals who likely need mobility-related devices and assistance might be reluctant to use them due to reasons related to affordability, lack of awareness and the fear of stigmatisation. Regional patterns suggest that individuals from the former war-affected provinces, hilly terrains and agricultural regions have higher functional limitations than the others. Thus, poverty may play a role in creating functional problems among respondents.

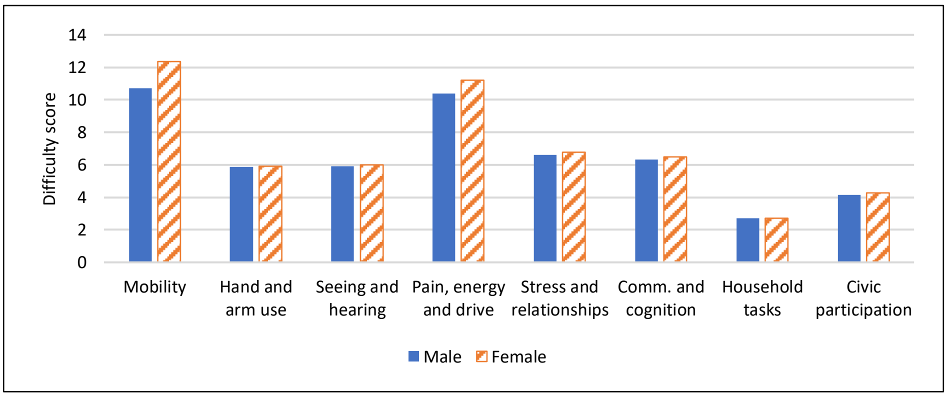
[55] For the purposes of this study, the work and education domains are excluded because they are limited to a subsample of respondents who are either students or are employed.

Table 4.2: Mean functioning score under different domains

	Mean	Robust SE	95% CI		Min	Max	Rescaled mean[56]
Mobility	11.6	0.2	11.1	12.0	5.0	35.0	33.1
Hand and arm use	5.9	0.1	5.7	6.0	4.0	25.0	23.5
Seeing and hearing	5.9	0.1	5.8	6.1	0.0	20.0	29.7
Pain, energy, and drive	10.8	0.2	10.5	11.2	6.0	35.0	30.9
Stress and relationships	6.7	0.1	6.5	6.9	3.0	25.0	26.8
Comm. and cognition	6.4	0.1	6.2	6.6	3.0	25.0	25.6
Household tasks	2.7	0.0	2.6	2.8	0.0	10.0	27.2
Civic participation	4.2	0.1	4.1	4.4	1.0	15.0	28.2

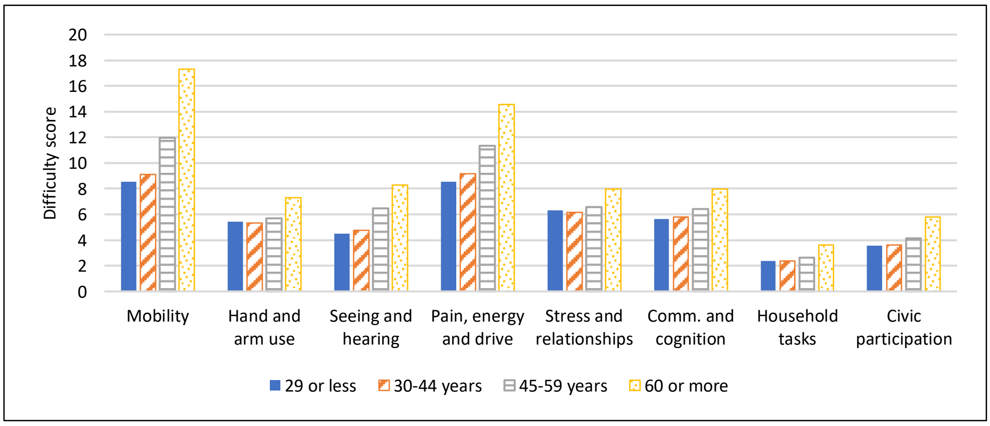
Source: Author estimates based on MDS (2014/15) data, using STATA SE/14

Figure 4.9: Functional score across different domains, by gender



Source: Author estimates based on MDS (2014/15) data, using STATA SE/14

Figure 4.10: Functional score across different domains, by age category



Source: Author estimates based on MDS (2014/15) data, using STATA SE/14

[56] The scores are rescaled to make them comparable.

4.3.6 Health

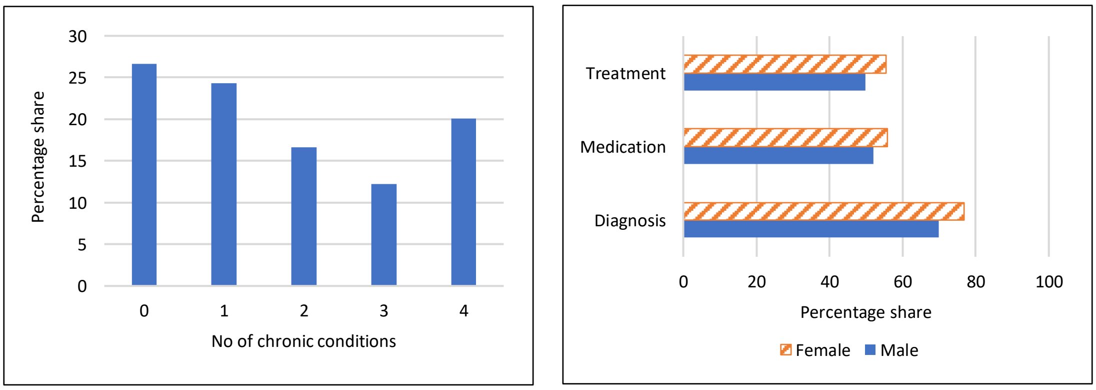
The domain of health focuses on activity limitations owing only to the health problems respondents may have (and not external factors). It collects information on a) one's own perception of health, and b) the presence of medically diagnosed conditions. Close to three fourths of the respondents consider themselves to be in good health, but this share is lesser among women (71 percent) than men (75 percent). Understandably, a sizably lower share of respondents from the oldest age group perceives their health to be good, compared to the overall sample (47 vs 75 percent).

Information on activity limitations due to health conditions shows that the majority of the respondents are not impaired by their health conditions in performing daily activities. The aggregate score of health-induced limitations (range: 17-85[57]) shows that women are slightly, albeit significantly, more likely to report such limitations than men[58] (Table I-8), which explains the greater functional limitations they experience. The score increases as the age group advances, as expected.

Figure 4.11: Presence of chronic conditions and interventions for such conditions

Panel A: Presence

Panel B: Interventions



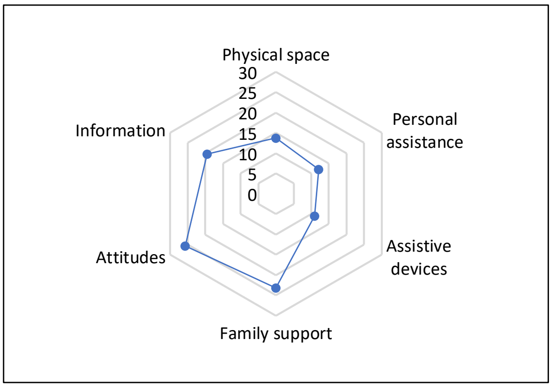
Source: Author estimates based on MDS (2014/15) data, using STATA SE/14

[57] 1 – very good to 5 – very poor for 17 enumerated functions
[58] The mean difference is significant at the 1 percent threshold

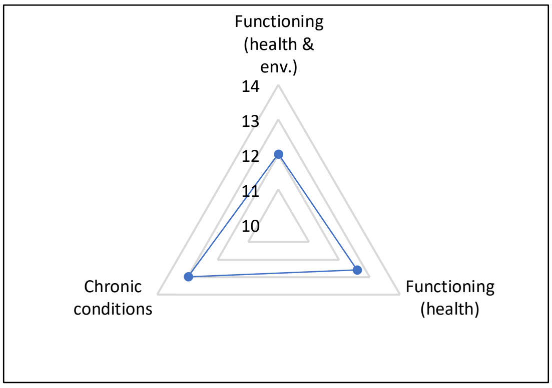
The information on chronic conditions is four-fold; the presence of a given condition, its formal diagnosis, treatment and medication. A little over a fourth of the sample does not have any of the enumerated 29 conditions (Figure 4.11: Panel A). About a fourth has at least one condition, while another 17 percent have at least 2 conditions. About 37 percent of the respondents have three or more chronic conditions. Among those who report having chronic conditions, 73, 53 and 52 percent have received a formal diagnosis, takes medication and has taken treatment, respectively. More women than men have received a formal diagnosis, medication and treatment (Figure 4.11: Panel B)[59]. The aggregate score on chronic conditions (range: 0-116[60]) is quite high for the oldest cohort, as expected (Table I-9).

Figure 4.12: Rescaled scores on disability dimensions

Panel A: Environmental barriers



Panel B: Functionings and health factors



Source: Author estimates based on MDS (2014/15) data, using STATA SE/14

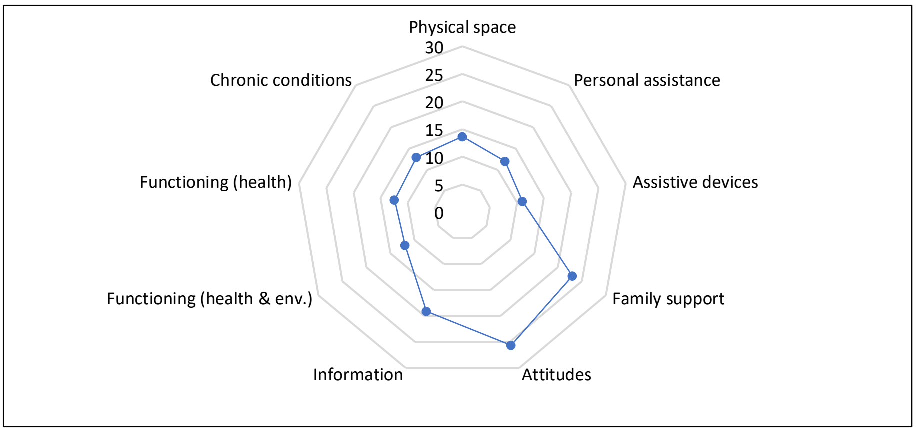
A visual consolidation of the dimensions related to the external environment and one's own health (that constitute the disability experience) are plotted in Figures 4.12 and 4.13, respectively. In the external environment, the soft components seem to have a profound impact on creating a disability experience. The physical environmental

[59] However, not enough information is available to assess whether the lack of treatment is due to affordability issues or if such treatment was not necessary.

[60] 0 (no presence); 1 (presence); 2 (diagnosis); 3(medication); and, 4) treatment for 29 enumerated chronic conditions

barriers are more muted (Figure 4.12: Panel A). Components on one's own health that contribute to disability appear to be fairly equally distributed. (Figure 4.12: Panel B).

Figure 4.13: Rescaled scores on all disability dimensions

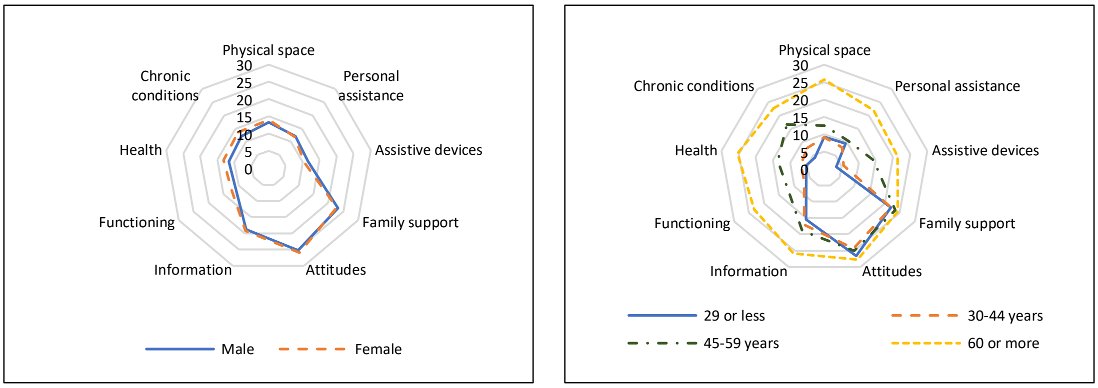


Source: Author estimates based on MDS (2014/15) data, using STATA SE/14

Figure 4.14: Rescaled scores on all disability dimensions by gender and age group

Panel A: By gender

Panel B: By age group



Source: Author estimates based on MDS (2014/15) data, using STATA SE/14

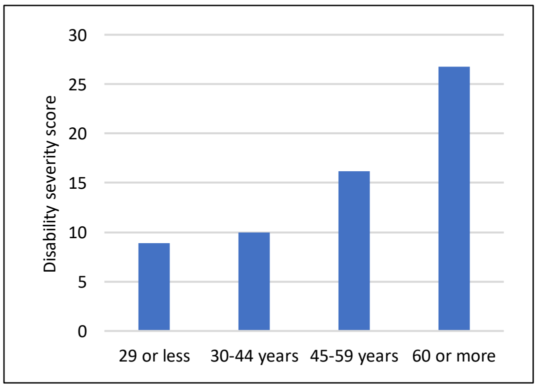
Figure 4.13 brings together all dimensions of disability and highlights the disproportionately larger impact of attitudes and information in shaping the disability experience (Table I-10). The gendered picture shows the most discernible divergences only in the domains of health and chronic conditions (Figure 4.14: Panel A). More women than men tend to have chronic conditions, and tend to be less satisfied with their health than men. The age group-wise (Figure 4.14: Panel B) scores show that, as expected, the oldest cohort scores the worst across all domains compared to the younger groups. Attitudes, family support and information also seem to influence the disability experience of the age 40-49 cohort more than the other factors. The largest contributors towards the disability experience among all groups are in the domains of attitudes and family support. The differences in the scores are not that marked between the youngest two cohorts. Expectedly, the physical environment is the least problematic for the youngest age group (age 20-29) of the four age groups considered. In effect, the scores across the enumerated domains underscore the rather deterministic role that social norms and attitudes play constructing the disability experience.

4.3.7 Disability severity score

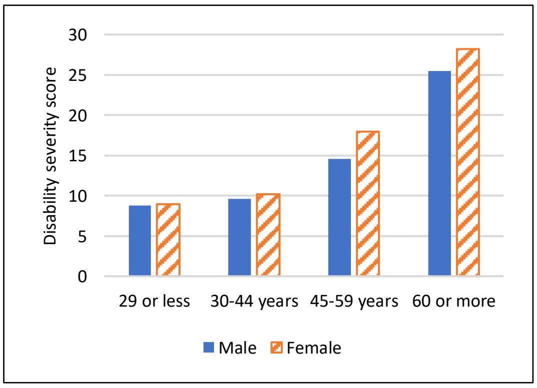
The disability severity score is constructed by summing up the rescaled scores from the domains discussed above – environment (both the physical and soft components), functionings and own health (both perceived and real conditions). While the higher disability severity as the age group advances is to be expected, the gendered nuances are telling (Figure 4.15). Similar to what was observed on HIES data, women are characterised by a higher severity score across all age groups. The difference, however, is particularly higher for the two older cohorts.

Figure 4.15: Disability severity score by age group

Panel A: Overall



Panel B: By gender

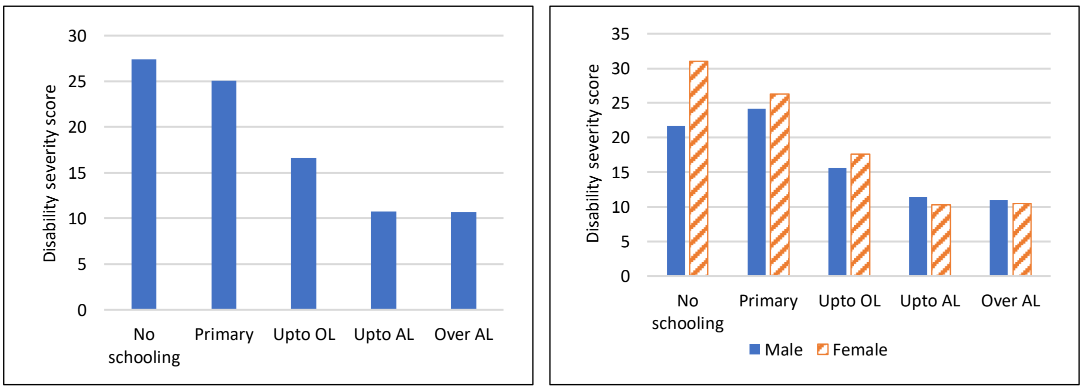


Source: Author estimates based on MDS (2014/15) data, using STATA SE/14

Disability severity by education is particularly high at the lowest educational attainments, but is much lower at the highest educational levels (Figure 4.16). Again, the gendered differences are insightful. At the lower end of education outcomes, women have remarkably higher disability severity scores compared to men. This trend is reversed for higher educational attainments, where severity scores are marginally less for women. Sectoral differences show that the disparities in the severity scores are most pronounced in the oldest cohort in the rural (with estate) sector (Figure 4.17).

Figure 4.16: Disability severity score by education

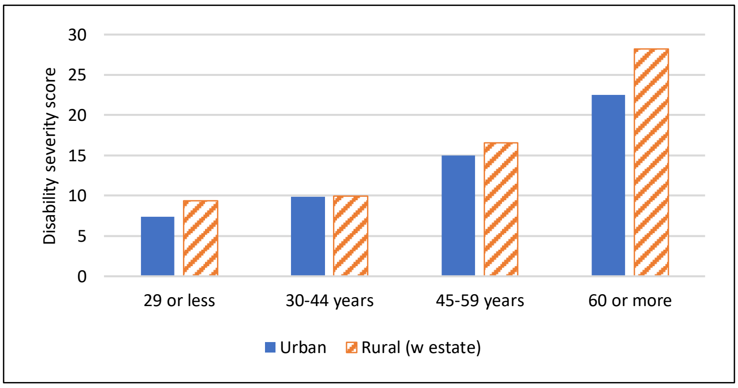
Panel A: Overall Panel B: By gender



Source: Author estimates on MDS (2014/15) data, using STATA SE/14

The disability severity score by marital status is highest among those who are ever married (Figure 4.18). Of course, it is plausible that the older respondents are overrepresented in this cohort which contributes to the higher severity score. Yet, the gendered scores are intriguing. Women’s disability scores are marginally higher in the unmarried and ever married categories, but marginally lower in the married category.

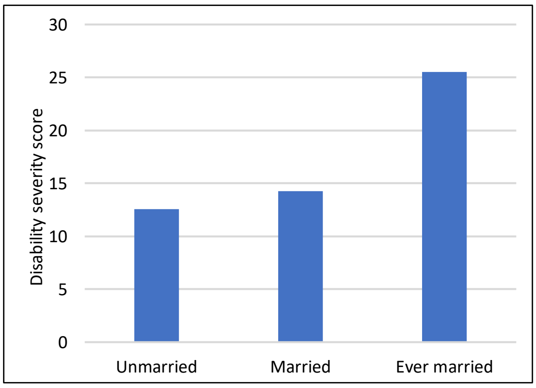
Figure 4.17: Disability severity score by sector of residence



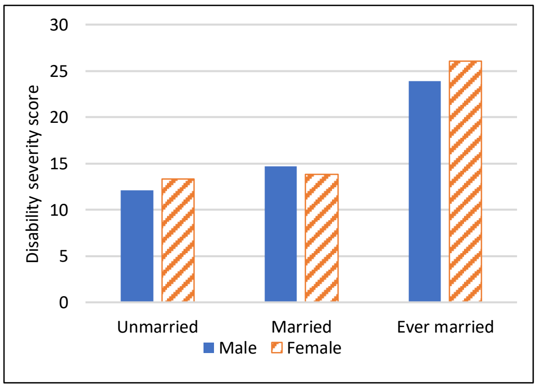
Source: Author estimates based on MDS 2014/15 data, using STATA SE/14

Figure 4.18: Disability severity score by marital status

Panel A: Overall



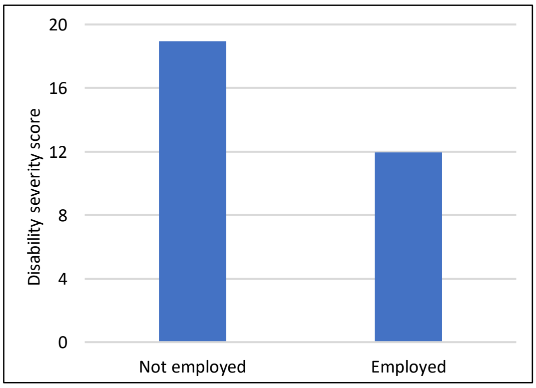
Panel B: By gender



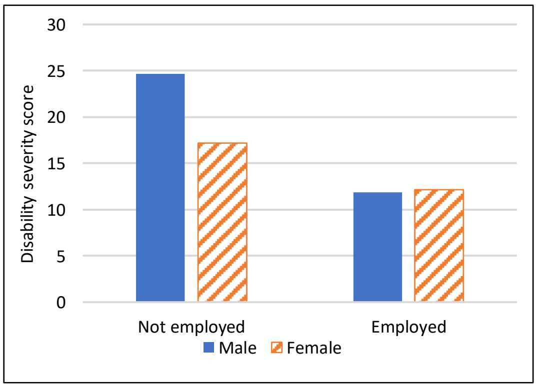
Source: Author estimates based on MDS (2014/15) data, using STATA SE/14

Figure 4.19: Disability severity score by economic participation

Panel A: Overall



Panel B: By gender



Source: Author estimates based on MDS (2014/15) data, using STATA SE/14

The severity scores by economic participation (Figure 4.19) shows a markedly lower severity score among respondents who are gainfully employed. The gendered differences imply that a higher severity score perhaps creates more challenges for men than for women in the labour market as was also observed with HIES data. The district-wise distribution of the overall score shows Ampara, Matale, and Puttlam districts being characterised by higher environmental and individual factors of the disability experience (Figure I-2).

4.4 Summary

This section has attempted to profile PWDs in Sri Lanka from a socio-economic perspective using available data. In doing so, two different types of datasets were used. The first, HIES data, are from a survey that has not been designed to measure disability. But the MDS dataset is from a survey designed specifically to measure disability. Thus, the resultant estimates are incomparable. But some significant insights that emanate from both analyses are summarised below in conclusion.

First, irrespective of which dataset is used to profile PWDs, and how disability is defined (a dichotomous variable in HIES vs. a continuous one in MDS), its prevalence (or intensity, according to the MDS) is found to increase with age, and women with disabilities are overrepresented in the older age cohorts. Secondly, women with lower educational attainments are characterised by a greater prevalence of disability. Finally, disability is more disadvantageous to the LFP of men than women, who anyway have to grapple with the gendered challenges of the labour market, quite apart from the disability-linked difficulties.

However, caution should be exercised in interpreting the HIES-based disability data which not only dichotomises the experience, but also pools together the ideas of disability and chronic conditions although the latter may not necessarily constitute a disability. The MDS analysis on the other hand produces a nuanced analysis by looking at the different constituents that make up the disability experience. The results show that attitudes and social capital play a key role in the overall disability severity score. Moreover, the contribution of physical barriers, attitudes, functionings and health problems is nuanced across gender, age groups and provinces. From a policy perspective, such a disaggregation yields important insights into what can be done within the physical environment, the institutional framework, and within the healthcare system to create greater social inclusion. Overall, the findings of both datasets provide insights into what kind of policy and programmatic support is useful for men and women, the young and the old and across different parts of the country to encourage full participation in society.

Chapter Five: Extra cost of disability among households in Sri Lanka

5.1 Introduction

There are many studies that have attempted to quantify this extra cost of disability using different conceptual approaches, the majority of which are from developed countries. However, over the recent years several studies on this issue have emerged from developing and low-income countries (See for example İpek, 2020; Palmer et al., 2016, 2019)[61]. To the best of my knowledge, no study of this sort has been conducted in Sri Lanka, or in South Asia.

Using data from the HIES (2016) and the MDS (2014/15), this research study attempts to measure the extra cost of disability in Sri Lanka. The study is envisaged to be of use within social protection and welfare policy realms as a quantification of extra costs of disability at the household level is essential information for ensuring welfare for such households. Additionally, it is expected the findings will add to the nascent body of evidence from developing countries on the topic.

The rest of this chapter is organised as follows. Section 5.2 engages in a discussion of the alternative methodological approaches to measuring the extra cost of disability. Section 5.3 lays out the methodology. The construct of the SOL index is discussed through Sections 5.4 to 5.6. SOL is the key outcome variable of interest for all of the empirical work of this thesis. Next, section 5.7 focuses on the construction of the main independent variable of interest i.e., the disability variable. The econometric strategy is

[61] A relatively earlier study that has investigated the extra cost of disability is Braithwaite & Mont (2009).

specified in Section 5.8, followed by a discussion of results (5.9) and the analysis (5.10). Section 5.11 summarises.

5.2 Alternative approaches to measuring the extra cost of disability

There are three main methods used for measuring the extra cost of disability. The most straightforward method is the goods and services approach (GS, also called the comparative approach). It compares the differences in the expenditure incurred by a PWD and a non-PWD who are otherwise comparable, to support his/her day-to-day activities. The information is gathered through in-depth interviews (Mont, 2021; Stapleton et al., 2008). The main advantage of this approach is its objectivity, because it looks at what people actually spend on (Tibble, 2005).

However, the GS approach has several flaws. On the one hand, this method requires people to recall their expenses; unless detailed records are maintained, the information may have problems of accuracy and reliability. Respondents' own biases may genuinely or deliberately cause over or under-statement of expenses (Baldwin, 2015). More importantly, disability experience differs from one individual to another; and therefore, the financial implications of disabilities are unlikely to be comparable across households, or even in the same household over time (Ibid). Furthermore, it is likely that PWDs may engage much less in the activities than non-PWDs do on a regular basis, such as travel, due to additional costs that have to be incurred to perform such activities (Stapleton et al., 2008). This means that if PWDs do not engage in any activity because it might be prohibitively expensive to do so, the extra costs of PWDs for such activities may in fact turn out to be negative.

The second approach is the goods and services required (GSR) approach (also called the direct approach or the subjective-direct approach). In this method, individuals are asked directly about what additional expenses are being incurred or need to be incurred in order for them to perform a given set of activities. An alternative method is to use a panel of experts to make these assessments. While this approach is also methodologically straightforward, the reliability of the subjective information collected this way is questionable, especially where PWDs have to estimate what the potential cost could be if they were to perform a certain task that they are not currently engaged in (Antón et al., 2016).

However, the GSR approach can allow for the income constraint to be tentatively removed because people are questioned on what expenses need to be incurred rather than what is actually incurred, which in turn is subject to household/individual budget constraints. In other words, this subjective-direct approach might be more useful in determining the extra resources required for a PWD to enjoy the same level of opportunities as a non-PWD (Mont, 2021). A major drawback common to both GS and GSR approaches is the high operational cost they entail. The information required calls for extensive interviews which cannot be collected in a typical household survey. As a result, it is difficult to conduct these evaluations periodically, especially with a larger nationally representative sample (Ibid).

The third alternative is the most widely used Standard of Living (SOL) approach (also called the subjective-indirect approach) which estimates the effect of household income and disability on a household's wealth (typically measured by an index of SOL) to determine how much extra income is required for a household to compensate for the presence of PWDs to obtain the same level of SOL as a household without PWDs. The SOL approach is discussed in detail in the next section.

5.3 SOL approach to measuring the extra cost of disability

Zaidi and Burchardt (2005) developed the SOL approach to measure the extra cost of disability in the UK, drawing on the argument of the Capabilities Approach (CA) framework that a household's/person's ability to convert resources to achieved outcomes (functionings) is mediated by conversion factors, one of which is disability. They began with the premise that, for a given level of monetary income, households with PWDs might experience a lower SOL than those without PWDs because such households may have to allocate some of the income to obtain goods and services that are specifically necessitated by their disability situation. Put differently, the SOL approach is built on the premise that two households with similar demographic and socioeconomic attributes would have acquired a given SOL at the same rate, having incurred their expenses, and any difference thereof will be due to disability (Mont, 2021; Mont & Cote, 2020). Thus, the outcome of interest in this framework is the SOL, a proxy for 'functionings' that is empirically elusive. As the SOL itself is an unobserved latent variable, it is proxied by one or several indicators.

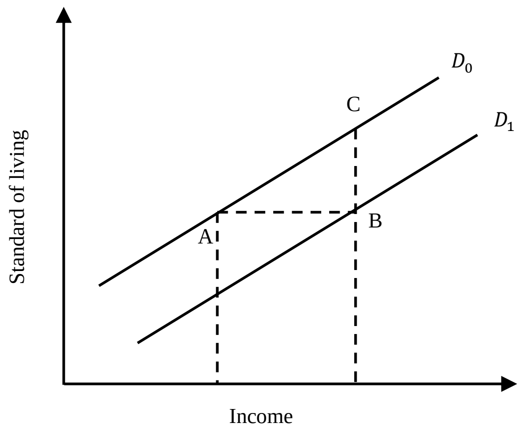
A household's income and SOL are hypothesised to be positively correlated. This assumption holds for both households with and without PWDs (Figure 5.1). However, at a given income level, households with PWDs enjoy a lower SOL than comparable households without PWDs ($C \rightarrow B$). In other words, households with PWDs need more income to achieve the same level of SOL as a household without PWDs ($A \rightarrow B$). In effect, the extra cost of disability is $B - A$. This relationship can be expressed as follows:

$$S = \beta_0 + \beta_1 Y + \beta_2 D + \beta_3 X \qquad 5.1$$

Where S is the SOL, Y is the household income, D is the variable indicating whether a household has PWDs or not and X is a vector of other variables that can influence SOL. The intercept corresponds to the given minimum level of SOL. The extra cost of disability is:

$$E = \Delta Y / \Delta D = -\beta_2 / \beta_1 \qquad 5.2$$

Figure 5.1: The relationship between income, disability and the Standard of Living



Source: Zaidi and Burchardt (2005)

In their own analysis, Zaidi and Burchardt (2005) used three indicators of SOL – whether the household had any savings; an index of consumer durables owned by households, and a subjective assessment of the household's financial situation. The analysis using these three different SOL constructs has shown that households with PWDs incur an extra cost of disability, and that this extra cost is high, especially for PWDs living alone, and that it tends to increase when disability severity is more. The study has also shown that when the extra cost of disability is accounted for, not only do the poverty rates among PWDs becomes much higher compared to non-PWDs, but so does the overall poverty rate in the UK.

This method overcomes the limitations in some of the earlier approaches to measuring the extra cost of disability (Zaidi and Burchardt 2005; Mont 2021). For example, it does not involve subjective judgement about the extra expenditure that is required to implement the GSR method; nor does it ask for detailed information on expenditure that is required for the use of the GS method; and is not arbitrary like the selection of equivalence scales[62]. However, the main appeal of this method has to be that it can be implemented cost-effectively. Only an additional schedule on PWD needs to be included in a usual household survey to gather information required to conduct this analysis. Thus, relevant data can be obtained efficiently and regularly (Mont 2021).

This approach is not without its shortcomings, however. As the SOL indicator is constructed to proxy an unobserved latent variable, the effectiveness of the analysis hinges upon what constituents make up the indicator. Households divert consumption from goods and services that can improve their SOL to disability-related consumption due to income-constraints. As such, the relevance of this methodology depends on the selection of an SOL indicator that is sensitive to this switch in consumption patterns (Zaidi & Burchardt, 2005). Moreover, the estimates of extra cost of disability derived from this method do not include the opportunity costs associated with disability experience such as the loss of own income or income foregone by full-time caregivers. Nor does it, like the GS approach, look at what is needed, but only at what is already accounted for (Mont 2021). Nonetheless, because data can be collected inexpensively, the extra cost of disability measured using the SOL approach can produce estimates for the entire country and can show the nuances by gender, age, region etc. The ensuing

[62] See Zaidi and Burchardt (2005) for a detailed discussion of the weaknesses of the earlier methods used to measure the extra cost of disability.

empirical analysis follows the SOL method to measure the extra cost of disability among households in Sri Lanka.

5.4 Constructing an SOL index: The outcome variable of interest

Information on capabilities and functionings discussed in the CA are typically not available in standard household surveys. In such situations, proxy variables can be identified from available data to implement the analysis. Following Zaidi and Burchardt (2005), the SOL index is identified as the achieved outcome (or functioning). The resources are proxied by household income. The ability to convert resources (household income) to functionings (SOL) depends on several conversion factors (Robeyns, 2005)[63]. The conversion factor of interest in this study is the presence of disability in a household.

Zaidi and Burchardt (2005) who pioneered the application of the SOL method to measure the extra cost of disability (in the UK) constructed an asset ownership index as one variable to represent a household's SOL. The many studies that have followed also use a similar strategy. For example, Asuman et al. (2020), Palmer et al. (2019), Loyalka et al. (2014), Mont and Cuong (2011), İpek (2020), Braithwaite and Mont (2009) and Minh et al. (2015) use a combination of variables on household white goods, earning assets, transport assets, household amenities and the financial situation of the household (such as whether they have savings or not) to construct SOL indices to measure the extra cost of disability in Ghana, Cambodia, China, Bosnia, Turkey and Vietnam (two studies) respectively.

[63] These conversion factors are three-fold – personal (e.g., gender, health condition, age, education), social (e.g., gender norms, attitudes, culture) and environmental (e.g., location, climate change)

As the asset-based SOL index is only a proxy for the broader and more complex idea of 'functionings', analysis is usually conducted on more than one construct of SOL. For example, in addition to the asset index, Zaidi and Burchardt (2005) [See also Zaidi (2004)] used a dichotomous variable on whether a household had savings or not and a subjective assessment of the household situation as alternative proxy indicators of SOL. Another option is to construct the asset index itself using different methodologies. For example, Minh and colleagues (2015) apply both the principal component analysis (PCA) technique and simple count methods to construct two different SOL indices[64]. Similarly, Loyalka et al. (2014) have used three constructs of the SOL index including a polychoric PCA and a count index.

An index measuring SOL comprises of a range of variables covering assets, the structure of the house, amenities available to the household as well as its financial situation. Several factors should be taken into consideration when identifying such index constituents. First, the SOL index should be sensitive to income changes i.e., changes in the availability of resources (Zaidi & Burchardt, 2005). In other words, an index should cover a range of assets that allows for the index to be sensitive to both the top and bottom of the income distribution. This way, the results obtained from the use of the index are not biased towards lower- or higher-income households (Ibid). McKenzie (2003; 2005) argued that it is necessary to include a sufficient number and range of indicators in the index to avoid problems of clumping[65] and truncation[66], which in turn affect the information inferred about the latent variable. Accordingly,

[64] These index-creation methods are discussed further in later sections.

[65] Households are clustered into a small number of groups because there are not enough indicators. In the extreme case, there is one asset and households are divided into two groups of those who own and do not own the asset.

[66] It is difficult to differentiate between different levels of poverty (or financial affluence) because the range of assets is limited.

incorporating more indicators might be useful to cover the full range of the income distribution (McKenzie, 2003, 2005; Vyas & Kumaranayake, 2006; Zaidi & Burchardt, 2005).

Cullinan et al. (2013) used two criteria to select variables to be included in the SOL index. One was to look the variables that were included in the SOL index of previous studies. The other was to measure the property of elasticity. Zaidi and Burchardt (2005) have highlighted as an important criterion for choosing variables for the SOL index. Given that Cullinan and colleague included only 6 variables in the SOL index, checking each individual item's elasticity for changes in income stands to reason. The process would be more cumbersome though if the number of variables were much higher.

Braithwaite & Mont (2009) used a different approach to the selection of index constituents. They chose seven assets that were most commonly owned by households respectively in Bosnia and Vietnam. However, Mont and Cuong (2011) have argued that using an index constructed with the most commonly owned assets may not account for households with a higher level of wealth who can afford to purchase other assets. Accordingly, they expanded the number of assets to 12 in creating the SOL index.

Separately, Minh et al. (2015) test the correlation of 34 households assets and a dummy variable about household savings with disability and income variables and retain 20 variables whose correlations with disability and income are significant at the 5 per cent threshold. More recently, Asuman et al. (2020) submit over 30 asset indicators, and several other variables that capture household amenities to a PCA to construct the SOL index. Thus, the number of variables to be used in the SOL, and the rationale for their inclusion in the index are varied.

A few caveats to be kept in mind are as follows. One is whether the index constituents represent a complete holistic measure of household wellbeing (Booysen et al., 2008). Another is if the dichotomous nature of the variables that generally make up these indices misses the complexity that is associated with a more continuous approach[67] (Wittenberg & Leibbrandt, 2017). A related issue is that an asset-based index draws from a generic list of enumerated assets and amenities and do not capture the qualitative nuances of a given asset (e.g., a wealthier household might own a colour tv with access to cable transmission, while a less well-off household may own a black and white tv) (Prakongsai, 2006). On the other hand, the use of a list of assets that has been determined *a priori* (in for example, a secondary dataset) might not be suited for the intended identification and categorisation purposes if there is no room for context specificity (Das, 2014; Ichoku, 2011). The approach that Zaidi and Burchardt (2005) followed by using several proxy indicators for SOL is a pragmatic strategy to tackle these challenges. Another strategy is to follow different techniques to construct the indices, as discussed further below.

5.4.1 Nuts and bolts of an SOL index

Two important factors to consider when constructing an asset index are 1) which variables are chosen to construct the index and 2) the relative importance of these variables within the index, reflected in the weight assigned to them. Recall that both the HIES and MDS data have schedules of durable assets, details on housing, and the household financial situation. Informed by an extensive literature review, relevant variables are identified to be examined further for the possibility of incorporating them

[67] Such as differentiating between households that have several of an enumerated asset from households that have only one and those with none (e.g., television, radio, mobile phone, computer) instead of merely assigning 1 and 0, respectively, to households with and without these assets

into the index. The SOL, the latent outcome variable, is hypothesised to be associated with and revealed by this index.

The next step is to assign weights to the index constituents, which can be accomplished using several approaches. (See Decancq & Lugo, 2013 for a detailed discussion of different approaches to to index weighting; see also Filmer & Pritchett, 2001). The simplest and the most straightforward method is setting up a count index in which all items are assigned an equal weight. It recognises the limitation that researchers do not have reliable information to assign suitable weights for different components of the index (Decancq & Lugo, 2013)[68]. Yet, it is also naïve to assume that all assets reflect SOL equally (Filmer & Pritchett, 2001).

Data-driven techniques (frequency-based, price-based and statistical weights) generate weights endogenously. To elaborate, an inverse proportion index derives weights based on the frequency distribution of indicators; the lower the frequency with which an indicator is observed in a population, the higher is the weight assigned to it (Deutsch & Silber, 2005; Mack & Lansley, 1985). Conversely, in a normative approach, the weights assigned are based on value judgements (Decancq & Lugo, 2013) [69].

Price-based weighting of index components uses the monetary value of assets to calculates weights (Decancq & Lugo, 2013; Filmer & Pritchett, 2001). Although this is a more realistic approximation of household wealth, the estimation of the monetary value of assets can be a cumbersome exercise because details pertaining to the value of assets at the time of purchase, years of usage, depreciation value etc., are necessary for

[68] Assigning equal or arbitrary weights, or weights based on expert opinion is classified under the normative approach to index weighting by Decancq and Lugo (2013)
[69] Weights assigned equally to all index constituents, or arbitrarily based on value judgements both fall under the normative approach to index weighting

creating such an index. Moreover, large scale surveys might not collect this additional information. Even if they do, the information could suffer from recall or social desirability biases. Due to these reasons, price-based SOL indices are rarely used in empirical studies.

Following the pioneering work of Filmer and Pritchett (2001), the use of statistical procedures to construct asset-based SOL indices has gained popularity. They were the first to apply the PCA technique to construct a wealth index in a study that used data from the 1992-93 National Family Health Survey data from India to explore the relationship between household wealth and children's school enrolments. However, the application of the PCA is best suited for continuous data, and is not ideal when the variables are categorical (Kolenikov & Angeles, 2009). In such situations, Multiple Correspondence Analysis (MCA) and polychoric PCA are better alternatives to the traditional PCA (Ezzrari & Verme, 2012; Kolenikov & Angeles, 2009).

For the purposes of this research study, four types of indices are constructed for both datasets – three of which are data driven (i.e., inverse proportion index, Tetrachoric PCA[70] and MCA). The fourth is the equal weight index. The methodological framework underpinning the index construction (Table II-1), index weights (Table II-2, Table II-3, Table II-4), along with tests of their internal (Table II-5) and external (Table II-6) coherence are presented in Appendix II.

5.5 Defining the disability variable

Many empirical inquiries into disability using secondary datasets (have to) create a definition of disability from the (limited) available data. Some of the commonly used

[70] Tetrachoric PCA is a special case of Polychoric PCA where the observed variables are dichotomous.

definitions include: (i) whether or not a household member has acquired a lifetime impairment (Asuman et al., 2020), (iii) whether or not individuals face limitations on daily life (LDL) and working life (LWL) , (iii) whether or not an individual has medical impairments (Loyalka et al., 2014) (iv) disability severity scores and thresholds determined by the researchers (Mont and Cuong, 2011). How close the definition of disability submitted to the empirical analysis is to the ICF's terminology depends on how well the questions are formulated in the survey instruments. While some surveys have questions on disability that are recommended by the WHO, others have relatively more crude questions.

5.5.1 Constructing the disability variable from HIES data

As mentioned in Chapter 4, the schedule on health in the HIES questionnaire includes a question about self-reported disability: "Do you suffer from Chronic illness/ Disability?"[71]. There are two main problems with this question. First, it does not provide any definition of what constitutes disability. Secondly, both disability and chronic illnesses are pooled together in the question. The relationship between the two variables is complex. Following the ICF definition, disability is any deviation in the body functions or structures that limit a person's activities and participation in life both due to such impairment and its interaction with contextual factors. Thus, a chronic illness that leads to an impairment can result in disability (See for example, Australian Institute of Health and Welfare, 2020; Yokota et al., 2015).

But when a chronic illness can be managed such that it does not interfere with a person's daily activities or participation in life, it does not qualify as an impairment that can lead

[71] See Section 3A in the HIES – 2016 questionnaire. p. 7

to disability. In the sub-sample of individuals that have a disability or chronic illness, 8.7 percent have cardiovascular conditions, 24 percent have high blood pressure, 21 percent have diabetes and 9 percent have asthma. Thus, close to 50 percent of the sub-sample report chronic conditions which may not fit the definition of impairment and/or disability[72], although these conditions might certainly aggravate the risk of acquiring functional disabilities (Elias et al., 2010). But the dichotomous nature of the responses to this question makes it impossible to delineate between conditions that do or do not constitute impairment. Thus, the data collected from this question can be quite misleading and unreliable in gauging both the disability and chronic illness prevalence of the country. The inherent risk of potential over- or under-reporting of health conditions associated with self-reporting also affects the quality of the information emanating from this question. Furthermore, as mentioned earlier, there are also no questions that capture the environmental factors that may interfere with their activity limitations.

Nonetheless, some of the follow up questions in the health schedule provide more insight. In one, the respondent is asked about the duration of the disability/chronic illness, and in another, about whether and for how long the disability/chronic illness has prevented the respondent from engaging in usual activities. These questions are more useful to gauge activity limitation and participation restrictions that contribute to disability. Therefore, to proceed, I apply the ICF conceptualisation of disability to the HIES data to help construct a reasonable definition of disability within the contours of available data (Figure 5.2).

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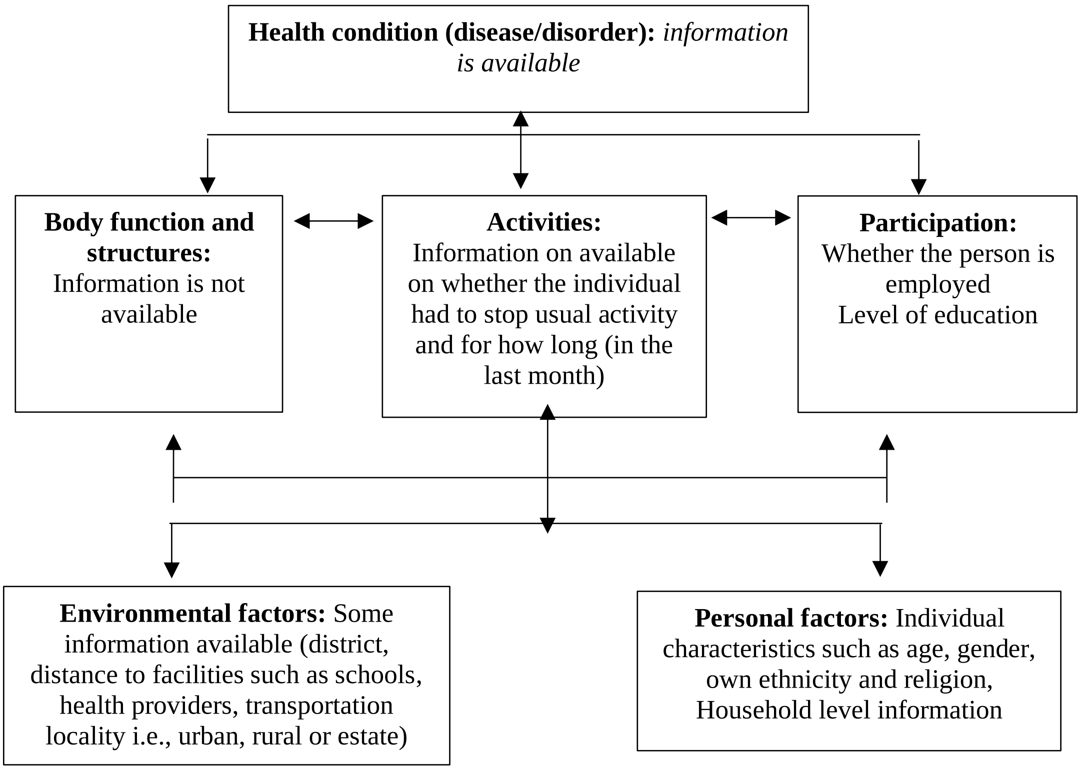
[72] For example, asthma has mild, moderate and severe stages. At its mild stage, asthma does not qualify as a disability because it does not impede a person’s ability to participate in life, and its onset can be controlled by creating a hygienic environment by dusting and vacuuming (Portman, 1994).

Clearly, not enough information is available in the HIES to confidently define disability in line with the holistic ICF concept. However, an idea about impairment can be gathered to some extent from the available information. Some information on participation is available in relation to education, but only for a small sub-sample[73]. Some environmental indicators are available, but there are no data on societal and environmental barriers that exacerbate an impairment into disability (these include data on norms and attitudes, formal and informal institutional structures, cultural beliefs, physical infrastructure). Personal factors such as age, education, ethnicity and religion which ICF does not discuss in detail are available.

Figure 5.2: Application of ICF definition to HIES variables



Source: World Health Organization (2002) p. 9

[73] Schedule 2: School education asks about reasons why a child never attended school or stopped attending school for which one of the responses is disability or illness. But this information is limited only for the 5-20 age group.

The dependent variable capturing disability was constructed in six different ways using available information, and their correlation with the SOL indices were tested. An obvious definition would be whether a household has persons (or the number of persons) with a self-reported disability or chronic illness. However, this definition does not work well, and in fact shows a positive correlation with all four indices (Table II-7). To unpack which of the enumerated disabilities/chronic conditions are likely causing this anomaly, each condition (1=Yes; 0=No) is compared with the 4 SOL indices (Figure II-1[74]). Chronic conditions such as high blood pressure, cardiovascular conditions, and catarrh are in fact associated with higher SOL; conditions that fit the general understanding of disability are associated with lower SOL (namely, natural disability; accidents; psychological disorders); and there are no discernible differences in the SOL in relation to conditions such as migraine, cancer and other disabilities.

These findings are telling. First, they speak to the vices of a naïve assumption that the presence of an impairment amounts to disability, which is a much more complex phenomenon. Secondly, the findings are in favour of the idea that not all types of impairments have the same effect on the household SOL. If a given impairment does not turn into a disability due to activity limitations and/or contextual constraints, such a condition does not necessarily create negative economic implications on the individual and his/her household. While it is outside the scope of investigation within this study, the higher SOL associated with chronic conditions such as cardiovascular conditions and high blood pressure begs the question if such conditions are in some ways the price paid to achieve a higher SOL compared to other households. Finally,

[74] For brevity, only the relationship between the MCA index and different disability/chronic illness conditions are presented although the relationship between all four indices and the different disability/chronic conditions were graphed.

these findings point to the pitfalls of using an oversimplified definition of disability to measure its economic implications on households. Employing such a superficial definition can in fact lead to inaccurate and misleading conclusions, as would have been the case here.

Fortunately, however, the follow up question in the health schedule "Did you have to stop doing your usual activities because of this illness/condition?"[75] is a better-framed question to capture disability. It resonates more than the first question with the ICF's conceptualisation of disability, because this question captures whether a person's impairment interferes with the participation in his/her usual activities. In the limited information available, this question can be thought of as an overarching (and perhaps an oversimplified) question about self-reported difficulties in performing activities of daily living (ADL).

The reasoning followed by Cullinan and colleagues (2008, 2011) in constructing the disability variable for their analysis of the extra cost of disability in Ireland is of great relevance here. With reference to one disability-related question in the Living in Ireland (LII) survey[76], they argued that "...it is not only the presence of a disability that is important in determining costs, but also the extent to which it limits or restricts a person in their day-to-day lives" (Cullinan et al. 2008, p. 11). They reasoned that the question "[A]re you hampered [limited] in your daily activities by this physical or mental health problem, illness or disability?" which measures the disability severity was better aligned with the social model of disability. Many other studies that investigate disability

[75] See Section 3A in the HIES – 2016 questionnaire. p. 7

[76] The question is as follows: "Do you have any chronic physical or mental health problem, illness or disability?" (See Cullinan et al. 2008, p.11)

using available datasets construct similar reasonable definitions of disability (See for example Minh et al., 2015; Morris & Zaidi, 2020; Yokota et al., 2015).

Accordingly, as has been done in such empirical studies, a variable is constructed to capture if a household has at least one member whose usual activity has been affected by any of the enumerated types of disabilities and chronic conditions. In addition to being a more sensible definition of disability than one which merely captures the presence of a disability/chronic condition, this construct of disability also works well with the SOL indices. From this point on, unless otherwise specified, this variable will be used to identify PWDs from HIES data. It is the one of the two main independent variables of interest in relation to the HIES data for the remainder of this research study. The other key independent variable central to measuring the extra cost of disability is household income which is discussed in Section 5.7, along with the control variables.

5.5.2 Constructing the disability variable from MDS data

Expectedly, constructing relevant variables of disability using MDS data is much less tricky. In line with ICF framework, the MDS questionnaire does not presuppose a definitive idea of what disability is. Instead, it attempts to place an individual that is selected from the household at random, in a disability continuum. As a result, the data are amenable to several constructs of disability – as a severity score (both as a continuous variable and a categorical variable), as Basic Daily Activities of Living (BDAL) and Instrumental Daily Activities of Living (IDAL) scales, own health impairments and external environmental barriers etc. For the purposes of the ensuing analysis, the disability variable is constructed in the following different ways:

Table 5.1: Different constructs of the disability variable

Disability variable	Variable construct
Overall disability severity score	A continuous variable
Disability dummy	A dummy variable that takes a value of 1 if severity score is above mean value; 0 otherwise
Disability severity rank	An ordinal variable that is constructed as 4 quantiles using -xtile-command in STATA and 4 groups using equal intervals.
BDAL	An ordinal variable that takes a value of 0 if there are no BDAL limitations 1 if only 1 or 2 limitations and 2 if BDAL between 3 and 7 and 3 if BDAL>7
BDAL disaggregated into different functions	Total sub-score each for mobility, use of hands, self-care, auditory and visual related impairments[77]

Source: Author

5.6 Econometric specification

The outcome variable of interest is the household SOL, which is an unobserved continuous variable, denoted by Y_i^* for the ith household ($i = 1,2, \ldots n$):

$$Y_i^* = \alpha + \beta X_i + \varepsilon_i \tag{5.3}$$

$$Y_i^* = \alpha + \beta D_i + \gamma Z_i + \varepsilon_i \tag{5.4}$$

Specification 5.3 is used to measure the association between SOL and household income, once controlled for household characteristics, including if a household has PWDs or not, and spatial variables. Specification 5.4 is followed to estimate the extra cost of disability. X_i is a vector of non-random explanatory variables for the ith household, and β is the corresponding vector of regression coefficients that are to be estimated (5.3). The dummy variable D_i capturing disability is separated in Equation 5.4, and β is the corresponding coefficient to be estimated (5.4). Z_i is the same vector of non-random explanatory variables, excluding the disability variable, and γ is the corresponding vector of regression coefficients to be estimated. The error term ε_i is

[77] The variables are constructed to take a value of 1 if the enumerated activity is difficult or very difficult for the respondent to perform

assumed to be an unobserved normally distributed random variable with a mean of zero and a variance of σ^2. The coefficient parameters β, γ and ε are estimated with the OLS regression methods. Only a continuous dependent variable can be submitted to an OLS regression. Thus, the regression is performed only on the SOL variable proxied by TPCA, MCA and inverse proportion weight indices.

The OLS measures the mean value of the outcome variable, given a vector of independent variables i.e., $E(Y|X)$ is the conditional mean. Thus, OLS assumes that the association between Y and X remains the same at different levels of the outcome variable, which may not be the case in reality (See Lê Cook & Manning, 2013 for a detailed illustration). Moreover, from a social policy perspective, the more substantive interest is likely to be about observations in the lowest (and highest) ends of a distribution, for which OLS may produce misleading results (Maiti, 2019).

Quantile regression, by relaxing the common slope assumption in OLS, offers greater flexibility to explore the relationship between Y and X, and therefore can produce more insightful results. In quantile regression, $Q_q(Y|X)$ is the expected quantile q given X, with $0 < q < 1$. The quantile $q \in (0,1)$ for Y splits the data into q below and $1 - q$ above: $F(Y_q) = q$ and $Y_q = F^{-1}(q)$. The following equation shows the quantile regression model as specified for the q th quantile:

$$Q_{y_i|x_i}(q) = \alpha_q + \beta_q X_i + \varepsilon_{qi} \qquad 5.5$$

Like OLS minimises $\sum \varepsilon^2$, a quantile regression minimises the sum that gives asymmetric penalties $(1 - q)|\varepsilon|$ for overprediction and $q\ |\varepsilon|$ for underprediction.

In addition to its better characterisation of the data, a quantile regression also has a few other advantages. OLS relies on several assumptions about data which might not be met by real data. Especially, the assumptions about the normal distribution and homoscedasticity of the error term are, at best, met approximately (Howard, 2018). Quantile regression makes no assumptions about the distribution of the error term. As such, a quantile regression is robust even for a non-normal distribution of the error term, which would make an OLS inefficient. Quantile regression is also more robust to outliers, and is invariant to monotonic transformations (such as log) while OLS is not i.e., $E(g(y)) = g(E(y))$. Although, not particularly relevant in this research study, another advantage of quantile regression is that it can be very useful when the data has a bimodal or multimodal distribution. The quantile regression is performed only on the Tetrachoric PCA, MCA and Inverse proportion indices as the dependent variable should be continuous.

As the equal weight index is a discrete variable, it cannot be submitted to an OLS regression. Accordingly, as in Zaidi and Burchardt (2005), an ordered logistic regression is performed on the equal weight index. It is separated into quartiles, and used as the dependent variable that consists of more than two categories that follow a meaningful sequential order (i.e., lowest to highest in the SOL distribution). Following Greene (2012), the ordered logit is set up as described below.

$$Y_i^* = \beta X_i + \varepsilon_i \qquad 5.6$$

X_i is a vector of non-random explanatory variables for the ith household, and β is the corresponding vector of regression coefficients to be estimated. The error term ε_i is assumed to represent the unobserved component of the latent variable and has a logistic distribution with a mean of zero and a variance of $\Omega^2/3$. Y^* is bound to the observed Y_i through the unknown threshold μ_j $\left(\mu_0 = -\infty \, and \, \mu_j = \infty\right)$ which delineates different levels of Y^*:

$$Y_i = 1\ if -\infty \le Y_i^* < \mu_1 \quad 5.7$$

$$Y_i = 2\ if \mu_1 \le Y_i^* < \mu_2 \quad 5.8$$

$$Y_i = 3\ if \mu_2 \le Y_i^* < \mu_3 \quad 5.9$$

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$$Y_i = J - 1\ if \mu_{j-1} \le Y_i^* < u_j \quad 5.10$$

$$Y_i = J\ if\ Y_i^* > u_j \quad 5.11$$

where i $(i = 1,2,3 \ldots n)$ and μ $(\mu_{1,}\mu_2\mu_3 \ldots \mu_j)$ are the threshold values to be measured along with regression parameters β. Accordingly, the predicted probabilities can be expressed as follows:

$$\Pr\ (Y_i = 1|X_i) = \mathrm{F}(\mu_1 - \beta X_i) \quad 5.12$$

$$\Pr\ (Y_i = 2|X_i) = \mathrm{F}(\mu_2 - \beta X_i) - \mathrm{F}(\mu_1 - \beta X_i) \quad 5.13$$

$$\Pr\ (Y_i = 3|X_i) = \mathrm{F}(\mu_3 - \beta X_i) - \mathrm{F}(\mu_2 - \beta X_i) \quad 5.14$$

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$$\Pr\ (Y_i = j - 1|X_i) = \mathrm{F}(\mu_j - \beta X_i) - \mathrm{F}(\mu_{j-1} - \beta X_i) \quad 5.15$$

$$\Pr\ (Y_i = j|X_i) = 1 - \mathrm{F}(\mu_j - \beta X_i) = F(\beta X_i - \mu_j) \quad 5.16$$

where $F(.)$ is the logistic distribution function of the error term ε_i with the mathematical form:

$$F(z) = \frac{e^z}{1 + e^z} \quad 5.17$$

and regression parameters μ and β are estimated by maximum likelihood. As the SOL index is divided into quartiles, such that the households with the lowest SOL falls into the first quartile, Y_i in this analysis will have three threshold points $(4 - 1)$. A district fixed effects model[78] is estimated in both OLS and quantile regressions to help eliminate the risk of producing biased estimates owing to omitted factors that vary across districts, and might affect both disability and household economic well-being (Mont & Cuong, 2011). Controlling for inter-district idiosyncrasies allows an analysis of within-household variations, i.e., an analysis at the household level. The district FE model is specified as

$$Y_i = \beta X_i + \alpha_i + \varepsilon_i \qquad 5.18$$

Where $\alpha_i (i = 1,2,3 \ldots n)$ is the unknown parameter for each district.

In the vector of explanatory variables submitted to the empirical models, the two key variables of interest for this particular analysis are disability and household income. For HIES data, it is defined as the log of disposable household income[79] i.e., the log of household income after deducting housing expenses[80]. Data on housing expenses are not available in the MDS data. Therefore, the total income figure is used in the analysis. The extended model includes control variables grouped under the characteristics of the PWD (only for MDS data), the head of the household, household characteristics, and spatial characteristics (See summary statistics in Table II-8 and Table II-10).

5.7 Results

In both datasets, a preliminary comparison of the key variables – SOL, household income and disability – shows statistically significant evidence in favour of the

[78] Stata command -*areg*- can be used run fixed effects model, with the option -*absorb(varname)*- to control for regional FEs for OLS regression. For quantile regression, this is accomplished by adding dummy variables for all the districts

[79] The log of household income consists of earned and unearned income. As the objective of the study is not to analyse the effects of disability on the earning capacity of households, it is sensible to include both earned and unearned income, including any transfer payments related to disability.

[80] Gross rent, taxes and water bills

hypothesised associations between them i.e., (i) households with PWDs are characterized by lower income (Table 5.2) and SOL (Table 5.3) than those without PWDs; and, (ii) households with more income enjoy higher SOL in general (Table 5.4).

Table 5.2: Average household income among households with and without PWDs

	PWD=0	**PWD=1**	**Δ in income**
Log of household income	10.259	9.919	-0.340***
	(0.013)	(0.032)	
Log of per capita household income	9.018	8.660	-0.357***
	(0.013)	(0.028)	
Log of OECD adult eq. income[81]	5.113	4.748	-0.365***
	(0.013)	(0.034)	

Source: Author estimates based on HIES (2016) data using STATA 14/SE
Notes: N = 20,937; Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. * p<0.10, ** p<0.05, *** p<0.01

Table 5.3: Average SOL index values among households with and without PWDs

	PWD=0	**PWD=1**	**Δ in SOL**
T-PCA	48.698	41.028	(7.670)***
	(0.348)	(0.505)	
MCA	46.832	39.704	(7.129) ***
	(0.323)	(0.466)	
Inv. Prop	36.684	30.021	(6.663) ***
	(0.304)	(0.477)	
Equal Prop	50.071	43.986	(6.085) ***
	(0.278)	(0.456)	

Source: Author estimates based on HIES (2016) data using STATA 14/SE
Notes: N = 21,634; Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. * p<0.10, ** p<0.05, *** p<0.01

Table 5.4: Spearman's Correlation (Rho) between SOL indices and the log of household income

	TPCA	**MCA**	**Inv. Prop**	**Eq. Prop**
Log of household income	0.5499	0.5509	0.5567	0.5520
Prob > | t |	0.0000	0.0000	0.0000	0.0000

Source: Author estimates based on HIES (2016) data using STATA 14/SE

The results of a more formal analysis conducted by way of an OLS regression using different constructs of household income confirms the hypothesised association between income and disability. The extended model (Table 5.5) includes all control

[81] The modified OECD scale is used. It assigns a value of 1 to the household head, of 0.5 to each additional adult member and of 0.3 to each child (Hagenaars et al., 1994)

variables including the district fixed effects (FEs). The models do not correct for endogeneity and therefore, no inference can be drawn about the causal relationship between the outcome variable and the covariates.

The results show that irrespective of which definition of household income is used, holding other variables constant, there is an inverse relationship between household income and the disability variable. Moreover, the disability coefficient is statistically significant at the 1 percent threshold across all 5 model specifications and all definitions of household income. Other things held constant, the presence of disability in households is associated with a little less than 13 percent reduction in the log of household income. This is about 19 percent for the log of per capita household income and as high as 33 percent for per adult equivalent (PAE) household income[82].

Table 5.5: Regression output for different definitions of household income (HIES)

		Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Dep var		β/se	β/se	β/se	β/se	β/se
Log of HH income	Disability	-0.3321***	-0.2075***	-0.1388***	-0.1306***	-0.1258***
		(0.0330)	(0.0290)	(0.0280)	(0.0270)	(0.0270)
Log of per capita HH income	Disability	-0.3538***	-0.2870***	-0.1958***	-0.1890***	-0.1893***
		(0.0290)	(0.0270)	(0.0260)	(0.0250)	(0.0250)
PAE HH income	Disability	-0.3750***	-0.4587***	-0.3125***	-0.3138***	-0.3308***
		(0.0370)	(0.0360)	(0.0360)	(0.0360)	(0.0360)
Control variables	HH vars	NO	YES	YES	YES	YES
	HOH vars	NO	NO	YES	YES	YES
	Sector	NO	NO	NO	YES	YES
	District FEs	NO	NO	NO	NO	YES

Source: Author estimates based on HIES (2016) data using STATA SE/14;
Notes: N=20,896; Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

[82] The regression analysis of PAE household food and non-food expenditure on the same set of explanatory variables also produce insightful results – disability has a significant inverse relationship with food expenditure. Although the association between disability and non-food expenditure is inverse as expected, the disability coefficient is significant and small in magnitude. On the other hand, a given increase in income, holding other variables constant, is associated with a sharper increase in non-food expenditure than food expenditure (See Table II-9)

Table 5.6: OLS regression output for the log of household income (MDS)

Dep var: Log of household income	**Model 1**	**Model 2**
	β (se)	β (se)
Disability severity score[83]	-0.0028***	-0.0020**
	(0.001)	(0.001)
Respondent's characteristics[84]	YES	YES
Characteristics of the HOH	YES	YES
Sector	YES	YES
Constant	YES	YES
District FEs	NO	YES

Source: Author estimates based on MDS (2014/15) data using STATA 14/SE
Notes: N = 3,014; Numbers in parentheses are robust standard errors clustered at Divisional Secretariat (DS) level. * p<0.10, ** p<0.05, *** p<0.01

MDS data-based results also produce similar patterns (Table 5.6)[85]. An increase in the disability severity score by a unit is associated with a 0.28 percent decline in the log of household income without district FEs. The magnitude declines to 0.20 percent when district FEs are accounted for. In both specifications, the coefficients are significant at the 5 percent cut off. These observations justify and prompt an examination of the extra cost of disability among households. The results of this central analysis are presented next. The HIES-based output is presented first. The TPCA, MCA, and inverse proportion indices are submitted to the OLS model (Table 5.7). Given the discrete nature of the equal proportion index, it is submitted to a generalised ordered logit model[86] (Table 5.8).

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[83] Rescaled disability score

[84] The MDS selects a respondent at random from the household roster to collect information on disability. Based on the respondent's own assessment of the ways in which the domains enumerated in the questionnaire affects her/his/their affects their ability to participate in society, the disability severity score will be calculated. Accordingly, all respondents have a severity score. Those with high activity limitations and participation restrictions will have a high score and with lower levels of activity limitation and participation restrictions will have a lower score.

[85] The inverse association between disability severity score and household income was preserved but turned out to be negligible and statistically insignificant in relation to the OECD-modified PAE income. The association was found to be positive but miniscule and insignificant in relation to the log of per capita household income. Results are not presented for brevity.

[86] A Brant test is performed on the ordered logistic regression output to check if the model violates its parallel lines assumption. However, weights are not supported by the Brant test. As a result the Generalised Ordered Logistic Model is used in the analysis using the user-written STATA command *gologit2* (See Williams, 2006). An ordered logistic model on the extended econometric specification

5.7.1 Extra cost of disability: OLS and Generalised Ordered Logistic Regression

The disability coefficients have turned out to be negative consistently across all four indices, in line with expectations (Table 5.7 and Table 5.8). However, there are differences in their statistical significance across different model specifications. In the TPCA and MCA-index based models, the disability coefficient is robust to the introduction of additional control variables, and retains its significance at the 1 percent threshold in the extended model, and when district FEs are removed. In the inverse proportionate index-based model, the disability coefficient turns out to be significant only at the 10 percent threshold once control variables for the HOH characteristics and spatial variables are added. The coefficient ceases to be significant when the district FEs are absorbed. A similar pattern is observed in the disability coefficient in the equal-proportion index-based model. The log of household income, the other main independent variable of interest is positive, and significant at the critical 1 percent threshold across all model specifications.

Overall, the regression results are in line with the existing empirical evidence and corroborates the idea that households with PWDs in fact tend to experience a lower SOL than those without. The extra cost of disability is measured as $dY/dD = -\beta_2/\beta_1$ (Equation 5.2) using the coefficient estimates for the disability and income variables (Table 5.9). The estimated extra cost of based on TPCA and MCA indices are fairly sizeable. The extra cost of disability based on the inverse proportion index is remarkably less. The equal-weight index-based results show that the extra cost of disability is highest for households in the upper SOL quantiles and is lower among the

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was run without sample weights. But the Brant test showed that the model violates the parallel lines assumption.

bottom SOL quantiles. Observe that across all model specifications, the removal of district FEs leads to a drop in the extra cost of disability. The decline is less pronounced for inverse proportion and equal weight indices, but recall that the disability coefficient of both these regression outputs turned out to be insignificant once district FEs were accounted for.

Table 5.7: OLS regression analysis output of household SOL

	OLS			District FE		
	TPCA	MCA	Inv Prop	TPCA	MCA	Inv Prop
	β/se	β/se	β/se	β/se	β/se	β/se
At least one member in the household stopped activity due to disability	-2.1260***	-1.9521***	-1.0298*	-1.8387***	-1.6701***	-0.8954
	(0.5770)	(0.5280)	(0.5710)	(0.5650)	(0.5180)	(0.5670)
Log of household income	6.1000***	5.7073***	6.1111***	5.7333***	5.3705***	5.8129***
	(0.1380)	(0.1300)	(0.1380)	(0.1350)	(0.1270)	(0.1370)
Household characteristics	YES	YES	YES	YES	YES	YES
Characteristics of the head of the household	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES
District fixed effects	NO	NO	NO	YES	YES	YES
Constant	YES	YES	YES	YES	YES	YES
R-squared	0.4804	0.4863	0.4330	0.5015	0.5068	0.4480
F	781.6338	735.7262	654.7056	499.1872	483.8410	465.6499
p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AIC	170754	167497	171409	169888	166647	170847
BIC	170945	167688	171599	170079	166838	171038

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: N= 20,896; Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Table 5.8: Generalized ordered logistic analysis output of household SOL measured by the equal proportions index

	Model 1A	Model 1B	Model 2A	Model 2B	Model 3A	Model 3B
	β/se	β/se	β/se	β/se	β/se	β/se
At least one member in the household stopped activity due to disability	-0.1414*	-0.1414*	-0.1414*	-0.1326	-0.1326	-0.1326
	-0.081	-0.081	-0.081	-0.081	-0.081	-0.081
Log of household income	0.6823***	0.8054***	0.8938***	0.6621***	0.7783***	0.8638***

	-0.025	-0.029	-0.037	-0.025	-0.029	-0.037
Household characteristics	YES	YES	YES	YES	YES	YES
Characteristics of the head of the household	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES
District fixed effects	NO	NO	NO	YES	YES	YES
Constant	YES	YES	YES	YES	YES	YES
chi2			8997.995			11533.81
p			0.0000			0.0000

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: N = 20,896; Group 4 (featuring the lowest SOL quantile based on the equal proportion index) is the reference category The final models do not violate the parallel lines assumption. All variables for which the parallel lines assumption is imposed carry the same coefficient. Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. Models 1B, 2B and 3B are district fixed effects models. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Table 5.9: Extra cost of disability as measured by the four SOL indices

	T-PCA	**MCA**	**Inv. Prop**	**Eq. Prop – 1**	**Eq. Prop – 2**	**Eq. Prop – 3**
Extra cost of disability (%)	*34.9*	*34.2*	*16.9*	*20.7*	*17.6*	*15.8*
Extra cost of disability - with district FE (%)	*32.1*	*31.1*	*15.4*	*20.0*	*17.0*	*15.4*

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: N= 20,896; Equal prop - Group 4 is the reference category (poorest quantile in terms of SOL)

Similar observations can be drawn from the MDS-based analysis. Irrespective of which construct of SOL is used, the index is associated positively with household income, and inversely with the disability severity score (Table 5.10). The coefficients of both variables are significant at the stringent 1 percent cut off even when controlled for district FEs. Note, however, that the magnitude of the disability coefficient is reduced by close to a third when the district FEs are removed. In contrast, the size of the income coefficient does not decline when district FEs are absorbed. As a result, the estimated extra cost of disability is about a quarter less with district FEs, for MCA and TPCA based SOL indices. The reduction is much smaller when SOL is measured by the inverse proportion index[87].

As mentioned earlier, the design of the MDS questionnaire lends its data to different constructs of the disability variable (Table 5.1) An application of these different constructs to the regression analysis produces a nuanced picture of the household extra cost of disability (Table 5.11)[88]. First, however, observe the consistencies across all model specifications. The household income is positively related to SOL in all models, and the coefficients are significant at the critical 1 percent cut off. The significance level is robust to the removal of district FEs. The magnitude of the income coefficient is also by and large similar across all specifications, and is slightly less when district FEs are accounted for. Thus, the differences in the estimated extra cost of disability are predominantly stemming from the differences in the association of the various constructs of the disability variable with household SOL.

[87] Since the equal proportion index is discrete, it cannot be submitted to a linear regression analysis. Instead, as before, a generalised ordered regression model was run with the equal index as the outcome variable of interest. However, the execution of the command with the disability severity score proved to be extremely time consuming, and was abandoned.

[88] Only the results of the model that uses MCA-based SOL as the dependent variable are presented and discussed for brevity. The MCA-based index was chosen because its regression output produced the lowest AIC and BIC.

Table 5.10: Regression output with household SOL as the dependent variable and disability severity score as disability variable

Dep var: Household SOL	MCA-index		TPCA index		Inv Prop index	
	Model 1	Model 1 FE	Model 2	Model 2 FE	Model 3	Model 3 FE
	$\beta\ (se)$	$\beta\ (se)$	$\beta\ (se)$	$\beta\ (se)$	$\beta\ (se)$	$\beta\ (se)$
Log of household income	12.9159***	11.3849***	13.1745***	11.5919***	11.0278***	9.8651***
	(1.089)	(0.904)	(1.113)	(0.918)	(0.937)	(0.855)
Disability severity score	-0.1546***	-0.0997***	-0.1588***	-0.1026***	-0.1307***	-0.0966***
	(0.026)	(0.024)	(0.027)	(0.025)	(0.024)	(0.022)
Respondent's characteristics	YES	YES	YES	YES	YES	YES
Characteristics of the HOH	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES	YES
District FEs	NO	YES	NO	YES	NO	YES
Extra cost of disability (%)	*1.20*	*0.88*	*1.21*	*0.89*	*1.19*	*0.98*

Source: Author estimates based on MDS (2014/15) data using STATA SE/14
Notes: N = 3,014; Numbers in parentheses are robust standard errors clustered at DS level. * $p<0.10$, ** $p<0.05$, *** $p<0.01$. Sampling weights applied. Significance level denoted by * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table 5.11: Regression output with SOL (MCA based) as the dependent variable and alternative constructs of disability variable

Dep var: Household SOL	**Model 1**	**Model 1 FE**	**Model 2**	**Model 2 FE**	**Model 3**	**Model 3 FE**	**Model 4**	**Model 4 FE**	**Model 5**	**Model 5 FE**
	$\beta\ (se)$	$\beta\ (se)$	$\beta\ (se)$	$\beta\ (se)$	$\beta\ (se)$	$\beta\ (se)$	$\beta\ (se)$	$\beta\ (se)$	$\beta\ (se)$	$\beta\ (se)$
Log of HH income	13.3113***	11.6091***	13.2951***	11.6333***	13.3553***	11.6506***	13.3726***	11.5387***	13.3079***	11.5506***
	(1.149)	(0.877)	(1.163)	(0.906)	(1.173)	(0.906)	(1.162)	(0.862)	(1.163)	(0.860)
Disability dummy var	-3.0324***	-0.9083								
	(0.845)	(0.682)								
Severity score quantile (Ref: 1)										
2			0.6036	1.1244						
			(0.889)	(0.932)						
3			-2.6825**	-0.6588						
			(1.027)	(0.879)						
4			-5.3600***	-2.8500**						
			(1.102)	(1.078)						

Disability severity rank (Ref: 1)										
2					0.4524	1.5453				
					(1.389)	(1.290)				
3					-0.5388	1.4287				
					(1.309)	(1.160)				
4					-4.3620***	-1.0892				
					(1.524)	(1.345)				
BDAL							-0.3888**	-0.4362**		
							(0.182)	(0.166)		
BDAL (Ref: 0)									-2.1707**	-2.1331**
1									(0.993)	(0.916)
									-3.5692**	-3.5435**
2									(1.427)	(1.390)
									-2.7592	-3.8364*
3									(2.148)	(2.064)
Respondent's characteristics	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Characteristics of the HOH	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
District FEs	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
r2	0.4236	0.4739	0.4281	0.4757	0.4250	0.4747	0.4212	0.4750	0.4202	0.4748
F	123.76	96.60	111.44	91.70	115.42	84.67	119.99	93.21	105.79	92.99
p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	3377	3377	3234	3234	3234	3234	3377	3377	3294	3294
AIC	28942	28634	27691	27410	27709	27417	28957	28627	28261	27935
BIC	29059	28751	27819	27538	27837	27544	29073	28744	28389	28063

Source: Author estimates based on MDS (2014/15) data using STATA SE/14
Notes: Numbers in parentheses are robust standard errors clustered at DS level. * p<0.10, ** p<0.05, *** p<0.01. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Table 5.12: Estimated extra cost of disability using different constructs of the disability variable from OLS regression

%	**Without district FE**	**With district FE**
Severity score	*1.2*	*0.9*
Dummy variable	*22.8*	*7.8*
Disability quantile (Ref: 1st quantile)		
2	*- 4.5*	*- 9.7*
3	*20.2*	*5.7*
4	*40.3*	*24.5*
Disability rank (Ref: 1)		
2	*- 3.4*	*-13.3*
3	*4.0*	*-12.3*
4	*32.7*	*9.3*
BDAL	*2.9*	*3.8*
BDAL rank (Ref: 0)		
1	*16.3*	*18.5*
2	*26.8*	*30.7*
3	*20.7*	*33.2*

Source: Author estimates based on MDS (2014/15) data using STATA SE/14

The dichotomised disability variable is inversely related to SOL, as expected. Its coefficient is significant at the critical 1 per cent cut off, but declines in magnitude and loses its significance once district FEs are removed, although the direction of associator with SOL is preserved. The output based on the endogenously-determined quantiles of disability (reference: 1st quantile) produces some intriguing results. Falling into the 2nd quantile (compared to the 1st) is associated positively with household income both with and without district FEs. Falling into the 3rd or 4th quantile turns out to be inversely related to SOL, but fails to retain statistical significance once the district FEs are absorbed. Observe that it is only at the highest quantile of disability, that its association with SOL is significantly, robustly and sizeably negative. Next, the manually-ordered severity rank produces coefficients that follow a similar pattern as discussed above, but the results are by and large insignificant. Only the disability coefficient pertaining to the highest severity rank has turned out to be significant. Although the direction of association is preserved, it is no longer statistically significant when district FEs are accounted for.

The next two constructs of disability (Models 4 and 5) are based on BDALs. The first is the number of BDALs. The second is an ordinal ranking given the number of BDALs experienced by the respondents. By and large, the disability coefficients of both models are in line with expectations. The relationship is inverse with SOL, and the majority of the coefficients are significant at the 5 percent threshold. The ranked BDALs show that once district FEs are removed, the magnitude of the disability coefficient increases monotonically as the rank goes up, in line with intuition. The estimated extra cost of disability figures based on these results are presented in Table 5.12, and range from an extra ‘benefit’ of 9.7 percent to an extra cost of 33.2 percent, with district FEs.

The analysis is, by and large, in consonance with the findings observed earlier with HIES data. However, the counterintuitive positive association observed between some constructs of the disability variable and SOL (although insignificant), and the resultant extra ‘benefit’ of disability underscores the importance of the role definitions and thresholds play in this type of inquiry. The results suggest that at the higher end of the severity spectrum, a person’s impairment tends to be associated with a lower SOL, while the reverse is true at the lower end of the spectrum. This highlights the possible downsides of oversimplifying the conceptualisation of disability as the mere presence of a medical or chronic condition (Recall that in the HIES analysis, the presence of a disability/chronic condition was in fact associated positively with SOL, and it was only if such chronic condition stopped one’s usual activity that the hypothesised inverse association between disability and SOL was upheld).

The varying directions and degrees of association between different disability constructs and household SOL also point to the heterogeneity of the economic effects of disability on a household's SOL. The results might be stretched to allude to the complexity of disability as a human experience, as well. Finally, it is clear that while a comprehensive framework to unpack disability is critically important from a broader inclusion perspective such as accessible physical infrastructure, transport, information and institutions including norms and attitudes, a tighter definition of disability is necessary to inform disability social protection measures to encourage effective targeting and adequate support for PWDs and their households.

5.7.2 Quantile regression

The preceding analysis, based on the OLS regression, estimates the household extra cost of disability at the mean. But, how do these estimates vary at different points of the distribution of the household SOL, other than the mean? A quantile regression is performed next to probe into this question. As earlier, HIES-based results are presented and discussed first. Note that only the SOL indices with continuous values are submitted to the quantile regression.[89] Only the TPCA (Table 5.13) and MCA-based (Table 5.14) results are discussed, as the disability coefficient of the inverse proportion index-based regression output have turned out insignificant across all quantiles.

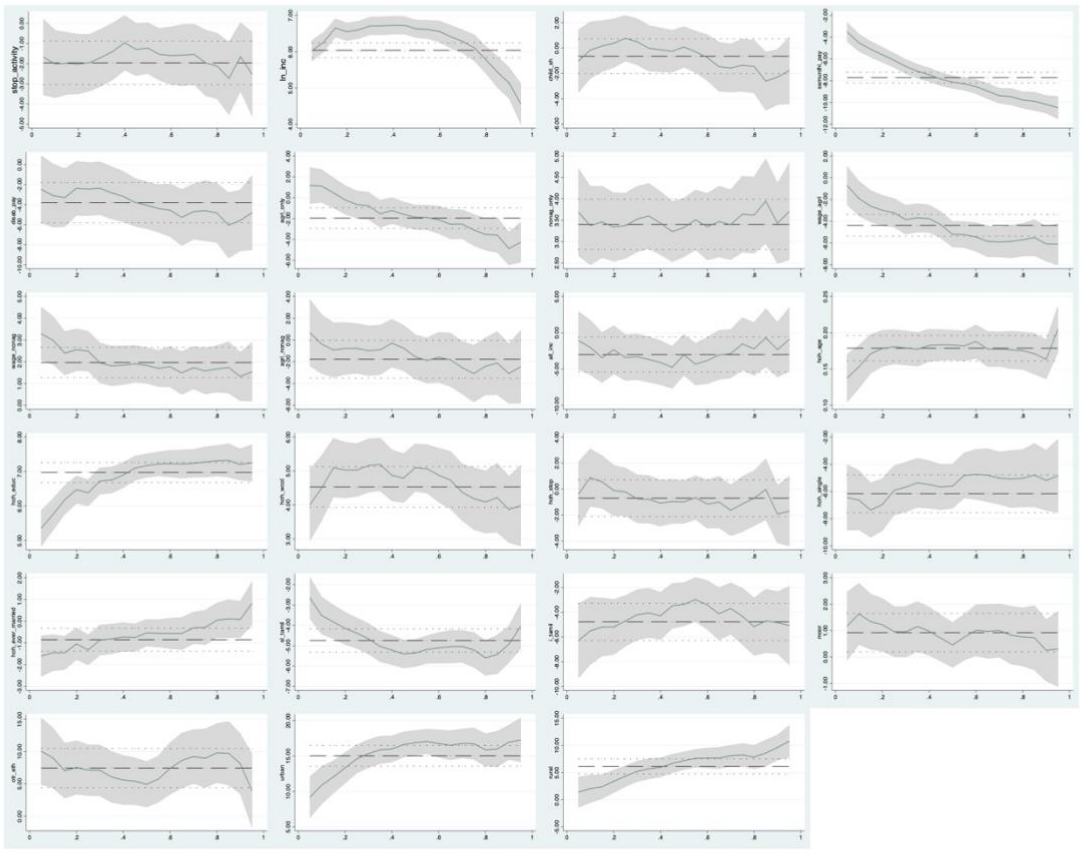
Figure 5.3 and Figure 5.4 present the bivariate scatterplots of the TPCA-based regression output with and without district FEs, respectively[90]. Each sub-graph presents each of the independent variables used in the models. The intercept is not graphed. The

[89] There is a user written program that allows for the running of logistic quantile regression in Stata for variables with bounded outcomes, as is the case with the equal proportion index (See Orsini & Bottai, 2011 for more details). However, this command does not support survey data.

[90] The scatterplots from the MCA-based regression output produce similar results, but have not been presented, for brevity

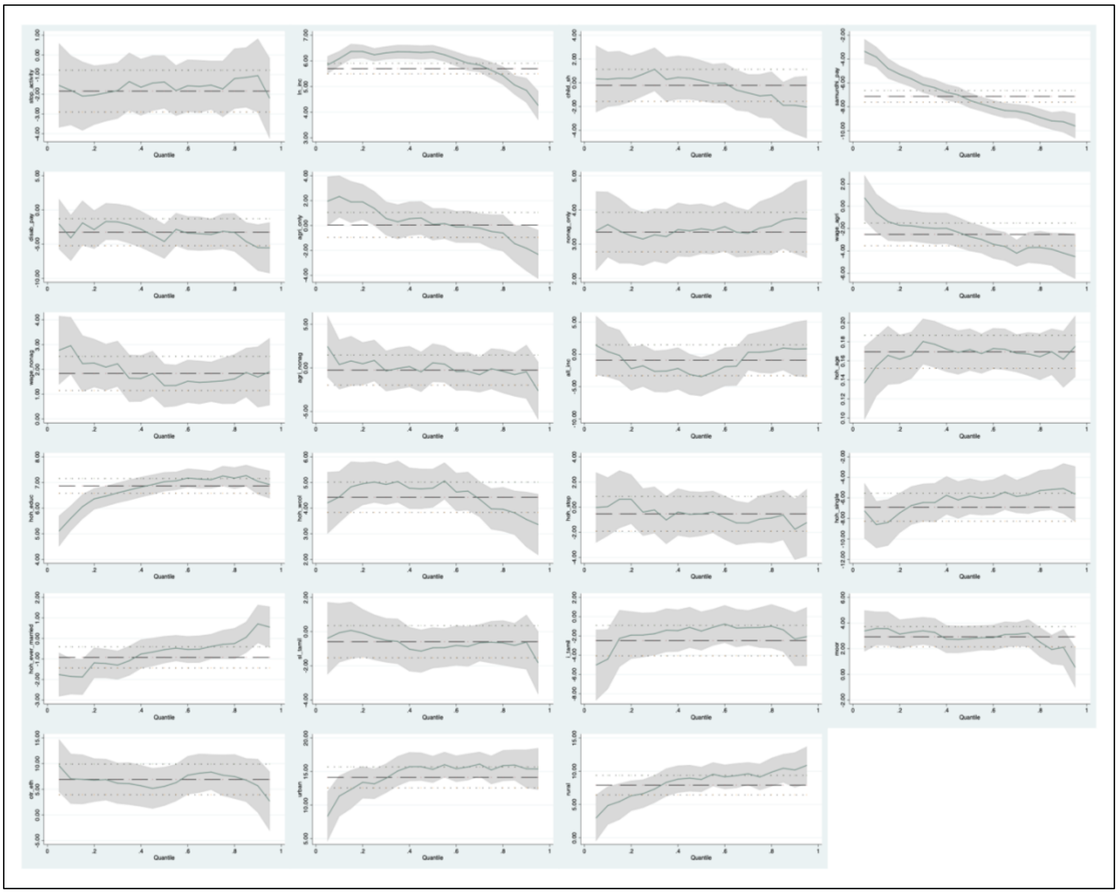
X- and Y-axes show the quantiles of the distribution of the SOL and the estimated parameter coefficients β of the independent variables, respectively. The solid line connects these estimated β values, and the grey area represents their 95 percent confidence interval. The long dash horizontal line is the corresponding OLS estimator coefficient, while the dotted lines show its 95 percent confidence interval.

Figure 5.3: Scatterplots from quantile regression output (no district FEs) – TPCA



Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: Y-axis represents the quantiles (0.2 to 1.0) across all scatterplots. The Y-axis labels correspond to the independent variables in the regression model and are as follows.
Row 1 (left to right) – stopped activity, log of household income, share of children, receives *Samurdhi*
Row 2 (left to right) – receives disability pay, agri. income only, non ag. income only, wage and agri. income only
Row 3 (left to right) –wage and non-ag. income only, agri. and non-ag. income only, all income, HOH age
Row 4 (left to right) – HOH education, HOH white collar job, HOH stopped activity, HOH single
Row 5 (left to right) – HOH ever married, SL Tamil, Indian Tamil, Moor
Row 6 (left to right) – Other ethnicity, urban, rural

Figure 5.4: Scatterplots from quantile regression output (district FEs) – T-PCA



Source: Author estimates based on HIES (2016) data using STATA SE/14
Note: Y-axis represents the quantiles (0.2 to 1.0) all the scatterplots. The Y-axis labels correspond to the independent variables in the regression model and follow the same order as Figure 5.3 above.

It is clear that the quantile regression estimators for many covariates tend to deviate significantly from the corresponding OLS parameter estimates. Of the two independent variables of interest, the log of household income especially shows marked deviation from the OLS parameter coefficient across different quantiles. This observation supports the expansion of analysis outside the mean.

The TPCA-based regression shows that the parameter coefficient for disability retains its statistical significance at some level across all specified quantiles (Table 5.13)[91]. The coefficients are robust to the removal of district FEs. The income coefficient is robustly

[91] See summary statistics inTable II-10: Summary statistics of the independent variables submitted to the econometric analysis (MDS) Table II-10

positive at the critical 1 percent across all quantiles, in both model specifications. In the MCA-based regression, the disability coefficient is significant only at the 10 percent threshold at the median, without district FEs (Table 5.14). But when district FEs are introduced, the coefficient becomes significant at the 5 percent threshold. Here too, the income variable is significant at the critical 1 percent cut off across both model specifications.

Table 5.13: Quantile regression output for T-PCA-based SOL index

Quantile	**20**	**40**	**50**	**60**	**80**
	β/se	β/se	β/se	β/se	β/se
At least one member in the HH stopped activity due to disability	-2.3761***	-1.1796*	-1.3017*	-1.7706***	-2.4547***
	(0.7360)	(0.6840)	(0.7060)	(0.6830)	(0.6110)
Log of HH income	6.7491***	6.9024***	6.7745***	6.6430***	5.8129***
	(0.1390)	(0.1320)	(0.1460)	(0.1460)	(0.1770)
HH characteristics	YES	YES	YES	YES	YES
Characteristics of the HOH	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES
District FEs	NO	NO	NO	NO	NO
Constant	YES	YES	YES	YES	YES
At least one member in the HH stopped activity due to disability	-2.2179***	-1.5466***	-1.2646**	-1.4925**	-1.5032**
	(0.6700)	(0.5600)	(0.5610)	(0.7360)	(0.6140)
Log of HH income	6.4642***	6.4242***	6.3922***	6.1381***	5.4095***
	(0.1300)	(0.1350)	(0.1280)	(0.1480)	(0.1720)
HH characteristics	YES	YES	YES	YES	YES
Characteristics of the HOH	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES
District FEs	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES
Extra cost of disability (%)	*35.2*	*17.1*	*19.2*	*26.7*	*42.2*
Extra cost of disability: with district FE (%)	*34.3*	*24.1*	*19.8*	*24.3*	*27.8*

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: N = 20,968; Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Table 5.14: Quantile regression output for MCA-based SOL index

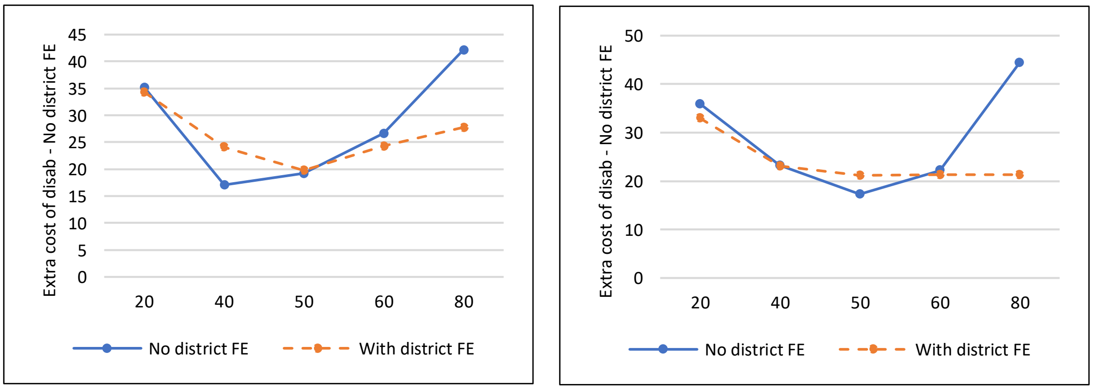
Quantile	**20**	**40**	**50**	**60**	**80**
	β/se	β/se	β/se	β/se	β/se
At least one member in the HH stopped activity due to disability	-2.2132***	-1.4559***	-1.0789*	-1.3581**	-2.4320***
	(0.7480)	(0.5120)	(0.6290)	(0.5610)	(0.6470)
Log of HH income	6.1736***	6.2743***	6.2380***	6.1259***	5.4725***
	(0.1220)	(0.1170)	(0.1290)	(0.1320)	(0.1600)
HH characteristics	YES	YES	YES	YES	YES
Characteristics of the HOH	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES
District FEs	NO	NO	NO	NO	NO
Constant	YES	YES	YES	YES	YES
At least one member in the HH stopped activity due to disability	-1.9411***	-1.3509***	-1.2444**	-1.1931*	-1.0865**
	(0.6330)	(0.4940)	(0.6010)	(0.6570)	(0.5330)
Log of HH income	5.8929***	5.8531***	5.8775***	5.6141***	5.1052***
	(0.1280)	(0.1230)	(0.1270)	(0.1390)	(0.1590)
HH characteristics	YES	YES	YES	YES	YES
Characteristics of the HOH	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES
District FEs	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES
Extra cost of disability (%)	*35.8*	*23.2*	*17.3*	*22.2*	*44.4*
Extra cost of disability: with district FE (%)	*32.9*	*23.1*	*21.2*	*21.3*	*21.3*

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: N = 20,968; Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Figure 5.5: Extra cost of disability measured by T-PCA and MCA-index based regression analyses

Panel A: TPCA

Panel B: MCA



Source: Author estimates based on HIES (2016) data using STATA SE/14

The differences in the sizes of coefficients of the disability and income variables warrant a closer look at them. Note that in both models without district FEs, the disability coefficient follows an inverted U-shape across the SOL quantiles. In effect, the disability coefficient is quite large at the lowest and highest ends of the SOL distribution when district FEs are not considered. But, when they are controlled for, there is a gradual drop in the disability coefficient from the lowest to the highest SOL quantile. Thus, the magnitude of the disability coefficient seems to be fairly robust to district level heterogeneities for households at the lower end of the SOL distribution. The disability coefficient estimated in the district FE model is lower for upper quantiles in both TPCA and MCA-based models. Finally, the magnitude of the income coefficient tends to decline beyond the median of the SOL distribution. Moreover, its magnitude declines marginally when district FEs are introduced and this holds for all quantiles in both model specifications.

The estimated extra cost of disability (Equation 5.2) is presented in the last two rows of Table 5.13 and Table 5.14, and graphed in Figure 5.5. The estimates are insightful. First, a U-shape can be traced from the lowest to the highest quantiles for both sets of estimates, based on T-PCA and MCA indices, respectively. The U-shape, however, is more pronounced in the MCA-based estimates. The left-hand side of this U-shape is, by and large, preserved when the district FEs are introduced, but the right-hand side becomes flatter. Thus, when the district FEs are not accounted for, the extra cost of disability is typically higher at the lowest and highest quantiles, compared to those in between. However, when the district FEs are accounted for, the extra cost of disability declines substantially for households in the highest quantile, but not so much for households in the lower quantiles. Overall, the extra cost of disability declines for households in the upper quantiles when the district FEs are removed.

The MDS-based quantile regression results are presented in Table 5.15. Only four constructs of disability were submitted into the analysis, for brevity: severity score, disability dummy variable, the quantiles of disability score and BDAL ranks. The points considered in the SOL distribution are the median, 25th and 75th percentiles. The effect of household income on SOL is consistently and significantly positive, in line with expectations. Moreover, the magnitude of the effect is by and large similar across the SOL distribution. The coefficients shed a few points when district FEs are removed, but their significance at the critical 1 percent cut off is retained. But, such homogeneity across the SOL distribution cannot be observed in relation to the disability variables.

An increase in the severity score has a statistically significant inverse effect on SOL, uniformly across the SOL distribution. When district FEs are not accounted for, the strength of the association appears to be overstated. The gradual increase in the magnitude of the coefficient when moving to higher SOL quantiles is as expected. The dichotomized severity score follows a similar pattern. But, both in terms of magnitude and statistical significance, the inverse association between the dummy variable and SOL appears to be the most robust at the highest SOL quantile.

A more nuanced pattern is revealed when the severity score is grouped into quantiles, although it is only the highest quantile (4th) that most coefficients have turned out to be statistically significant. Even though generally insignificant, observe that falling into the second severity quantile bodes well for household SOL, compared to falling into the base category (the lowest severity quantile). In effect, a modest level of disability severity, denoted by the 2nd quantile here, appears to create a ‘benefit’ on household SOL. This ‘benefit’ is particularly marked for households in the lowest SOL quantile. In contrast, there is an inverse association between disability and SOL in the third and fourth severity quantiles, in line with expectations. Moreover, there is a monotonic increase in the size of the disability coefficient as the severity quantile advances from 2 to 3 and 3 to 4, and this pattern is preserved even when the district FEs are accounted for, although there is a reduction in the size of the coefficients. The magnitude of the disability coefficient for 2nd and 3rd quantiles also increases as households move up the SOL distribution. Note, in contrast, the reduction in the strength of the 'benefit' of disability observed in the 2nd quantile of disability towards the higher end of the SOL distribution, once the district FEs are accounted for.

The BDAL ranking-based covariate also shares a heterogenic association with household SOL. Here, however, to a larger extent, the anticipated inverse relationship between the disability and SOL covariates is preserved, and the differences are mainly in terms of the magnitude of the disability coefficients. The strongest and the most statistically significant association between the two variables are found among households falling into the 75th quantile of the SOL distribution. The increase in the size of the coefficient is in line with intuition (Figure 5.6: Panel A). Observe the sharp increase in the magnitude coefficient of level 4 BDAL once district FEs are absorbed (Figure 5.6: Panel B). Overall, there is a gradual increase in the inverse association between disability coefficient and SOL for level 2 and level 4 BDAL. The patterns are more muddled for level 3 BDAL in that the direction of association between disability and SOL changes when district FEs are absorbed for the households in the 25th quantile and the median. However, the sizeable and significant inverse association between the disability variable and SOL observed in the 75th quantile echoes the patterns in the HIES data.

Table 5.15: Quantile regression output with MCA-based SOL as dependent variable disability severity score as the disability variable

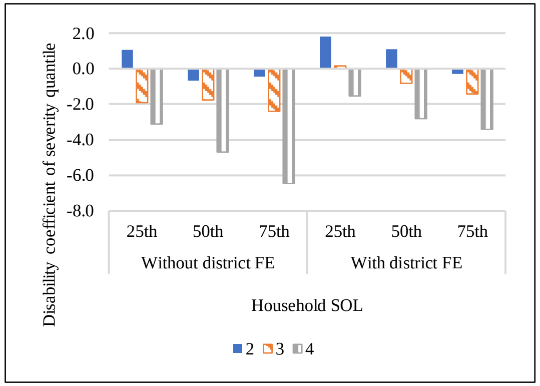
	25		50		75	
	Model 1	Model 1 District FE	Model 2	Model 2 District FE	Model 3	Model 3 District FE
	β (se)	β (se)	β (se)	β (se)	β (se)	β (se)
Log of HH income	14.1633***	12.3620***	14.8650***	12.9276***	14.6698***	12.4515***
	(0.677)	(0.617)	(0.735)	(0.689)	(0.871)	(0.516)
Severity score	-0.0974***	-0.0738***	-0.1327***	-0.0830***	-0.1490***	-0.1094***
	(0.033)	(0.023)	(0.029)	(0.031)	(0.040)	(0.029)
Log of HH income	14.4501***	12.5804***	14.9655***	12.7694***	14.6908***	12.4271***
	(0.690)	(0.622)	(0.737)	(0.700)	(0.791)	(0.668)
Severity dummy	-2.0839**	-0.7007	-3.2350***	-1.1711	-3.8638***	-2.3651***
	(0.844)	(0.889)	(0.872)	(0.835)	(0.945)	(0.788)
Log of HH income	13.9318***	12.4607***	15.0871***	13.0640***	15.0048***	12.4551***
	(0.520)	(0.604)	(0.674)	(0.631)	(0.794)	(0.630)
Severity quantile (Ref: 1)						
2	2.1377*	2.0290*	-0.0251	0.7183	-0.1584	0.1118
	(1.153)	(1.093)	(1.157)	(1.041)	(1.276)	(0.906)
3	-2.4729**	-0.5630	-2.6366**	-1.7201*	-3.8112***	-1.8000
	(1.051)	(1.183)	(1.041)	(1.042)	(1.285)	(1.159)
4	-3.2587***	-2.0312	-5.3011***	-3.7920***	-6.8552***	-4.3887***
	(0.960)	(1.256)	(1.200)	(1.254)	(1.357)	(1.210)
Log of HH income	14.0314***	12.2992***	15.4534***	12.7997***	14.9734***	12.2197***
	(0.215)	(0.626)	(0.698)	(0.659)	(0.750)	(0.650)
BDAL rank (Ref: 0)						
1	0.2159	-0.5787	-1.5841	-0.7446	-2.7258**	-2.0125*
	(1.110)	(0.885)	(0.966)	(0.910)	(1.325)	(1.073)
2	-2.3343	-4.4341***	-3.1795**	-3.0641**	-3.7495***	-2.8747*
	(1.475)	(1.203)	(1.579)	(1.474)	(1.437)	(1.609)

3	2.0538	-0.4400	0.9801	-0.9844	-3.2447**	-6.4644***
	(2.915)	(2.198)	(1.578)	(1.789)	(1.378)	(1.726)
Control variables						
Respondent's characteristics	YES	YES	YES	YES	YES	YES
Characteristics of the HOH	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES	YES
District FEs	NO	YES	NO	YES	NO	YES

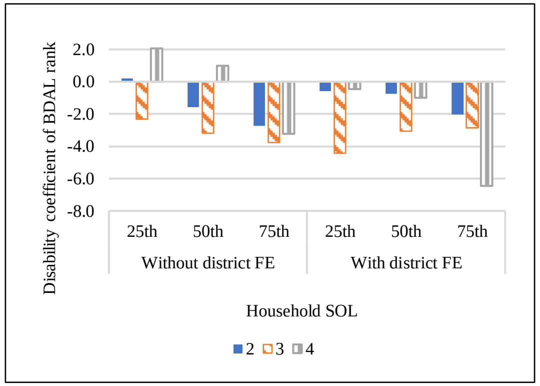
Source: Author estimates based on MDS (2014/15) data using STATA SE/14
Notes: N (Severity score) = 3,235; N (Dummy) = 3,377l; N (Severity quantile) = 3,234; N (BDAL category) = 3,294. Numbers in parentheses are robust standard errors. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Figure 5.6: Disability coefficients from quantile regression output

Panel A: Severity score quantile



Panel B: BDAL rank



Source: Author estimates based on MDS (2014/15) data using STATA SE/14

Table 5.16: Estimated extra cost of disability using different constructs of the disability variable from Quantile regression

%	25		50		75	
	Without dis. FE	With dis. FE	Without dis. FE	With dis. FE	Without dis. FE	With dis. FE
Severity score	*0.7*	*0.6*	*0.9*	*0.6*	*1.0*	*0.9*
Severity dummy	*14.4*	*5.6*	*21.6*	*9.2*	*26.3*	*19.0*
Severity quantile (Ref: 1st)						
2	*-15.3*	*-16.3*	*0.2*	*-5.5*	*1.1*	*-0.9*
3	*17.8*	*4.5*	*17.5*	*13.2*	*25.4*	*14.5*
4	*23.4*	*16.3*	*35.1*	*29.0*	*45.7*	*35.2*
BDAL rank (Ref: 0)						
1	*-1.5*	*4.7*	*10.3*	*5.8*	*18.2*	*16.5*
2	*16.6*	*36.1*	*20.6*	*23.9*	*25.0*	*23.5*
3	*-14.6*	*3.6*	*-6.3*	*7.7*	*21.7*	*52.9*

Source: Author estimates based on MDS (2014/15) data using STATA SE/14

The extra cost of disability estimated using the quantile regression analysis (Table 5.16) shows that except in relation to BDAL level 2, in all other model specifications, the extra cost of disability is rising along the SOL distribution, and is highest at the 75th SOL quantile. The high extra cost of disability seen at the upper end of the SOL distribution is somewhat counterintuitive. However, recall that the income coefficient is more or less robustly similar in both magnitude and significance across all three SOL quantiles, and the differences are underpinned by the size of the disability coefficients. A higher disability coefficient at the upper SOL quantiles indicates that more of income (resources) are likely being diverted into supporting PWDs, which does not seem to be the case at the lower end of the SOL distribution. As disability is only one of the many types of conversion handicaps, it could be posited that among poorer households, disability is only part of a larger vector of conversion handicaps that challenges transforming resources (income) into functionings (SOL). In contrast, among more well-off households, disability could be the single largest source of conversion handicap, which is captured in a larger negative disability coefficient. Thus, the estimates reiterate the complexity and heterogeneity of economic implications of disability at the household level in Sri Lanka.

5.7.3 Extra cost of disability using an administrative definition of disability

Recall from Chapter 2 that disability definitions can be functional, self-reported or administrative in nature. Both HIES and datasets collect information on disability payments as part of household income[92]. From this, a dichotomous variable can be created which takes a value of one if there is a value for this category of income and zero otherwise. This construct of disability can be thought of as an administrative definition of disability[93]. The models were executed, submitting this administrative definition of disability as one of the two main dependent variables of interest. As the disability variable defined thus failed to turn up statistically significant in the MDS-data based regression analysis, the ensuing discussion is only limited to HIES data. The independent variables are modified as follows. Instead of whether households receive transfer income or not, a dichotomous variable on whether or not a household receives *Samurdhi* payments is included. The other independent variables, including the outcome variable of interest, are unchanged[94]. The results (Table 5.17 and Table 5.18) are discussed below.

The extra cost of disability estimated from this regression analysis is substantially higher than that measured in the preceding analysis using HIES data. The extra cost ranges from 39.0 to 59.1 percent without district FEs, and increases when they are

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[92] See Section 5.5.1 Income from other cash receipt during last calendar month / last calendar 12 months in the HIES 2016 questionnaire and Section 4 Welfare assistance progammes in the MDS 2015 household questionnaire.

[93] In the sense that administratively, these are the households that have individuals who have been identified for and who have qualified for disability payments from the government.

[94] An analysis run by removing the disability transfer income from household income had no effect on the output. Therefore, log of income including this income was retained for this analysis as well.

controlled for. The effects of controlling for district FEs are rather mixed in the generalized ordered logistic regression results. Controlling for district FEs reduces the extra cost of disability for households in Groups 1 and 3, but increases for Group 2[95].

[95] Group 4 is the lowest SOL quantile (reference category). Groups 3, 2 and 1 consist of households falling into sequentially higher quartiles in the SOL distribution. Group 1 falls into the highest SOL quantile.

Table 5.17: Regression analysis output of household SOL

	OLS			District FE		
	T-PCA	MCA	Inv Prop	T-PCA	MCA	Inv Prop
	β/se	β/se	β/se	β/se	β/se	β/se
Log of HH income	6.1788***	5.7805***	6.2005***	5.8134***	5.4448***	5.8958***
	(0.1360)	(0.1290)	(0.1370)	(0.1340)	(0.1260)	(0.1360)
HH receives disability pay	-2.8593***	-2.6601***	-3.3393***	-3.5425***	-3.2960***	-3.7252***
	(0.2530)	(0.2370)	(0.2590)	(0.2480)	(0.2320)	(0.2570)
HH characteristics	YES	YES	YES	YES	YES	YES
Characteristics of the HOH	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES
District FEs	NO	NO	NO	YES	YES	YES
Constant	YES	YES	YES	YES	YES	YES
R-squared	0.4837	0.4896	0.4383	0.5068	0.5121	0.4546
F	799.9878	755.8235	679.0655	504.2668	489.1360	476.2760
p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AIC	170622	167362	171209	169663	166417	170595
BIC	170805	167545	171392	169845	166600	170778
N	20896	20896	20896	20896	20896	20896
Extra cost of disability (%)	*46.3*	*46.0*	*53.9*			
Extra cost of disability: with district FE (%)				*60.9*	*60.5*	*63.2*

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Table 5.18: Generalized ordered logistic analysis output of household SOL measured by the equal proportions index

	Gen. ordered logit			Gen, ordered logit with district FE		
	1	2	3	1	2	3
	β/se	β/se	β/se	β/se	β/se	β/se
Log of household income	0.6945***	0.8910***	0.7895***	0.8148***	0.6717***	0.8635***
	(0.0250)	(0.0370)	(0.0300)	(0.0290)	(0.0250)	(0.0370)
Household receives disability pay	-0.4104***	-0.3478***	-0.3927***	-0.3368***	-0.4437***	-0.4191***
	(0.0500)	(0.0450)	(0.0390)	(0.0380)	(0.0510)	(0.0450)
Household characteristics	YES	YES	YES	YES	YES	YES

Characteristics of the HOH	YES	YES	YES	YES	YES	YES
Sector	YES	YES	YES	YES	YES	YES
District fixed effects	NO	NO	NO	YES	YES	YES
Constant	YES	YES	YES	YES	YES	YES
N			20,896			20,896
Chi2			10995.4			28080.38
p			0.0000			0.0000
Extra cost of disability (%)	*59.1*	*39.0*	*49.7*			
Extra cost of disability: with district FE (%)				*41.3*	*66.1*	*48.5*

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: N=20,896; Group 4 (featuring the lowest SOL quartile based on the equal proportion index) is the reference category. The final models do not violate the parallel lines assumption. All variables for which the parallel lines assumption is imposed carry the same coefficient. Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

The source of the differences in the extra costs based on the two sets of results (self-reported and administrative definition of disability) are worth probing into. The magnitude of the household income coefficient is by and large similar across the two model specifications. But the disability coefficient is substantially larger when the administrative definition of disability is used. This stands to reason. Administratively-defined disability is typically more restrictive than self-reported disability (Molden & Tøssebro, 2010); such stringent definitions are particularly important to identify and target individuals with high service needs by the government (Palmer & Harley, 2012).

As such, it is sensible to posit that households with PWDs that qualify for disability payments under a restrictive definition of disability are in fact those households that are at a greater disadvantage in converting resources (income) in to achieved outcomes/functionings (SOL). This disadvantage is reflected in the sizeable negative coefficient of this more stringently defined disability variable.

5.8 Discussion

As the preceding section covered a lot of ground with two large datasets, multiple definitions of disability and different constructs of SOL, the results are quick recapped and summarised here. The first analysis established that as expected and in line with existing empirical evidence, disability and household income (and expenditure) are inversely related; a similar association is observed between SOL and disability. In contrast, SOL and household income share a positive relationship. These associations observed in both MDS and HIES-based inquiries justified the central analysis of the chapter which was to estimate the extra cost of disability at the household level.

The OLS regression was undertaken to measure the extra cost of disability at the mean, and quantile regression, to measure it at different points in the distribution of the household SOL. The HIES-based analysis used four constructs of SOL and two different definitions of disability (self-reported and administrative) while the MDS-based analysis benefited from several constructs of the disability variable, owing to the more nuanced and non-binary data on disability in this dataset. The multiple models run using different constructs of disability and SOL produces a range of estimates, and allows to compare how they differ across different definitions of disability and SOL.

The results echo findings from elsewhere, and show that by and large there is a non-trivial extra cost of disability that households with PWDs have to incur if they were to attain the same SOL as those without PWDs, irrespective of which dataset is used. Although at milder levels of disability, an extra 'benefit' of disability was observed, the results were by and large negligible in size and statistically insignificant. However, more stringent definitions of disability produced rather high estimates of extra cost of disability. For example, the administrative definition of disability led to the highest extra cost of disability estimate. Even so, the positive association observed between the disability construct and the household SOL in the MDS-based analysis challenges the oversimplistic assumption of disability as a universally adverse experience.

The quantile regression results underscored the heterogeneity of the economic impact of disability on households at different points in the household SOL distribution. Common to both datasets is the observation that the extra cost of disability estimates changes for households at different points in the SOL distribution. However, while the HIES-data based analysis presented a more-U shaped pattern in the extra cost estimates, the MDS-based results showed an increasing trend in the extra cost as households moved to higher SOL quantiles. Another observation common to both sets of estimates is their sensitivity to district FEs. The results highlighted the importance of accounting for district-level heterogeneities, a failure to do so which may lead to an over- or understatement of the estimates of extra cost of disability among households. In summary, the results support the existing evidence that in the presence of disability, households experience difficulty converting their income (resources) into achieved outcomes (SOL). However, the conversion handicap is not uniform across the achievement continuum. The HIES data-based analysis indicates that the conversion handicap tends to be greater for households falling into the lower end of the SOL distribution, echoing the existing evidence on the disproportionate burden of disability on poorer households. However, the results from the MDS-based regression output indicates that the conversion handicap is much greater at the higher end of the SOL distribution. These counteractive estimates potentially alludes to the possibility that disability is among the many drivers of conversion handicap among poorer households, compared to richer households, which might in fact allow them to allocate more resources for the well-being of the PWD, thus leading to a higher extra cost of disability at the higher end of the SOL distribution.

These empirical results bring to light the economic disadvantages and challenges that households with PWDs experience, and raises some important points. First the robustness of the inverse relationship between SOL and household income with the disability variable, to different constructs of both variables, shows that the risk of impoverishment is very real for households with PWDs. It also corroborates the findings of Kumara and Gunawardena (2017) discussed in Chapter 2. However, the estimates also provoke concerns whether a low extra cost of disability might necessarily be a good thing. It could very well be an indication of a marginalisation of PWDs within the household. For example, if a household does not consider it necessary or important to allocate resources to support the well-being of its PWD-members, the negative effect of disability on SOL might be lower.

Secondly, the extra cost of disability estimated here, while sizeable, might still be lower than the true extra cost of disability because this method of estimating the extra cost of disability only takes into consideration what is spent and not what is needed (Mont, 2021), and does not take into account indirect and opportunity costs incurred by the household that experiences disability (Loyalka et al., 2014; Mont, 2021). Moreover, the non-measurable psychosocial costs such as anxiety, grief, frustration, stress and other negative experiences associated with the disability experience are not reflected in the estimates. Additionally, the HIES dataset has only a fairly modest amount of information on disability (see earlier discussion) which may contribute to an underestimation of the true extra cost of disability among households.

Thirdly, the household economic implications of disability are heterogeneous, as reflected in the differences in the extra cost of disability among households at the mean, median and other quantiles. Importantly, the change in the size of the income coefficient is fairly straight-forward across quantiles in the analyses across both datasets. Across all models, the association of household income and SOL is consistently positive and significant. However, the magnitude of association between the parameter coefficient for disability and household SOL is more complex. In some instances, with a looser definition of disability, even a positive association between disability and SOL was observed.

The findings underscore the importance of having inclusive policy measures in place, given that there is a rather sizeable extra cost of disability borne by households with

PWDs in Sri Lanka. Moreover, such extra costs are not uniform across all households, and points to the fact that disability is not a homogeneous experience among individuals or households. The differences in estimates with and without district fixed effect allude to the possibility that employing oversimplistic and 'one-size-fits-all' social protection and assistance measures for PWDs and their households could lead to inequitable outcomes for households with lesser socio-economic status and living in different districts. The importance of definitions must also be noted given the sensitivity of estimates to the definition of disability applied in measuring the extra cost of disability.

Overall, the study also points to the importance of generating and maintaining reliable data on disability. The mere presence of an impairment or chronic condition does not amount to disability or a disempowering condition. The analysis found that when such a naïve dichotomy is used to define disability, the SOL and disability in fact share a positive correlation. However, a disability construct closer to the ICF's conceptualisation of the phenomenon produces results that are in line with other empirical studies – an inverse association between disability and household SOL and a resultant extra cost of disability. Thus clearly, using oversimplistic and outdated questions to gather health and disability related data can lead to misleading conclusions.

Yet, thanks to the additional data collected in the HIES health schedule, some useful findings could be generated in relation to disability at the household level in Sri Lanka. If the health schedule can be expanded or revamped to include questions from the Washington Group of Disability Statistics (WG), the HIES can be used as a cost-effective way of collecting disability-specific data on a periodic basis[96]. Moreover, such

[96] In fact, some improvement in the disability data collection is observed in the 2019 HIES data. Nonetheless, the 2019 HIES has still failed to collect information on disability and chronic conditions separately (See Chapter 4 for the discussion).

data can then be used to make comparisons with other countries as increasingly more of them employ WG questions to measure disability prevalence.

While the MDS data overcomes the shortcoming of information deficiency found in HIES-based data, the former is not without its own complexities. While the plethora of information it carries is particular useful to understand ways in which to promote an inclusive development agenda, its uses might be limited for advising and informing social protection measures. A loose and somewhat ideological definition of disability might not prove to be particularly helpful in allocating funds for safety nets of PWDs. Therefore, even from the rich data that the MDS affords, a cut off must be imposed at a point where the definition of disability is rigorous enough to be feasile from a fiscal perspective and effective from an economic inclusion perspective for households with PWDs. Such a cut off often again dichotomises the disability experience. However, with MDS-data, such a dichotomisation is done in the context of additional important information about disability, and less in a vacuum as would be the case with HIES data.

5.9 Summary

This study employs the SOL approach pioneered by Zaidi and Burchardt (2005) on data from the HIES and MDS to estimate the extra cost of disability at the household level in Sri Lanka. While similar studies have been carried elsewhere, this study, to the best of my knowledge, is the first of its kind in Sri Lanka. The latent SOL variable is proxied for by four constructs of indices which capture different assets and characteristics of households. The two key independent variables of interest are disability and household income. Several constructs of SOL and disability are utilised in the analysis to assess the sensitivity of the estimates to changes in the key variables of interest.

The empirical analysis, in line with the existing body of evidence, concluded in favour of an inverse association between disability and household income, and showed that for a given level of SOL, households with PWDs typically incur a non-trivial extra cost of disability. The results are robust to the different constructs of the latent SOL variable and constructs of a strict definition of disability. As expected, the estimates are larger for more stringent definitions of disability, and vary depending on where a household falls in the SOL distribution. All models indicated that a failure to account for district-level heterogeneities might lead to misleading estimates of such extra costs.

The findings raise some points that may be of use within social protection policy realms. The analysis points to the pitfalls of treating disability as a homogeneous experience across all households. The findings also suggest that ignoring district level heterogeneities when planning and devising social protection and assistance programmes and interventions for PWDs and their households, might undermine their effectiveness. Moreover, the study underscores the importance of creating and maintaining a robust and internationally comparable dataset on disability, preferably incorporating questions from the WG to the which can produce even more reliable estimates that was produced in this analysis employing useful but modest data on disability in the HIES dataset. Finally, it is clear that the definition of disability must be a realistic one in order for safety nets for PWDs to be well-targeted and effective. Broader contours are important for creating a disability-inclusive socioeconomic fabric, but might be impractical and unrealistic for devising social protection programmes for PWDs.

Chapter Six: Economic implications of disability duration on households in Sri Lanka – A survival analysis

6.1 Introduction

Chapter 2 discussed at length the economic implications of disability on households, the positive association between poverty and disability and how the two variables tend to reinforce each other. Even before accounting for the extra cost of disability, households with PWDs are likely to experience greater poverty than those without PWDs (Kumara & Gunewardena, 2017). When the extra cost of disability is accounted for, the poverty rates among PWDs tend to increase further (Braithwaite & Mont, 2009; Saunders, 2007).

The preceding analysis has established that in Sri Lanka, as found elsewhere, households with PWDs tend to incur a considerable extra cost of disability. However, beyond the mere presence of disability, what are the economic implications of the duration of such presence on a household? Does a longer duration of disability tend to have graver economic implications on a household? Are the economic implications of disability higher closer to the time of acquiring a disability, or further away from it? Does the length of disability affect the household economic situation equally across different types of disabilities? And does disability duration affect all types of households similarly? These are important questions to explore, especially from a policy and programmatic perspective.

There are several studies that have probed into the long term effects of disability on poverty, income, education, employment, and subjective well-being (Table 6.1). They point to the disadvantages of long-term disability on the acquisition of human capital, employment, income and life satisfaction on individuals, which in turn increase their vulnerability to poverty.

Table 6.1: A summary of studies that have explored long-term effects of disability on different individual and household level outcome variables

Study	Country and Data	Key findings
Long-term disability is associated with lasting changes in subjective well-being: Evidence from two nationally representative longitudinal studies (Lucas, 2007)	Germany: German Socio-Economic Panel Study (Waves 1-19, starting 1984) Britain: British Household Panel Study (BHPS) (Waves 1-12, starting 1991)	Life satisfaction among participants reported a decline at disability onset, and did not return to baseline levels during the time period following disability onset. Thus, life satisfaction did not indicate signs of adaptation over years. Even though psychological distress improved over the years following disability onset, they were still below baseline levels during the reference period.
Long-Term Poverty and Disability Among Working-Age Adults (She & Livermore, 2009)	USA: Survey of Income and Program Participation data from 1996 to 1999	The likelihood of being in poverty for over 12 months for individuals with work limitations for more than 36 months was about 4.5 times the likelihood for those with no work limitation at all. If the work limitation is over 48 months, this likelihood of being in poverty for over 12 months was about 15 times more than for those with no work limitations
The impact of disability transitions on social inclusion (Gannon & Nolan, 2007)	Ireland: Living in Ireland Survey data from 1995 to 2001	The mean equivalised household income for individuals with persistent disability was about 10 percent less than for individuals who were experiencing disability onset over the reference period, and much lower than for those who did not report disability at any point over the reference period. Relative income poverty was 35 percent higher among individuals with persistent disabilities, over twice the share of poverty among individuals without any disabilities.
Discrimination and other barriers to employment for teens and young adults with disabilities (Lindsay, 2011)	Canada: Participation and Activity Limitation Survey data (2006)	Individuals with long term disability (10 years or more) faced significant employment-related discrimination. Such individuals were more likely to be refused a job interview, a promotion and a job accommodation, and were paid less than others working similar jobs, and given less responsibilities. The non-availability of employment opportunities was also a significant barrier for the male youth with 10+ years of disability.

The Impact of Disability on the Lives of Children; Cross-Sectional Data Including 8,900 Children with Disabilities and 898,834 Children without Disabilities across 30 Countries (Kuper et al., 2014)	30 countries covering South America, Africa and South Asia[97]: Plan International Sponsorship Programme (2012)	CWDs were less likely to attend formal education, and if they did, they were more likely to be at a lower level of schooling for their age compared to children without disabilities

Source: Author

However, in comparison to the sizeable body of empirical literature that explores the disability-poverty nexus, there is a relative paucity of studies that have interrogated the implications of the duration of disability on a household's economic situation. Such studies are particularly difficult to come by for low- and middle-income countries (LMIC) (Banks et al., 2017). In fact, to the best of my knowledge, no such studies have been conducted in South Asia or in other LMICs. Applying the survival analysis methodology, and using data from the HIES survey, this chapter is aimed at unpacking the association between the duration of disability and the risk of a household falling into poverty in Sri Lanka. The remainder of this chapter is organised as follows. Section 6.2 discusses the salient literature that uses this survival analysis methodological approach to look at the socioeconomic implications of disability. Section 6.3 presents the methodology, data and variables. Sections 6.4 and 6.5 present and discuss the results of the regression analysis, respectively. Section 6.6 summarises.

[97] The 30 countries consist of Bolivia, Brazil, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Paraguay and Peru from South America, Benin, Egypt, Guinea, Kenya, Mozambique, Niger, Rwanda, Senegal, Sudan, Tanzania, Uganda, Zambia and Zimbabwe from Africa, and India, Indonesia, Nepal, Philippines, Sri Lanka and Vietnam from South Asia

6.2 Relevant literature

Studies that use survival analysis methodologies to investigate the socioeconomic implications of disability can be traced to four main thematic areas. The first and the most common strand of literature is in relation to employment. Milner et al. (2018) use longitudinal panel data (2001-2015) from the Household, Income and Labour Dynamics in Australia (HILDA) Survey to evaluate the characteristics associated with leaving employment, and the differences in such characteristics between PWDs and non-PWDs. Their analysis shows that the probability of remaining in employment by the end of the study period was 0.42 among PWDs compared to 0.56 among non-PWDs. The risk of leaving employment for unemployment and for withdrawing from the labour force altogether was significantly higher among PWDs than non-PWDs. However, they did not find significant differences in employment-related variables that predicted exit from employment between the two groups[98]. The authors point out that beyond the health implications, disability may also increase the proneness among individuals to be subject to work place bullying and discrimination, and a lack of support from colleagues. They are also more likely to experience other job stressors such as high job demand and low job control. Together, these factors underpin a higher risk of PWDs exiting employment and the labour market[99].

[98] These variables included being employed in a low skilled occupation, being employed casually or on a fixed term basis, and being employed in a low psychosocial quality job. The authors posit that these variables are related to wider structural issues that affect employees irrespective of whether they have a disability or not. People engaged in low status and low-quality jobs are generally more likely to fall out of the labour market.

[99] Lee et al. (2018) who apply survival analysis methods to data from Waves 1-5 (2006-2014) of the Korean Longitudinal Study of Ageing to study the risk of early exit from working life among workers aged over 45 also draw similar conclusions. Their variable of interest is health (poor health and poor perceived health) instead of disability, and observe that poor health and perceived poor health status were significant predictors of early exit from employment.

In another study, Reisine et al. (2007) analysed data collected from a random sample of rheumatologists in the USA in 1987 and 1998 to study factors associated with leaving employment among women with newly diagnosed rheumatoid arthritis. The survival analysis showed that having one or more joint deformity, compared to having no such deformity, made it three times more likely that women would leave employment. However, the analysis also showed that disease flares had a profound impact on women's employment in 1987, but not in 1998, which the authors have posited could be linked to the availability of better clinical treatments and improved medication in 1998 compared to 1987.

A second thematic area that employs survival analysis methodologies is in relation to disability payments. For example, a study conducted by Landfeldt et al. (2018) looks at the long term impact of early treatment of multiple sclerosis (MS) on the risk of disability pension[100], using data over 2002-2012 on a sample of MS patients in Sweden and pension claims data from the Swedish Social Insurance Agency. The study finds the risk of claiming disability pension is 36 percent lower among patients who sought treatment within the first six months from the onset of MS, compared to patients that started treatments only 18 months after the onset of the disease, after controlling for variables such as the patients' age, sex, marital status, university education, and prevalent comorbidities. The results also show that MS patients with a university education have a significantly lower probability of obtaining full-time disability pension than patients with lesser educational attainments. But women and older patients are more likely to obtain full-time disability pension.

[100] Sickness compensation, activity compensation, and early retirement pension

A similar study was conducted by Krupa et al. (2012) using longitudinal data from Canada to determine the rate at which individuals served by early intervention for psychosis (EIP) programmes applied for disability income support during the 5 year period after entry into such a programme, and to identify factors that predicted the time of application for disability income support. However, unlike Landfeldt et al. (2018) who find that early treatment is associated with a lower risk of claiming full-time disability pension, Krupa et al. (2012) found evidence that countered the expectation that early intervention in fact promoted gainful re-entry into the labour market, and financial autonomy. They observed that the rate of application for disability income support, rose from 30 percent within the first year of entry into an EIP, to 44 percent within the first three years of entry into EIP. Individuals who were not engaged in productive economic activities, relied on government income and had repeated hospitalization histories at the time of entry into the EIP were more likely to apply for disability income earlier than the other groups. For them, disability income tends to be an acceptable substitute for financial autonomy.

Salkever et al. (2003) made similar observations in a study using primary data collected from 116 employers in different parts of the US, who had long-term disability (LTD) policies in effect over 1993-1995. The objective of the study was to understand the determinants of return-to-work and claims duration for employees receiving LTD benefits for mental disorders. The results showed that even where LTD benefits were available, high deductibles associated with such mental health benefits, longer pre-existing condition exclusion periods[101], and the presence of mental healthcare carve out

[101] The time period during which an individual policy will not pay for care relating to a pre-existing condition

arrangements[102] reduced the probability of return to work among employees. In contrast, the study found that shorter claims duration limits (which were common among firms with higher injury rates) encouraged return to work. Disability benefits are also a main channel via which older workers with poor health generally tend to exit the labour market (Reeuwijk et al., 2017).

The relationship between disability and poverty is a third thematic area, although all available studies look at a given chronic condition, rather than a broad notion of disability. For example, Callander and Schofield (2016a) investigate the relationship between developing arthritis and falling into poverty among Australian adults (aged 21 or more), using the HILDA survey data for 2007-2012 period. Their analysis finds that individuals diagnosed with arthritis have a higher risk of falling into poverty compared to those who were not diagnosed with arthritis. However, such risk is gendered. The hazard ratio of falling into multidimensional poverty is estimated at 1.15 and 1.88 among women and men with arthritis, respectively, compared to women and men without arthritis, indicating that an arthritis diagnosis poses a greater risk of falling into poverty on men than women. However, living in remote areas, and not being married are associated with a greater risk of falling into poverty for both men and women.

In another study, Callander and Schofield (2016b) also evaluate the risk of falling into poverty after developing a heart disease among Australians aged 21 or more, using HILDA survey data over the same period as above. The analysis shows that the risk of falling into income and multidimensional poverty among those who develop heart ailments decreases monotonically with age. The hazard ratio of falling into income poverty is 9.24 among those aged 20, but lowers to 5.64 for those aged 40, 1.29 for

[102] A supplement to a person's standard health insurance plan, provided by a third-party vendor

those aged 60, and to only 0.29 by age 90, compared to those who have never developed a heart condition. The hazard risk of falling into multidimensional poverty among those aged 20 is 14.21 and drops to 1.52 for those aged 60, and to below 1 for those aged 70 or more, compared to those who have never developed heart disease. Clearly, the risk of falling into poverty upon developing a heart condition is highest among the younger cohorts. However, young women with heart conditions are more likely to fall into poverty than young men with similar conditions.

A fourth thematic area explores the relationship between disability and mortality. Lamarca (2003) investigated this association, incorporating the transitions in the disablement process (i.e. independent, having difficulties, and dependent) among men and women using data from the Health Interview Survey of Barcelona for a little less than 1,300 respondents aged 65 or more. The follow up period was a median of 8 years. The results showed that the strength of the association between disability and mortality was influenced by age, with a decline in the relative risk of death among elderly men and women in the dependent state of the disablement process. These findings corroborate the observations made in an earlier study by Ferrucci et al. (1996) who also observed that the development of severe disability varied across different age groups. The study also found that disability prevalence was higher among women, and that their disability was more strongly associated with mortality than men’s disability. In contrast, however, in an earlier study by Dunlop et al. (1997) which looked at disability rate and patterns of dependence in activities of daily living (ADL) using data from the Longitudinal Study of Aging (1984-1990), it was observed that older women had a higher incidence and a longer retention period of impairment, but also had a lower mortality rate than older men. On the other hand, the higher incidence of disability prevalence among women concurs with the findings of Lamarca (2003).

A recent study by Gao et al. (2018) that investigates the effects of participating in different types of social activities on the onset of functional disability among adults aged 65 or more in China can also be placed under this theme. Using the 2005, 2008, and 2011 waves of the Chinese Longitudinal Health Longevity Study, the analysis finds that extensive social participation is associated with a significantly reduced risk of the onset of functional disability. Such social participation includes group leisure-time activities (such as playing cards), frequent engagement in organised social events and participating in informal social interactions (i.e., visits from siblings). Partaking in these activities contributes to the reduced risk of functional decline through different mechanisms. In contrast, the researchers do not observe a significant reduction in the risk of the functional decline among adults participating in paid jobs.

In summary, this section has looked at the few available empirical studies that have applied survival analysis methodologies to investigate different socio-economic aspects of disability. However, nearly all such studies analyse longitudinal datasets from developed countries. To the best of my knowledge, no such studies that employ survival analysis methods have been generated from developing countries. This study is a modest attempt to contribute to lowering this paucity of empirical evidence from the developing world, while also adding to the still thin body of material that apply the survival analysis methodology to probe into the disability-poverty nexus.

6.3 Data and methods

While the HIES is designed primarily to collect nationally representative data on household income and expenditure (as the name implies), it does collect some useful health-related information on household members. An operational definition of disability was constructed using the information in this schedule in the preceding chapter and was used to measure the extra cost of disability at the household level. Another useful piece of information collected in the health schedule is the duration of disability /chronic illness if a person has been suffering from one, at the time of the data collection. This retrospective recall information lends itself to a survival analysis methodology, even though the dataset is cross-sectional in nature (Jenkins, 2005)[103].

6.3.1 Outcome variable

Survival analysis is a statistical methodology that is designed for analysing time-to-event data. The events used in survival analysis are typically of detrimental nature (Etikan et al., 2018). In this study, the event is defined as a household falling into poverty[104]. Two events are considered from the available data. One is monetary poverty, measured in relative terms, and its threshold set at the mean value of the log of household income[105]. Households falling below the mean are considered to be poor[106]. Sensitivity analyses are performed by using variants of the poverty variable construct: 1) falling into the bottom two quantiles of the log of income distribution; 2) falling into the 25th percentile of the log of household income distribution; and, 3)

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[103] Survival analysis is applied with data in which subjects are tracked until an event occurs. Thus, typically, such duration details are obtained from panel data that track observations on a set of variables over multiple periods of time.

[104] The concept of poverty is vast and complex, as is its complex and layered association with disability. However, the concept of poverty is only limited to an operational one, where a household is considered to be poor if it falls below a given threshold. The usual relative poverty threshold is 50 – 60 percent of a country's median income. The absolute poverty line reflects a country's income status (Ferreira & Sánchez-Páramo, 2017). In Sri Lanka, people living below USD 3.20 a day are considered to be poor.

[105] A poverty line is essentially arbitrary (Ferreira & Sánchez-Páramo, 2017; Mack, 2016). As such several poverty lines are used in the econometric analysis to explore the association between disability duration and poverty, expressed in stringent and relatively looser terms.

[106] An alternative definition of poverty as falling below the median is also considered to check for robustness of results. This is because the median is typically more robust to out outliers. However, in this case, the mean and median values of the log of household income are quite close to each other, and the results do not vary much between the two constructs of poverty. See results in Table III-4 in Appendix III.

falling into the 25th percentile of the log of food expenditure distribution[107]. The second main outcome variable of interest is non-monetary poverty, defined as falling into the bottom two quantiles in the SOL index, constructed using the MCA. Here instead of different threshold, the four constructs of SOL are used for sensitivity analysis[108].

6.3.2 Time-to-event

The population at risk are all the individuals in the survey who have acquired a disability or chronic illness. As the large majority of available data in the HIES is at the household level, in a household that has more than one individual with a disability, the individual with the longest duration of disability is considered[109]. While the extent or severity of disability would be a more sensible criterion to choose such an individual from households with more than one PWD, this kind of information is not available in the HIES data. The survival time (duration) is the time period between an individual acquiring a disability or a chronic illness, and the household of such an individual falling into poverty. Observations are censored if households have not fallen into poverty at the time of data collection.

Whether the duration variable (T) is continuous or discrete in nature influences the type of survival analysis methodology the data can be submitted to. Jenkins (2005) has defined T as continuous if the transition into the event takes place at any point in a non-negative time continuum, and discrete if the transition takes place at a discrete point in time. Discrete time-duration processes can occur due to two reasons. The first is that

[107] 60 percent of median household income is usually employed as the poverty threshold. However, when such a stringent definition of poverty is applied, only a very few households in the sub-sample of households with PWDs are poor.
[108] See Table III-1 for the proportion of households falling into poverty under each definition of income and non-income poverty.
[109] In the overall sample, 33.8 percent of the households have only one PWD. About 12.4 percent of the households have two PWDs. Only about 1.8 percent of the households have more than two PWDs.

even though the underlying transitory event may take place in continuous time, the data is recorded in discrete time intervals (such as days, months etc). This is called grouped discrete data. The second is a situation in which the underlying transitionary process is in fact a discretionary one (e.g., the number of menstrual cycles from puberty to first birth). The length of the disability experience in this survey is recorded in years and months, and accordingly, the exact point at which the transition was experienced is not available. As such, T in this situation would best be described as grouped discrete data. However, a less parsimonious definition of continuous duration data is provided in Mills (2011), who has stipulated that

> "[i]f the time of the event is known precisely, it can be measured on a continuous scale (e.g., seconds, days, months). If the time units are unknown within larger units of years or decades, discrete-time methods are often used." (p. 4)

Thus, the available data qualifies to be considered on a continuous scale. Accordingly, for the purposes of the ensuing analysis, the survival time from the point of acquiring a disability to falling into poverty T is treated as a continuous, random, non-negative variable (Mills, 2011). As the data is cross-sectional, the event is a single episode. A single-episode conceptualisation captures between-household differences in event-timing (Lougheed et al., 2019)[110].

Observations are right-censored for individuals who have not fallen into poverty at the time of data collection, and truncated at 65 years as there are very few individuals who have a disability duration longer than 65 years. This is outcome variable of interest in the analysis. The observations continue until time t ($t \in [0, \infty]$), which in this case is

[110] In effect, poverty is not assumed to be a recurring event i.e., households transitioning in and out of poverty.

the point of survey data collection (2016). By then, households have either experienced the transitory single event i.e., falling into poverty, or are censored if not.

A note of caution is in order before proceeding to the discussion of the econometric strategy. First, a failure to account for the truncation of the sample in the econometric model can lead to spurious results (See Van den Bulte & Iyengar, 2011 for a detailed discussion)[111]. The analytical procedure proposed by Van den Bulte and Iyenger (2011) to circumvent this issue not feasible here, given the cross-sectional, and therefore the limited nature of the data. However, as the authors have pointed out the important issue is whether truncation affects the conclusions about the effects of the covariates employed in the analysis. To examine if this is the case, I also implement the econometric procedure using the full nontruncated sample (See Section 6.5.2 for discussion and Table III-4 in Appendix III for regression output). Secondly, given that survival time (duration of disability) is available only for PWDs, the analysis is invariably limited to the subsample of households with PWDs. Thus, the survival analysis cannot be extended to households without PWDs. Moreover, the limited nature of the duration data renders controlling for economic shocks (such as recessions) in a given time period rather impractical.

6.4 Econometric Specification

Two statistical functions are of relevance in time-to-event data analysis – the failure (hazard) function and the survival function. Let T be a continuous random non-negative variable with a cumulative distribution function (c.d.f.) $F(t)$ and a probability density function (p.d.f.) $f(t)$, where t is the elapsed time since entry to the state at time 0.

[111] The discussion however uses the terms censoring and truncation interchangeably.

$$F(t) = \Pr(T \leq t) = \int_0^t f(u)du \qquad 6.1$$

The survival function $S(t)$ measures the probability that the event of interest has not taken place by duration t:

$$S(t) = \Pr(T > t) = \Pr(T \geq t) = 1 - F(t) \; for \; t > 0 \qquad 6.2$$

In effect, $S(t)$ is 1 minus the corresponding c.d.f. $F(t)$, and takes a value between 0 and 1. Since T is a continuous random variable, the survival function can be written as 6.3 below, where $S(t)$ is the integral of the p.d.f. $f(t)$.

$$S(t) = \Pr(T > t) = \int_t^{\infty+} f(u)du \qquad 6.3$$

By taking the negative of the derivative of 6.3 in respect to t, the following is obtained.

$$f(t) = -\frac{\partial S(t)}{\partial (t)} \qquad 6.4$$

The quantity $f(t).\partial(t)$ can be likened to an "approximate" probability that the event will occur at time t. $S(t)$ is a probability and lies between 0 and 1 and is a strictly decreasing function of t.

$$0 \leq S(t) \leq 1 \qquad 6.5$$

$$S(0) = 1 \qquad 6.6$$

$$\lim_{t \to \infty} S(t) = 0 \qquad 6.7$$

$$\frac{\partial S}{\partial t} < 0 \qquad 6.8$$

$$\frac{\partial^2 S}{\partial^2 t} <> 0 \qquad 6.9$$

Since the derivative of the survival function with respect to t is negative, then the function $f(t)$ represented in 6.4 will be nonnegative $[f(t) \geq 0\,]$. The hazard function (also called the hazard rate), that is often discussed along with the survival function is:

$$h(t) = \lim_{\Delta t \to 0} \frac{\Pr\,(t \leq T < t + \Delta t | T \geq t)}{\Delta t} \qquad 6.10$$

$$h(t) = \lim_{\Delta t \to 0} \frac{\Pr\,(t \le T < t + \Delta t)/S(t)}{\Delta t} = \frac{f(t)}{S(t)} \qquad 6.11$$

$$h(t) = \lim_{\Delta t \to 0} \frac{\Pr\,(t \le T < t + \Delta t)}{\Delta t} . \frac{1}{S(t)} = \frac{f(t)}{S(t)} \qquad 6.12$$

$$h(t) = \frac{f(t)}{S(t)} = \frac{f(t)}{1 - F(t)} \qquad 6.13$$

where $f(t)$ is the p.d.f. the random variable T, and is the slope of its c.d.f. $F(t)$. The hazard function measures the instantaneous potential of experiencing an event at time t, conditional on having survived to that time. The cumulative hazard function describes the accumulated risk of experiencing an event up to time t. In other words, it is the cumulative amount of hazard up to time t.

$$H(t) = \int_0^t h(u)\, du \qquad 6.14$$

The hazard function $h(t)$, the cumulative hazard function $H(t)$ and the survival function $S(t)$ are linked as follows:

$$h(t) = \frac{f(t)}{S(t)} = \frac{-\partial[S(t)]/\partial t}{S(t)} \qquad 6.15$$

$$h(t) = \frac{-\partial[1 - F(t)]/\partial t}{1 - F(t)} \qquad 6.16$$

$$h(t) = \frac{\partial\{-ln[1 - F(t)]\}}{\partial t} \qquad 6.17$$

$$h(t) = \frac{\partial\{-ln[S(t)]\}}{\partial t} \qquad 6.18$$

Integrating both sides:

$$\int_0^t h(u)\, du = -\ln[1 - F(t)] \Big|_0^t \qquad 6.19$$

As $F(0) = 0$ and $ln1 = 0$:

$$ln\,[1 - F(t) = ln[S(t)] = -\int_0^t h(u)\, du \qquad 6.20$$

$$ln[S(t)] = exp\,(-\int_0^t h(u)\, du\,) \qquad 6.21$$

$$ln[S(t)] = exp\,[-H(t)] \qquad 6.22$$

$$H(t) \geq 0 \qquad 6.23$$

$$\frac{\partial H(t)}{\partial t} = h(t) \qquad 6.24$$

Accordingly,

$$S(t) = e^{-H(t)} = e^{\left(-\int_0^t h(u)du\right)} \qquad 6.25$$

Thus, $h(.)$ is determined if and only if $f(.)$ or $S(.)$ is determined, and vice versa. The survival analysis can be carried out using non-parametric, semi-parametric or parametric methodologies. A useful starting point is the non-parametric model, which does not make any assumptions about the underlying hazard distribution, imposes the least structure and therefore produces results that are easier to estimate and interpret. As such, non-parametric models offer a good exploratory tool. However, the non-parametric analysis is mostly descriptive in nature and cannot be used for multivariate analysis. The most widely used non-parametric models are the Kaplan-Meiyer (KM) estimator, which will be used in this analysis.

The KM estimator which is used to measure the fraction of observations surviving a given event, during a given period of time is given by the following formula:

$$\hat{S}(t) = \prod_{i:t_i \leq T} 1 - \frac{d_i}{n_i} \qquad 6.26$$

where:

t_i = a time when at least one event happened

d_i = the number of events that happened at time t_i

n_i = the number of individuals known to have survived up to time t_i (they have not yet transitioned into the event or have been censored). i.e., the number of observations at risk at time t_i. The survival probability at time t is equal to the product of the percentage chance of surviving at time t and each $t-1$.

The proportional hazards (PH) models in survival analysis are characterized by satisfying a separability assumption (Jenkins, 2005):

$$h(t, X) = h_0(t)\exp(\beta' X) = h_0(t)\lambda \qquad 6.27$$

where:

$h_0(t)$ = baseline hazard function, which depends on t, but not X, and $\exp(\beta' X) = \lambda$= observation is a specific non-negative function of a vector of covariates X, which does not depend on t by construction and scales the baseline hazard function common to all observations. In effect, the PH assumption holds that the hazard rate is equivalent over time across groups.

The Cox model estimates the β coefficients in 6.27 above, without having to specify a functional form for the baseline hazard function (which makes the model semi-parametric), and using a partial likelihood method of estimating β that does not involve the baseline hazard function $h_0(t)$. Accordingly, the Cox model provides a versatile methodological tool for multivariate analysis for estimating the association between the time-to-event outcome of interest and explanatory variables, without the structural demands on the data imposed by parametric models. However, the Cox model must satisfy the PH assumptions for the validity of the findings based on such analysis (Xue et al., 2013). Explanatory variables are discussed in Section 5.6.2.

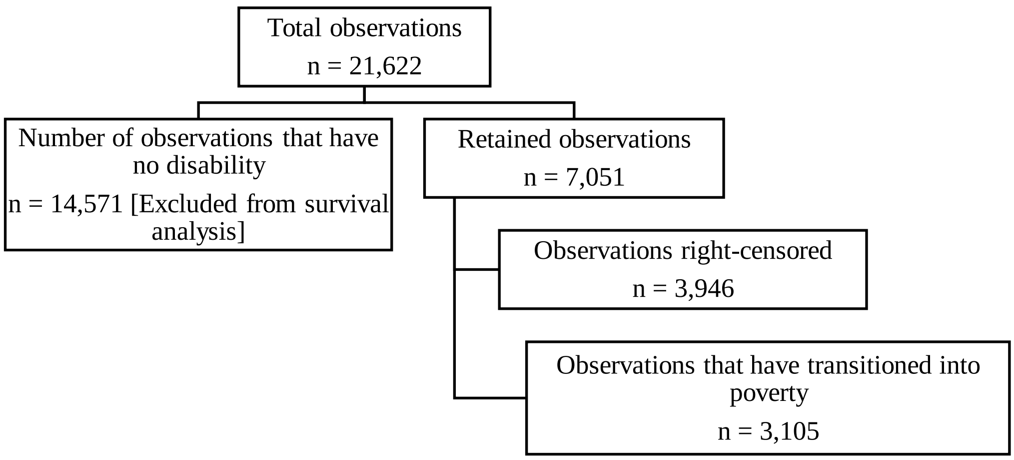
6.5 Results on income poverty

From a total sample size of 21,622 observations in the household dataset[112], 14,571 (67.4 percent) do not have disability or a chronic illness (Figure 6.1**).** The total number

[112] Altogether there are 82,961 observations, disability duration data are available for 13,847 individuals. However, income data are available mainly at the household level. As a result, in a household that has more than 1 individual with information on the duration of disability, the duration

of observations that qualify for analysis accordingly are 7,051 and the time at risk is 66,914.75 (the number of time periods summed over the observations). 3,105 observations (44 percent) have transitioned into income poverty, based on the definition of poverty as falling below the mean value of the log of household income (i.e., failures)[113].

Figure 6.1: Flow chart of the data for survival analysis of persons with disabilities chronic illness



Source: Author calculations based on HIES (2016) data using STATA SE/14
Note: A total of 14,571 had to be dropped because duration data are available only for households with PWDs. The survival analysis is therefore limited only to households with PWDs.

The incidence rate which measures the number of failures over the time at risk is 4.55 percent. The average disability duration is 9.44 years (Table 6.2). The duration is slightly less for individuals who have not transitioned into poverty, compared to those who have, based on the first two definitions of poverty. In the third and the least

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details pertaining to the individual with the longest duration of disability are obtained. Both intuitively, and in the context of the existing empirical literature discussed in Section 2, it makes sense to assume that a longer duration of disability may have greater impact on household poverty than a shorter duration.

[113] Of the entire sample; Income-poverty – Definition 2: 3554 observations (50.4 percent) have transitioned into poverty, and the incidence rate is 5.24 percent. Definition 3: 2,031 observations (28.8 percent) have transitioned into poverty, and the incidence rate is 2.97 percent. Definition 4: 1,963 observations (27.8 percent) have transitioned into poverty, and the incidence rate is 2.91 percent.

parsimonious definition of poverty, the duration differences between poor and non-poor households is negligible.

Table 6.2: Mean duration of disability

	Sub-sample	Mean (Years)	Robust SE	95% CI	
	Overall	9.44	0.10	9.25	9.63
By gender	Male	9.50	0.13	9.25	9.76
	Female	9.30	0.19	8.92	9.68
Stopped activity or not	Didn't stop activity	9.29	0.10	9.09	9.49
	Stopped activity	10.17	0.30	9.58	10.76
Sector	Urban	10.11	0.24	9.65	10.58
	Rural	9.37	0.11	9.14	9.59
	Estate	7.31	0.58	6.17	8.46
Poverty definition 1 (<mean LN HH income)	Non-poor	9.33	0.13	9.08	9.57
	Poor	9.59	0.17	9.26	9.92
Poverty definition 2 (In the bottom 2 LN HH income quantiles)	Non-poor	9.36	0.13	9.09	9.62
	Poor	9.53	0.16	9.21	9.84
Poverty definition 3 (<25th percentile in LN HH income)	Non-poor	9.46	0.19	9.08	9.84
	Poor	9.43	0.13	9.19	9.68
Poverty definition 4 (<25th percentile in LN HH food-exp)	Non-poor	9.37	0.12	9.13	9.61
	Poor	9.61	0.22	9.19	10.04

Source: Author calculations based on HIES (2016) data using STATA SE/14

6.5.1 Non-parametric analysis (income poverty)[114]

The overall smoothed hazard estimate (Figure 6.2: Panel A) shows that the probability of transitioning into poverty rapidly increases from 5 to 20 percent from about 42 years to 60 years of disability duration. The probability of transitioning into poverty up to year 40 is fairly benign, and in fact stabilises somewhat over years 20 to 40. This pattern stands to reason. The onset of disability is likely to be accompanied by a loss of income, increased opportunity cost (if a household member has to take up unpaid care work for the PWD) and an increase in household expenditure (e.g., medicine and healthcare expenses). Thus, households are at a higher risk of becoming poor immediately after

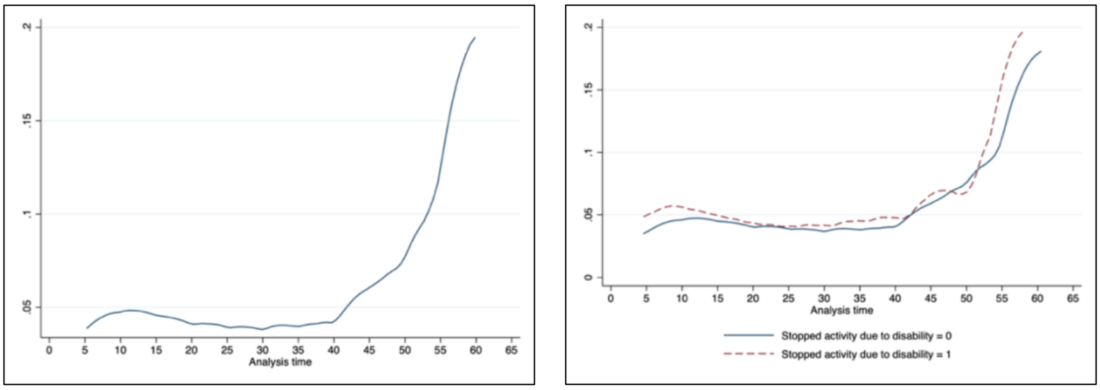
[114] For brevity, the univariate analysis is limited only to the 1st definition of poverty (falling below the mean household income)

the onset of disability (Burchardt, 2003; Gannon & Nolan, 2007). In the medium term, households might adapt to the new reality, or even obtain more income by way of disability relief. But, in the long-term, the risk of falling into poverty is significantly high. Vulnerabilities associated with old age, reduced ability to save and invest in long-term assets are likely to compound the risk of transitioning into poverty among households that have experienced long durations of disability (Mitra et al., 2011).

Figure 6.2: Smoothed hazard estimate[115]

Panel A: Overall

Panel B: By stopped activity



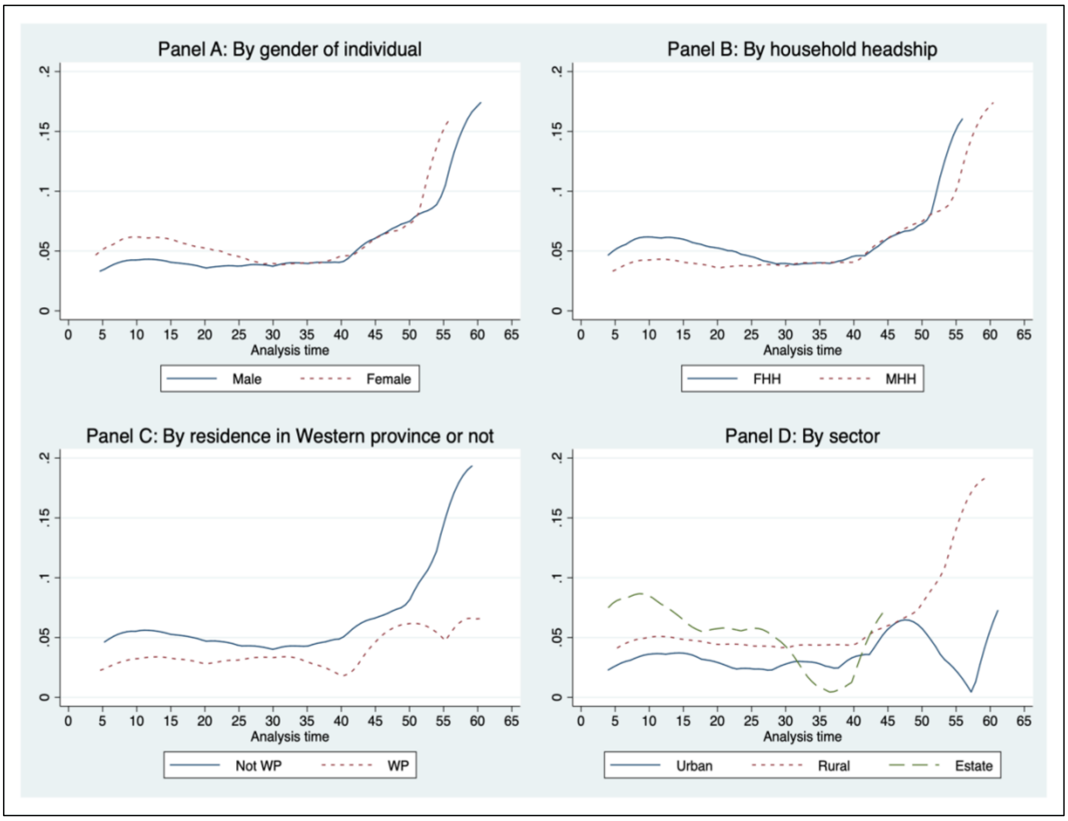
Source: Author calculations based on HIES (2016) data using STATA SE/14

Having had to stop usual activity due to a disability/chronic illness condition (Figure 6.2: Panel B) increases the vulnerability of falling into poverty in approximately the first and last 10 years of disability duration. At the beginning of the analysis time, the probability of experiencing poverty is higher among the cohort that has had to stop activity due to disability. However, this difference gradually closes by about year 20. A clear diversion between the two hazard functions remerges, beyond a little ahead of Year 55. In between these two time periods, the differences in probabilities of experiencing poverty between the two groups is somewhat fuzzy. These results

[115] In all smoothed hazard curves, the Y-axis plots the probability of transitioning into poverty

reinforce the idea that disability has a more profound effect at the onset and in the long term compared to the time period in between.

Figure 6.3: Smoothed hazard estimate by gender, household headship and spatial variables



Source: Author calculations based on HIES (2016) data using STATA SE/14

The patterns emerging from the smoothed hazard curves by the gender of the individuals, the type of HOH, whether the individuals are resident in the Western province or not and by the sector are informative (Figure 6.3). First, the probability of households transitioning into poverty is higher if the PWD is a female, in the initial years and towards the latter years (Panel A). Probabilities are roughly the same for both genders in between. This pattern is mirrored in Panel B. The hazard curves in Panel C and D show that individuals living outside the Western Province and in rural areas are at a higher risk of falling into poverty than those who are resident in the Western province or in urban areas. However, at the onset of disability, the risk of transitioning into poverty is highest among respondents in the estate sector (Panel D: By sector), compared to those living in rural and urban sectors, respectively[116].

6.5.2 KM Survival estimates by asset ownership

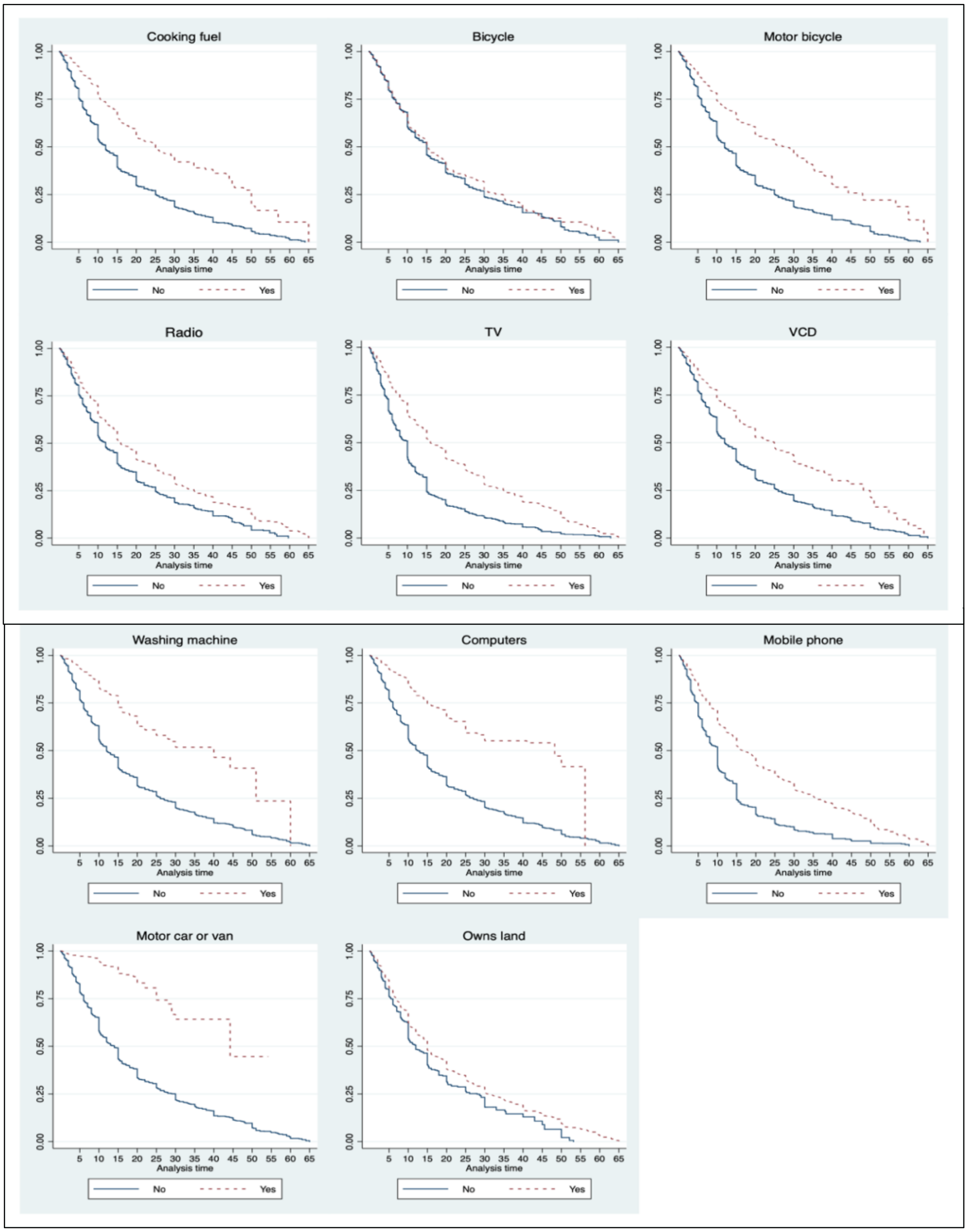
To probe further into the association between disability duration and a household's vulnerability to income poverty, a series of KM survival estimates are plotted by a number of assets (Figure C-2). Some of these assets are owned by a large majority of the households while other assets such as motorised transportation, computers and washing machines are owned by a relatively smaller share of households.

The survival estimates have turned out as expected. Households that own each of the enumerated assets have a higher probability of survival than those who do not (Figure 6.4). Observe that while the gap in survival probabilities is rather wide for big ticket assets such as computers, washing machines, and motor cars/vans, it is discernibly narrow in relation to assets such as bicycles and radios.

These patterns produce some useful insights, as these assets signal a household's financial affluence. For example, the ownership of a bicycle has been found to be associated with lower household income and socio-economic status (Baez Ramirez et al., 2018; Khudri & Chowdhury, 2013; Kumarage, 2007). Conversely, household income is a critically important variable for the ownership of motorised transport (Ha et al., 2019). As households move to higher income brackets, they tend to upgrade to motorised transportation. (Dilini et al., 2021; Kumarage, 2007).

[116] Figure III-1presents the Kaplan-Meier survival functions which focuses on surviving the event.

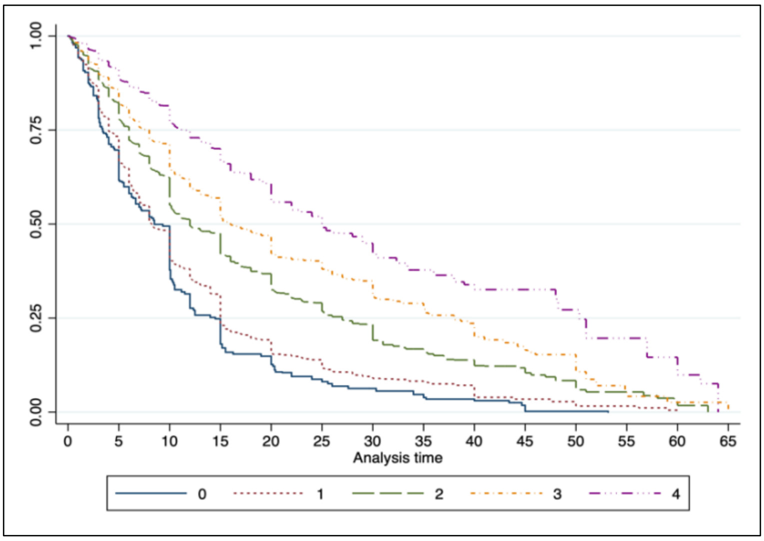
Figure 6.4: KM survival estimates by selected household assets and amenities



Source: Author calculations based on HIES (2016) data using STATA SE/14

Thus, the survival estimates strongly suggest that the risk of falling into poverty among households that experience disability is profoundly greater among households that have a lower financial affluence, as proxied by these assets. An alternative construct of the assets variable[117] also produces consistent results (Figure 6.5). The higher the number of assets owned, the less likely is a household with PWDs to transition into income poverty. Assuming that the ownership of expensive assets and a higher number of assets is indicative of greater financial affluence and stability of a household, the analysis shows that households without such stability and affluence are at a higher risk of transitioning into poverty when confronted with disability.

Figure 6.5: KM survival estimates by the number of assets owned



Source: Author calculations based on HIES (2016) data using STATA SE/14

In summary, the univariate analysis has established that the risk of falling into income poverty is higher at the onset and in the long term, but there are signs of adaptation in the medium term, as reflected in a stabilisation in the risk of falling into poverty. Where respondents have had to stop usual activity due to their impairment, the household survival probability is lower, as one would expect. In line with empirically established relationships between disability and gender, the survival probabilities are less for women at each analysis period. The same holds for FHHs, irrespective of the gender of the PWD. KM estimates also confirm expectations and concur with available literature

[117] Four assets are considered – radio, television, VCD and mobile phone/telephone.

on disability and spatial variables. Living in rural and remote areas is associated with a lower survival probability than living in urban areas or in the Western province. Survival probabilities by different types of assets also underscore the economic fragility that disability tends to impose on households with less financial affluence and stability. Next, the results of the multivariate analysis based on the Cox PH model are presented.

6.5.2 Multivariate analysis (Income poverty)

I. Model Building

The selection of independent variables to be submitted to the Cox semi-parametric regression is informed by both relevant empirical literature and as well as the results of log-rank tests[118] performed on the selected covariates (Callander & Schofield, 2016a; Schober & Vetter, 2018), and involved an iterative process. A Cox PH model with a single predictor variable is used to check the suitability of continuous variables. An insignificant p-value would encourage its inclusion in the final model. The set of covariates thus selected are used in the ensuing analysis as follows.

The first set of covariates are related to the PWD himself/herself. All variables turned out to be statistically significant. The first is gender, a dummy variable which takes a value of 1 if male and 0 if female. The second is the education level of the individual which is also defined as a categorical variable – taking the lowest value of 1 if the individual has had no education at all and a highest of 5 for education attainments beyond GCE Advanced Level. PWD's age worked best as a continuous variable[119].

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[118] The log-rank option is not available in STATA for data with sample weights. Instead, STATA offers its own command -*sts test, cox*- which allows to run the test with sample weights (StataCorp, 2021a).

[119] Age variables constructed as categorical variables turned out to be significant at the 5 percent threshold compared to at 1 percent for age as a continuous variable. In addition, the AIC (and BIC) was

The household level variables included the following in the extended model: characteristics of the HOH including whether s/he is a PWD, has a white-collar job or not, and his/her marital status (with unmarried as the base category), household characteristics such as the share of children in the household, whether the household gets transfer payments, has taken loans from banks, has pawned jewellery, owes to retail shops, and owns land. Spatial variables include the sector of residence (with the estate sector as the base category) and whether a household is located in the Western Province or not[120].

It is important that the PH assumption is met for the regression output to be meaningful[121]. If the PH assumption is preserved, then the Cox PH model is a robust model i.e., the results obtained using the Cox model will be very similar to the results obtained from the correct parametric model (which specifies the correct underlying distributional form of the survival function) (Dawson et al., 2021).

II. Testing the PH assumption

The global test statistic turns out to be significant and therefore rejects the null hypothesis that there is no violation of the PH assumptions. Among the individual variables, the age of the PWD, whether the HOH has a disability, and whether the HOH is married are in violation of the PH assumption. The violation of the PH assumption is also checked visually, except for the continuous age variable. There is some evidence of the violation of PH assumptions in both variables. When HOH has a disability, the

the lowest for the model with PWD’s age as a continuous variable. Accordingly, this construct was retained in the final extended model.

[120] See Table III-2 for summary statistics of the covariates used in the final models of this analysis. Note that all covariates used in the final models satisfy the equality tests. The p-value of predictors are well below 0.2 which justifies the use of them as predictors in a model.

[121] Only the PH assumption needs to be tested for the Cox semi-parametric model. There is no need to test the log-linearity of the Cox model (Schechter, 2017).

model overstates the effect of disability on transitioning into poverty in the initial years, and understates such effects towards the latter years. No such problem is observed if the HOH has no disability. Similarly, in the subset of households whose HOHs are not married, the effects of disability are overstated towards the latter years.

One solution to is to stratify the model by covariates that do not adhere to the PH assumption. Another is to construct alternative variables for the problematic ones. The latter strategy is adopted first. Accordingly, new covariates are constructed and tested for PH assumption coherence. The age variable does not work well, and is dropped. The marital status of the HOH was replaced with a dichotomous variable that takes a value of 1 if it is an MHH and 0 otherwise, but continued to violate the PH assumptions and was removed from the model.

The variable denoting whether the HOH has a disability consistently turns out to be in violation of the PH assumption. Instead of dropping it, the model is stratified by this variable in order to circumvent the PH violation problem. The final model (Table 6.3) satisfies the PH assumption (Table III-3), and has an improved AIC and BIC compared to its predecessors.

The cumulative hazard function follows the 45-degree reference line very closely (Figure 6.6). Some deviation from the reference line for large values of time is common and is not a cause for concern (UCLA: Statistical Consulting Group, n.d.). Accordingly, it can be concluded that the final model fits the data well.

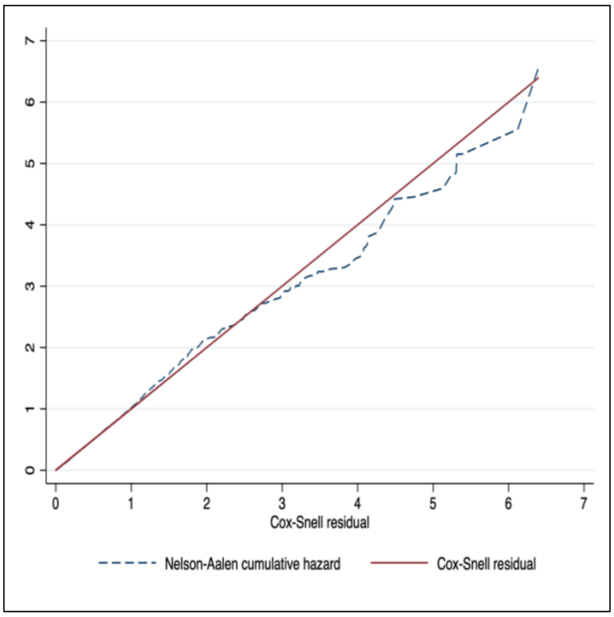
Table 6.3:Cox PH regression output – Final extended model

		Model 6[122] Final model	Model 7 Hazard Ratio
		β/se	HR
Individual variables	Sex	0.145***	1.156***
		(0.0420)	(0.0484)
	Education	-0.209***	0.812***
		(0.0260)	(0.0210)
	Stopped activity due to disability	0.077*	1.0800
		(0.0440)	(0.0475)
Household variables	HOH has a white-collar job	-0.629***	0.533***
		(0.0790)	(0.0422)
	Share of children in the household	0.982***	2.670***
		(0.1490)	(0.3970)
	Earns transfer income	0.178***	1.195***
		(0.0430)	(0.0519)
	Has loans with banks	-0.441***	0.643***
		(0.0410)	(0.0267)
	Has pawned jewellery	-0.148***	0.863**
		(0.0530)	(0.0461)
	Owes to retail shops	0.0770	1.0800
		(0.0560)	(0.0609)
	Owns land	-0.166***	0.847**
		(0.0630)	(0.0537)
Spatial variables	Urban‡	-0.563***	0.570***
		(0.1260)	(0.0720)
	Rural‡	-0.243**	0.784*
		(0.1180)	(0.0923)
	Lives in the Western Province	-0.401***	0.669***
		(0.0530)	(0.0354)
	chi2	637.2189	
	p	0.0000	
	N	7051	7051
	AIC	45919.5	45919.5
	BIC	46008.7	46008.7

Source: Author calculations based on HIES (2016) data using STATA SE/14
Note: Reference – estate sector ‡; clustered at the PSU; Exponentiated coefficients; for Model 7; robust SE in parentheses; * p<0.10, ** p<0.05, *** p<0.01

[122] See Model 6A in Table III-4 for the regression output when poverty is defined as falling below the median log household income. See also Model 6B in Table III-4 for the regression output with the nontruncated sub-sample. There are no profound deviations in the results obtained from both these econometric specifications, from what is observed in Model 6 here.

Figure 6.6: Cox-Snell residuals graph



Source: Author calculations based on HIES (2016) data using STATA SE/14

Hazard ratios (HR) in Model 7 are discussed next. An HR >1 indicates an increased risk of experiencing the event, while an HR <1 suggests its opposite. An HR of 1 indicates a lack of association between the event and the independent covariate. Thus, at a cursory glance, holding other variables constant, clearly the sex of the PWD, an increase in the share of children in the household, and the receipt of transfer income are significantly associated with a higher risk of falling into poverty. Similarly, households in which the PWD has had to stop usual activity due to a disability, and households that owe to retail shops are also at a higher risk of transitioning into poverty, although the coefficients are insignificant.

Individual level variables are discussed first. If the PWD is a female, the risk of falling into poverty increases by 15.6 percent. An increase in the level of education reduces the risk of falling into poverty by 18.8 percent, holding other variables constant. However, having had to stop usual activity due to disability increases the risk of transitioning into poverty by 8.0 percent. The results, however, are insignificant.

At the household level, if the HOH has a white-collar job, the risk of falling into poverty is lowered by 46.7 percent. An increase in the share of children in the household has an astounding risk (167 percent) on transitioning into poverty. A household that receives transfer income is 19.5 percent more likely to experience poverty. The risk of falling into poverty is 35.7 percent less for households that have obligations with banks; for households that have pawned jewellery, such risk is 13.7 percent less. Thus, households that seek financing from the formal sector (i.e., jewellery pawning and bank borrowings) are less likely to experience poverty. In contrast, households with retail shop debt, which is typically an informal form of borrowing, are 8 percent more likely to fall into poverty, but the results are insignificant. Land ownership lowers the risk of falling into poverty by 15.3 percent. Households living in the urban and rural sectors are 43.0 percent and 21.6 percent, less likely to transition into poverty, respectively, compared to those in the estate sector. Living in the Western province is associated with 33.0 percent less of such risk.

A few variations in the definition of poverty in relation to the log of household income are submitted to regression analysis to conduct a sensitivity analysis. All models uphold the PH assumptions[123]. The results (Table 6.4) are in line with intuition. The PWD being a female increases the risk of falling into poverty, irrespective of which definition is used. Such risk is about 21 percent when poverty is defined least parsimoniously i.e., below 25th percentile of the log of household income distribution. Observe also that the more stringent the income poverty definition is, the higher is the risk of falling into poverty when the PWDs are women. Conversely, the risk of falling in to poverty

[123] Global test statistics are as follows: Model 8 – chi2: 19.95; Prob>chi2: 0.0964; Model 9 – chi2: 19.04; Prob>chi2: 0.1219; Model 10 – chi2: 19.51; Prob>chi2: 0.1080; All individual variables also fulfill the PH assumptions. The detailed results are not presented, for brevity.

gradually decreases for higher educational levels. The variable denoting the stoppage of usual activity by and large continues to remain statistically insignificant.

At the household level, if the HOH has a white-collar job, the risk of falling into poverty is lowered by between 39.2 percent and 46.4 percent. An increase in the share of children raises the risk of falling into poverty by over 100 percent for all three poverty variables constructed from household income, and is about 75 percent for poverty defined using food expenditure data. Loans from banks reduces the risk of falling into poverty, by as much as 44 percent in the most austere definition of poverty. How the hazard ratios (HR) have turned out for transfer income, pawning and land ownership is telling. A household that receives transfer income is more likely to transition into poverty, and the risk is as high as 44.3 percent in the strictest definition of poverty. The reverse is true for pawning. Again, this risk is highest when poverty is defined most stringently. As expected, land ownership reduces the risk of a household falling into poverty. The HR on retail shops is insignificant across all model specifications. Living in an urban or rural area, compared to living in the estate sector, and in the Western province reduces the risk of falling into poverty, irrespective of which definition is used. However, the HRs on the rural sector variable is by and large statistically insignificant.

Table 6.4: Cox PH-regression based on alternative definitions of monetary poverty

	Model 8	Model 9	Model 10	Model 8	Model 9	Model 10	Ref: Model 7
	β/se	β/se	β/se	HR	HR	HR	HR
Definition of poverty	Falling into the bottom 2 LN HH income quantiles	Falling below the 25th percentile in the LN HH income distribution	Falling below the 25th percentile in the LN HH food exp. distribution	Falling into the bottom 2 LN HH income quantiles	Falling below the 25th percentile in the LN HH income distribution	Falling below the 25th percentile in the LN HH food exp. distribution	Falling below the mean of LN HH income
Individual variables							
Sex	0.137***	0.191***	0.038	1.147***	1.210***	1.038	1.156***
	(0.0400)	(0.0480)	(0.0510)	(0.0454)	(0.0586)	(0.0528)	(0.0484)
Education	-0.184***	-0.263***	-0.288***	0.832***	0.769***	0.750***	0.812***
	(0.0240)	(0.0310)	(0.0330)	(0.0201)	(0.0238)	(0.0248)	(0.0210)
Stopped activity	0.069*	0.066	0.117**	1.072	1.068	1.124*	1.080
	(0.0400)	(0.0580)	(0.0560)	(0.0428)	(0.0620)	(0.0625)	(0.0475)
Household variables							
HOH in white-collar job	-0.583***	-0.624***	-0.497***	0.558***	0.536***	0.608***	0.533***
	(0.0730)	(0.0980)	(0.1080)	(0.0410)	(0.0526)	(0.0658)	(0.0422)
Share of children in HH	1.109***	0.736***	0.565***	3.031***	2.088***	1.759**	2.670***
	(0.1250)	(0.1990)	(0.2080)	(0.3780)	(0.4160)	(0.3650)	(0.3970)
Earns transfer income	0.085**	0.367***	-0.022	1.089*	1.443***	0.978	1.195***
	(0.0420)	(0.0580)	(0.0550)	(0.0452)	(0.0831)	(0.0541)	(0.0519)
Has loans with banks	-0.379***	-0.579***	-0.206***	0.685***	0.560***	0.814***	0.643***
	(0.0410)	(0.0580)	(0.0580)	(0.0277)	(0.0327)	(0.0469)	(0.0267)
Has pawned jewellery	-0.096*	-0.314***	-0.061	0.908	0.731***	0.941	0.863**
	(0.0500)	(0.0710)	(0.0650)	(0.0457)	(0.0519)	(0.0614)	(0.0461)
Owes to retail shops	0.082	-0.006	-0.007	1.085	0.994	0.993	1.080
	(0.0540)	(0.0710)	(0.0690)	(0.0589)	(0.0706)	(0.0690)	(0.0609)
Owns land	-0.162***	-0.287***	-0.215***	0.851**	0.750***	0.807**	0.847**
	(0.0590)	(0.0760)	(0.0810)	(0.0500)	(0.0570)	(0.0657)	(0.0537)

Spatial variables							
Urban‡	-0.456***	-0.694***	-0.484**	0.634***	0.500***	0.616*	0.570***
	(0.1190)	(0.1520)	(0.1960)	(0.0751)	(0.0759)	(0.1210)	(0.0720)
Rural‡	-0.198*	-0.208	0.063	0.821	0.812	1.065	0.784*
	(0.1120)	(0.1390)	(0.1750)	(0.0922)	(0.1130)	(0.1870)	(0.0923)
Lives in WP	-0.335***	-0.496***	-0.285***	0.715***	0.609***	0.752***	0.669***
	(0.0480)	(0.0660)	(0.0680)	(0.0341)	(0.0404)	(0.0514)	(0.0354)
chi2	586.8936	686.9639	353.4338				
p	0.0000	0.0000	0.0000				
N	7051	7051	7051	7051	7051	7051	7051
AIC	53093.2	29745.3	29149.9	53093.2	29745.3	29149.9	45919.5
BIC	53182.3	29834.5	29239.1	53182.3	29834.5	29239.1	46008.7

Source: Author calculations based on HIES (2016) data using STATA SE/14
Note: Reference – estate sector ‡; clustered at the PSU; Exponentiated coefficients for HR models; robust SE in parentheses; * p<0.10, ** p<0.05, *** p<0.01

6.5.3 Multivariate analysis (Non-income poverty)

The second part of the multivariate analysis explores the risk of households with PWDs falling into non-income poverty. For the purposes of the ensuing analysis, non-income poverty is constructed using the 4 SOL indices (Chapter 5). A household is considered to be poor it if falls into the first- and second-SOL quantiles, which are the lowest two of the four SOL quantiles. As some of the covariates considered in the preceding models are constituents of the SOL index, they are removed from the list of covariates submitted for this analysis. Instead, two new covariates are introduced, namely the total of male and female adults in the households who are employed. The other covariates included in the preceding final models were retained. All the covariates included in the final set of models were tested for the equality of survivor functions, and their equality test statistics turned out to be insignificant. The final models and their individual covariates adhere to the PH assumptions[124], and describe the data well (Figure 6.7). The results are presented in Table 6.5.

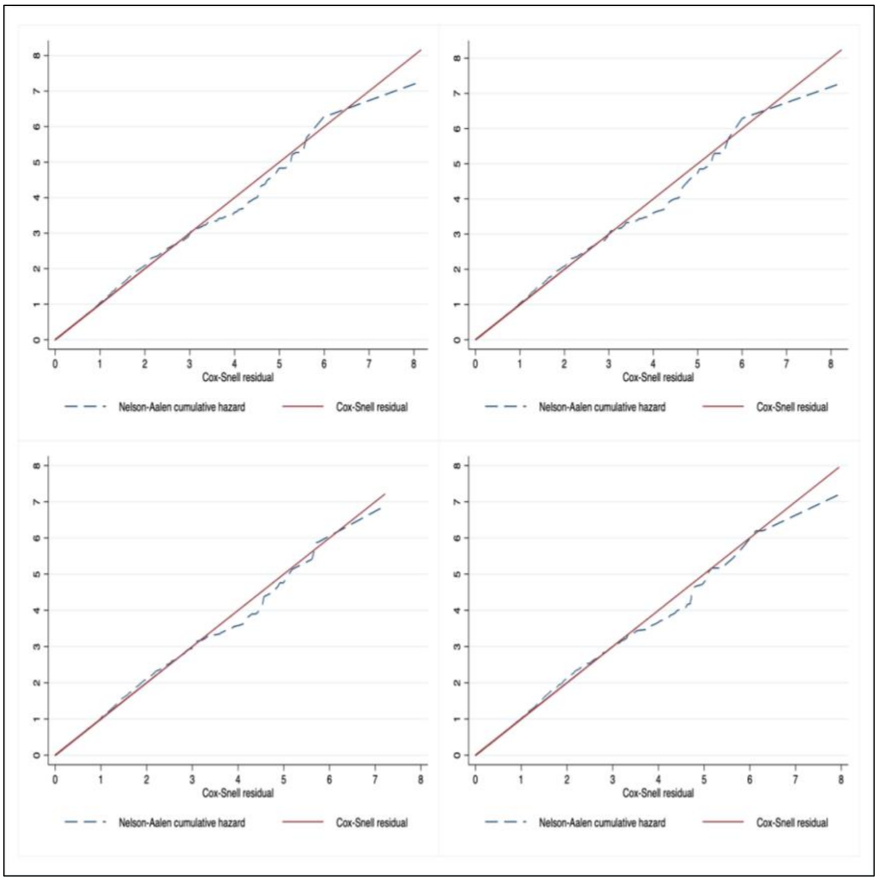
PWD's gender now has turned out to be insignificant, although a PWD being a female is still associated with an increased risk of falling into non-income poverty. An increase in the level of education significantly reduces the risk of falling into non-income poverty by 26.3 – 29.3 percent across all four specifications. Having had to stop activity due to disability is significant at the 5 percent cut off for MCA and TPCA based poverty constructs. The risk of falling into poverty in such a situation is about 11-12 percent. At the household level, the presence of children has a profound adverse impact on non-

[124] MCA-based model: chi2 – 14.01; Prob>chi2 – 0.2324. TPCA-based model: chi2 – 14.87; Prob>chi2 – 0.1884. Inverse proportion-based model: chi2 – 16.28; Prob>chi2 – 0.1310. Equal proportion-based model: chi2 – 17.71; Prob>chi2 – 0.0887. All individual variables also follow the PH assumptions. The detailed results are not presented, for brevity.

income poverty too. An increase in the share of children raises the risk of falling into poverty between 95.1 and 168.7 percent. When the HOH has a white-collar job, such risk is reduced by between 31.2 and 38.8 percent. The receipt of transfer income reduces the risk of falling into poverty between 8.1 and 12.0 percent.

An increase in the number of male and female adults reduces the risk of falling to poverty between 9.1 and 12.0 percent and 7.8 and 12.0 percent. respectively. Observe, however, that the poverty risk is lower when more men are employed. Residing in the urban or rural sector, compared to the estate sector, as well as in the Western province bode well for households. The risk of falling into poverty in urban and rural households is 59.9 to 69.4 percent and 36.9 to 40.8 percent lower, respectively, than in the estate sector. Living in the Western province reduces such risk between 32.2 and 40.9 percent.

Figure 6.7: Cox-Snell residuals graphs



Source: Author calculations based on HIES (2016) data using STATA SE/14

Table 6.5: Cox PH-regression output based on SOL using four different SOL index constructs

		Model 1 MCA/PCA	Model 2 TPCA	Model 3 Inverse prop	Model 4 Equal prop	Model 1 MCA/PCA	Model 2 TPCA	Model 3 Inverse prop	Model 4 Equal prop
		β/se	β/se	β/se	β/se	HR	HR	HR	HR
Individual variables	Sex	0.011	0.015	0.027	0.046	1.011	1.015	1.027	1.047
		(0.0410)	(0.0410)	(0.0410)	(0.0370)	(0.0417)	(0.0414)	(0.0420)	(0.0388)
	Education	-0.343***	-0.347***	-0.338***	-0.305***	0.709***	0.707***	0.713***	0.737***
		(0.0260)	(0.0260)	(0.0250)	(0.0230)	(0.0183)	(0.0182)	(0.0176)	(0.0171)
	Stopped activity	0.106***	0.113***	0.055	0.047	1.112**	1.120**	1.057	1.048
		(0.0390)	(0.0390)	(0.0410)	(0.0380)	(0.0438)	(0.0434)	(0.0432)	(0.0399)
Household variables	HOH in white-collar job	0.987***	0.988***	0.668***	0.880***	2.683***	2.687***	1.951***	2.412***
		(0.1460)	(0.1460)	(0.1490)	(0.1390)	(0.3920)	(0.3910)	(0.2900)	(0.3340)
	Child share in HH	-0.491***	-0.463***	-0.429***	-0.373***	0.612***	0.629***	0.651***	0.688***
		(0.0690)	(0.0690)	(0.0750)	(0.0650)	(0.0422)	(0.0433)	(0.0490)	(0.0449)
	Earns transfer income	-0.084**	-0.086**	-0.119***	-0.128***	0.919*	0.918*	0.887**	0.880***
		(0.0360)	(0.0370)	(0.0370)	(0.0360)	(0.0335)	(0.0337)	(0.0329)	(0.0317)
	Adult males employed	-0.096***	-0.096***	-0.128***	-0.096***	0.908***	0.908***	0.880***	0.909***
		(0.0250)	(0.0240)	(0.0250)	(0.0220)	(0.0227)	(0.0221)	(0.0220)	(0.0200)
	Adult females employed	-0.082***	-0.092***	-0.113***	-0.106***	0.922**	0.912**	0.893***	0.900***
		(0.0310)	(0.0320)	(0.0310)	(0.0300)	(0.0288)	(0.0295)	(0.0274)	(0.0272)
Spatial variables	Urban‡	-1.184***	-1.178***	-0.938***	-0.914***	0.306***	0.308***	0.392***	0.401***
		(0.1080)	(0.1090)	(0.1080)	(0.1010)	(0.0332)	(0.0334)	(0.0424)	(0.0404)
	Rural‡	-0.515***	-0.525***	-0.460***	-0.468***	0.598***	0.592***	0.631***	0.626***
		(0.0920)	(0.0920)	(0.0970)	(0.0910)	(0.0548)	(0.0547)	(0.0611)	(0.0570)
	Lives in Western Province	-0.526***	-0.520***	-0.457***	-0.389***	0.591***	0.594***	0.633***	0.678***
		(0.0550)	(0.0550)	(0.0500)	(0.0460)	(0.0324)	(0.0327)	(0.0314)	(0.0313)

chi2	759.2789	755.5548	680.4697	643.4319				
p	0.0000	0.0000	0.0000	0.0000				
N	7051	7051	7051	7051	7051	7051	7051	7051
AIC	50473.6	50470.3	51528.5	58111.5	50473.6	50470.3	51528.5	58111.5
BIC	50549.1	50545.7	51603.9	58186.9	50549.1	50545.7	51603.9	58186.9

Source: Author calculations based on HIES (2016) data using STATA SE/14
Note: Reference – estate sector [‡]; clustered at the PSU; robust SE in parentheses; Exponentiated coefficients; for HR models; * $p<0.10$, ** $p<0.05$, *** $p<0.01$

6.6 Discussion

The preceding section presented at length the findings on both univariate and multivariate analyses on the risk of falling into poverty among households with PWDs. The univariate analysis was only limited to income poverty. By and large, the findings resonate well with the existing evidence on the disability-poverty nexus, and concurs with the idea that households with PWDs tend to grapple with both income and conversion handicaps. The smoothed hazard functions concur with Gannon and Nolan's (2007) observations that the onset of disability is associated with an increase in the risk of falling into poverty which then declines in the later years. The authors found in their analysis that for some individuals while the disability onset results in a sharp reduction in household income, the next year there was some recovery of income, including additional income from social welfare. The decline in the smoothed hazard curves following an initial increase, mirrors this observation.

The smoothed hazard curves by different sub-groups support the available evidence on the association of these variables with disability. For example, it has been well-established in the empirical literature (See Chapter 2 for more details) that disability tends to have a disproportionately larger adverse effect on women, FHHs and those living in remote and rural areas, more profoundly than men, MHHs or those resident in urban areas. Disability adds another layer of vulnerability to such households. In other words, they have to grapple with the challenges brought about by disability, while also facing other drivers of socio-economic vulnerability.

Both income and non-income definitions of poverty submitted to the preceding analyses robustly support the importance of PWDs' education in mitigating the risk of falling into poverty. Its coefficient and the HR have turned out to be significant at the critical 1 percent threshold, and is consistently associated with a lower risk of falling into poverty, irrespective of what specification of poverty is used in the analysis. The role of education in pulling people out of poverty has been discussed at length in empirical literature and is well recognised in the development agenda. In fact, access to quality education features prominently as the 4^{th} among the 17 SDGs. Education helps improve the earnings potential of individuals, which in turn helps them escape poverty. Importantly, studies have found that a consistent increase in educational attainments is associated with a corresponding decline in the likelihood of experiencing poverty (Awan et al., 2011). However, disability tends to deny access to education through numerous complex channels. Financial difficulties, environment challenges (such as exclusionary educational facilities), the non-availability and/or poor standards of material and human resources available for the education of PWDs, and unaffordability of private or special education programs that cater to PWDs are some examples (Braathen & Loeb, 2011).

Even when CWDs are engaged in formal education, the prejudices and overt discrimination of such students within policy and practices of educational institutions can adversely affect their educational outcomes (Mutanga, 2018). With limited or no education, disability places children at the risk of a life time of discrimination (Mont & Cuong, 2011), and such risk is invariably higher for individuals living in rural areas where access to education might be limited. Thus, the age at the onset of disability is an important criterion in influencing a person's access to education, and therefore the resultant impact on poverty. The onset of a disability in old age, after people have acquired their education and earned income through employment, might have a lesser impact on poverty, than when experiencing disability earlier in life (United Nations, 2019).

The importance of education in reducing the risk of households transitioning into poverty is also reflected in the variable capturing whether the HOH has a white-collar job or not. Like the education variable, the white-collar job-related variable is consistently and significantly associated with a reduced risk of a household with PWDs transitioning into poverty. The logic is straight-forward; in order to secure a white-collar job, one must have a relatively high educational attainment. A white-collar job is more remunerative, is governed by formal labour laws, and tends to have more stable pay overtime with pension or other types of retirement pay. Furthermore, those employed in such jobs are likely to benefit from not just higher salaries, but they are also better positioned to benefit from macroeconomic development than those employed in other types of employment (Glewwe et al., 2000; Sameti et al., 2012). A household whose head is a white-collar employee may also be better-positioned both in terms of social and financial affluence to circumvent institutional discrimination against his/her household members who are affected by disability, by being able to pay for private healthcare, private education or private transportation, for example.

Next, the finding that households with a higher share of children are at a heightened risk of falling into poverty stands to reason. First, empirical evidence suggests a positive relationship between poverty and fertility i.e. households with more children tend to be poorer than other households (Mussa, 2014). This does not mean that poorer households necessarily have more children, but that households with many children are characterised by a higher rate of transitioning into poverty, and a lower rate of transitioning out of poverty (Aassve et al., 2005; Cantó et al., 2007).

On the one hand, more children increase the need for care work, and if households cannot afford paid care, adult household members may have to withdraw from the labour market to fulfil such a role, reducing the household's overall labour supply. On the other hand, a higher number of children increases the dependency ratio of a household. As more resources are allocated to necessary expenses such as food and clothing, such households may find it difficult to invest in assets and amenities that improve their SOL. This would explain the profoundly high risk of falling into poverty among households that have a higher share of children, not just in terms of income poverty, but also in terms of SOL. The ability of such households to transition out of poverty may be linked to exogeneous factors such as the availability of social protection programmes (Cantó et al., 2007).

As transfer income primarily consists of transfer payments from government social protection programmes such as *Samurdhi*, disability or elderly pay, it stands to reason that households that receive such income are more prone to transitioning into poverty than other households. Yet, the receipt of such income reduces the risk of falling into non-monetary poverty as measured using the SOL. This makes sense, however. It is their lower income levels, that make such households eligible for state-funded poverty alleviation and social protection programmes. However, households may use such transfer income to purchase assets and amenities which in turn put them in a higher quantile with regard to SOL than one based merely on household income. Importantly, the receipt of transfer income makes households less likely to fall into poverty, as measured by food expenditure. In effect, such income is important for households that receive these transfer payments to help them stay out of poverty.

The financial obligations variables are quite telling. It is quite clear from the analysis that financial obligations to banks in fact allude to greater economic affluence among households, and sits well with intuition. Borrowing from the formal banking system is a traditionally demanding process, and typically requires a borrower to be able to present collateral, and documented regular income in order to obtain facilities. Thus, the inability to meet such requirements precludes the opportunity to borrow from the formal banking system. As such, that households which have borrowed from banks are less likely to transition into poverty stands to reason.

Note that the risk of falling into poverty among households that have pawned jewellery is also less, yet its magnitude is a little over 20 percent less than the percentage corresponding to the bank variable. On the one hand, jewellery ownership is also a sign of wealth or social status. As such, it makes sense then that households that own jewellery are less likely to transition into poverty compared to households that do not own jewellery. A more plausible reasoning is that jewellery in this part of the world is a fungible quasi-liquid form of asset that can be used to smooth consumption when incomes drop (Doss et al., 2008; Frankenberg et al., 2003; Quisumbing & Kumar, 2011). The ability to pawn jewellery is a particularly important buffer against falling into poverty, when it is defined most parsimoniously (i.e., falling into the poorest income quantile). That the ownership of land reduces the vulnerability of falling into poverty concurs with the idea that land is considered to be an indicator of economic well-being, social status and political power (Mukhopadhyay, 2001).

The employment of both male and female adults reduces the risk of a household with PWDs falling into non-income poverty as measured by the SOL. The higher HR for male adults, however, is suggestive of the higher importance of male employment in strengthening household SOL, and resilience against the risk of transitioning into non-income poverty, than that of female employment. The gender pay gap that has been observed for Sri Lanka (Gunewardena, 2002; Solotaroff et al., 2020) may partially explain why male employment might be somewhat more important than female employment in lowering the risk of a household falling into poverty. Nonetheless, that an increase in the number of employed female adults statistically significantly reduces the risk of a household falling into non-income poverty has important policy implications on female LFP in Sri Lanka. If more opportunities are created for women to take up work, it would bode well for strengthening the socio-economic well-being among households with PWDs, and reducing their vulnerability to falling into poverty.

As discussed in preceding sections, the spatial variables continue to highlight the disproportionately higher negative effects of disability on households living outside urban areas. The results consistently show that living in the estate sector and outside the Western Province increase the risk of a household with PWDs falling into income and non-income poverty. Moreover, the results are robust for different specifications of poverty, and consistently turn up statistically significant at the critical 1 percent level in relation to non-income poverty. They also corroborate the findings of Kumara and Gunewardena (2017) who observed that poverty was highest for the estate sector, followed by the rural and urban sectors, respectively across several different definitions of income and non-income poverty.

An array of complex factors underpins the association between spatial variables and the risk of households with PWDs falling into poverty. First, the small and stagnant regional economies, their weak labour markets, poor infrastructure, facilities, services and low connectivity would not only affect the ability to earn income, but may also have a negative effect on the human capital development of residents in such areas, especially among PWDs. Secondly, disability may add to the many layers of jeopardy that households located in these areas encounter. These include the reduced labour supply if PWDs need extra care and additional household expenses due to disability such as medical and travel expenses. Thirdly, the non-availability of adequate health facilities such as hospitals and clinics may cause small injuries and impairments into long-term disabilities. However, empirical evidence does not suggest that residence in a rural area is necessarily associated with a higher degree of discrimination and stigmatization of PWDs and their households (See for example, Forthal et al., 2019; Loganathan & Murthy, 2008).

In summary, the findings from the above analysis are broadly in line with and add to the existing corpus of empirical evidence on the disability-poverty nexus. Findings from both the descriptive and econometric analysis highlight how disability tends to disproportionately burden households that are already pre-disposed to poverty through female headship, low educational attainments, the lack of assets and residence in remote localities. Conversely, households in which PWDs have acquired a higher education, where their HOHs work white collar jobs, are able to borrow from banks, and/or pawn jewellery to make up for a shortfall in income, are resident in urban areas or the Western province are at a lower risk of falling in to poverty. These findings also underscore the economic fragility households face at the onset of disability at a young age. In the initial years, there is a rapid decline in the households' ability to survive the risk of falling into poverty. Such risk tempers in the long term however, insinuating that the onset of disability in a household that has acquired human capital, and savings through livelihoods are less likely to be as vulnerable to poverty in the face of disability, compared to an early onset of disability. Thus, disability cannot be viewed as a driver of vulnerability in isolation. It interacts with different variables in producing differential outcomes among different households.

6.7 Summary

Using available secondary data, this paper attempted to explore the risk of a household with PWDs falling into poverty, following the onset of disability. Although the HIES (2016) data used for this analysis is cross-sectional in nature, the survey has retrospective recall information about the duration of disability/chronic illness which makes it possible to carry out a single-episode survival analysis (Mills, 2011). The event was defined as falling into a) income poverty and b) non-income poverty. Several definitions of income and non-income poverty were employed to test for the robustness of the results.

Both the univariate and multivariate analyses produced results in favour of the widely established positive association between disability and poverty in the empirical literature. The descriptive analysis showed that the probability of entering into income poverty is elevated at the onset of disability, stabilises in the medium term, and picks up rapidly in the long-term. Households that appear to come from an affluent financial background (as proxied by the ownership of big ticket assets) seem to be better at withstanding the risk of poverty, compared to those that do not.

The econometric analysis also mirrors these findings. An individual's own and the HOH's human capital are critical for reducing the risk of falling into both income and non-income poverty among households with PWDs. Asset ownership also provides a buffer against the risk of households with PWDs falling into poverty. By and large, the results suggest that households characterised by lower access to human and financial capital are more likely to transition into poverty in the face of disability.

The results are important for several reasons. First, it is expected that this study contributes in a modest way to filling the lacuna of empirical studies that explore the nexus between poverty and disability duration. As such studies are non-existent in South Asia, and in LMICs in general, to the best of my knowledge, it is hoped that this analysis provides the impetus for further research along similar lines to unpack the long-term associations between disability and its implications on income and non-income variables of households. Secondly, from a policy perspective, the findings of this analysis underscore the importance of investing in the human capital of PWDs, in helping households stay out of poverty. Creating decent job opportunities in the formal labour market is also important in this regard. It is also clear that macroeconomic and other policies and initiatives that can help households improve their assets and financial capital are also required to lower the risk of households with PWDs falling into poverty. The findings also speak to the importance of making economic growth and development more equitable so that households living in rural and estate sectors and outside the Western Province are also able to benefit from infrastructure and service improvements which in turn would benefit households with PWDs. Finally, this study also points to the possible benefits of investing in designing and implementing longitudinal surveys. Such data would allow for a more rigorous analysis which can generate critical insights for creating more inclusive socio-economic conditions for PWDs and their households.

Chapter Seven: Economic implications of disability on households in Sri Lanka - A causal analysis

7.1 Introduction

A plethora of empirical studies have concluded in favour of a positive association between disability and poverty. While many of them discuss and map potential causal pathways in both directions (See among others, Lustig & Strauser, 2007; Pinilla-Roncancio, 2015), they do not necessarily attempt to establish these causal links using empirical data. There is value in exploring the correlation between poverty and disability, but there is also a need for research studies that establish the causal pathways between disability and poverty, for a number of reasons. First, compared to the relatively larger evidence base that explore correlations between the two variables, there is a lacuna of a systematic investigation into establishing causal pathways between them. Secondly, identifying a causal link between the two variables is central to devising appropriate policy recommendations and other interventions that attempt to address the economic implications of disability among PWDs and their households, and to lower the incidence of disability among the poor. Thirdly, the efficiency of policies in pulling households with PWDs out of poverty and economic vulnerability can be measured through causal studies (Mitra et al., 2011). A case in point is the study conducted by Christian et al. (2019) that assesses the long-term impact of Indonesia's Program Keluarga Harapan (PKH), a conditional cash transfer programme, on the suicide rates among its recipients. Using causal analysis, the study establishes that PKH has been effective in reducing suicide rates among recipients, and particularly so in areas that experience adverse agricultural productivity shocks. Thus, this study shows that social welfare programmes can mitigate the negative effect of economic shocks on people's mental health.

The analysis undertaken in this chapter applies econometric technique to the HIES (2016) data in a modest attempt to assess the causal economic implications of disability on households experiencing it – measured both in income (log of household income) and non-income (SOL) terms. A preliminary analysis shows that not only is the distribution of both the log of household income and the SOL index[125] statistically different between households with and without PWDs[126], but also that the income and SOL index of households without PWDs first order stochastically dominates those of households with PWDs[127]. These observations, along with the findings of the preceding chapters, allude to the retrogressive effects disability seems to create on household income and SOL, and merits an investigation into its causal effects on these outcomes. The layout of the rest of this chapter is as follows. The next section (7.2) briefly reviews the relevant literature. Section 7.3 presents the methodology. Sections 7.4 and 7.5 present the results of the regression analysis. These results are discussed next (7.6), followed by a recap of the chapter (7.7).

7.2 Literature review

The term 'treatment effect' was first used in medical literature to study the causal effects of a treatment procedure, such as a new drug, on patients, but the term is used more generally now. Such experimental studies follow randomized control trial (RCT)

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[125] Only the MCA-based index is applied.

[126] The two-sample Kolmogorov – Smirnov tests of the equality of distributions is used. However, sample weights are not allowed in this non-parametric test.

[127] The *distcomp* command developed by Kaplan (2019) is used to test for the first order stochastic dominance (FOSD). The results presented in Table IV-1, Table IV-2 and Figure IV-1 in Appendix IV are a restricted form of FOSD that Atkinson (1987) has defined in Condition 1 (p. 751). A restricted FOSD is more realistic because empirically, dominance is only sensible over a restricted range of a continuous variable of income, wealth, or in this case an index of SOL (Davidson & Duclos, 2013). As seen in the dashed line in Panel A of Figure IV-1 (see also Table IV-2), the FOSD holds roughly in the range 6.66-11.89 of income. This range is 11.34-93.87 in the SOL index (Panel B of Figure IV-1 and Table IV-2). The familywise error (FWER) is the probability of rejecting any true H_{0r} where $H_{0r}: F(r) = G(r)$. The FWER strongly controlled for at 10 percent (Kaplan, 2019).

procedures in which an experimental group receives the 'treatment', while a control group does not; any observed differences between the two groups is attributable to the 'treatment effect' under study. RCTs are increasingly used in social experiments too (See for example Banerjee et al., 2015; de Mel et al., 2018; Karlan & Zinman, 2010). However, 1) the ethical implications of assigning participants randomly to treatments; 2) the high cost involved given the long-term and complex nature of the research design; 3) practical challenges of executing randomization in the field; and, 4) the difficulty of avoiding treatment contamination in social experiments tends to make RCT methods less amenable to social research (Baldassarri & Abascal, 2017; Macdonald & Macdonald, 2001). On the other hand, quasi-experimental methods, which do not rely on the random assignment of participants into groups, offer a pragmatic alternative to measuring the 'treatment effect' of a social experiment such as a livelihood intervention or a skills development training, where randomisation might be ethically, administratively and/or logistically impractical.

A diverse range of topics related to disability (and more broadly health), including medical, psychological, educational, cultural, social and economic issues are explored using quasi-experimental methods. However, to the best of my knowledge, there are only a handful of studies that follow quasi-experimental procedures to probe specifically into the disability-poverty nexus. These studies are discussed first, before moving onto a more general discussion of the disability-related socioeconomic and cultural issues investigated using quasi-experimental research methods.

A recent study conducted by Takasaki (2020) combines a natural experiment (defined as landmine explosions) with spatial blocking (by way of a survey stratified by disability status within villages), in order to conduct a matching analysis to study the impact of disability on poverty in Cambodia. The focus on limb amputations among adults due to landmine explosions makes the treatment (amputation) more random than due to other reasons. The author finds that amputation has a significant negative impact on income and consumption, and tends to increase poverty levels and their magnitude. Curiously, however, subjective well-being (or adaptation) is not affected as much by the disability.

Igei (2017) employs quasi-experimental methods to quantify the real gap in multidimensional poverty between PWDs and non-PWDs in South Africa. To do so, the author applies an exact covariate matching technique, which as the name implies, allows to compare PWDs to non-PWDs with identical observable characteristics as the PWD from household data obtained from the 2011 South African census. The matching-based decomposition method is then used to identify differences in poverty explained by disability status. The findings show that there is a high prevalence of poverty among PWDs, but also that PWDs tend to be more deprived in areas of education and employment. At the household level, the deprivation is larger for working age (25-54 years) PWDs. The study also finds evidence of racial and regional differences in the impact of disability on poverty. In sum, the analysis underscores how disability intersects with other drivers of vulnerability to create more unfavourable economic outcomes for individuals already predisposed to poverty.

Another recent mixed methods study conducted by Hameed et al. (2021) measures the effect of the impact of Disability Allowance on poverty, well-being and social participation of the recipients in Maldives. Its quantitative research component employs a difference-in-difference analysis to evaluate the impact of the Disability Allowance on data collected from 5,363 individuals in a baseline and end line survey. The authors find that the impact of the Allowance was negligible, and did not improve household per capita expenditure, social participation, quality of life or access to work and education. Although some improvement on the health indicators were seen, by and large, the recipients of Disability Allowance are found to be significantly poorer, having a lower quality of life and vulnerable to social exclusion compared to non-PWDs.

Mohanan's (2013) approach to identifying the exposure variable can be likened to that of Takasaki (2020) in that it uses bus accidents as a proxy for exogeneous health shocks. The study used accident data obtained from the Karnataka State Road Transport Corporation and primary data collected from 420 households in Karnataka, India. It applied a matching procedure to investigate the causal effects of health shocks faced by households on their income and consumption. The analysis showed that households managed to smooth food and housing expenses, but experienced a drop in educational expenses. Notably, there was an increase in high-cost borrowings to meet the shock-related expenses, and therefore was found to be in debt compared to the control group.

Farahani et al. (2013) have used propensity score matching (PSM) to estimate the effects of HIV/AIDs-related disability on absenteeism and earnings among adults, using data from a random sample of 4,000 adults (aged 15-49) in Botswana. Absenteeism between individuals with and without HIV/AIDs-induced disabilities is compared using PSM, and the effect of such disability on earnings is measured by applying the Heckman selection procedure. The study found that HIV/AIDs-induced disability resulted in 5.2 and 3.5 additional days of absenteeism among men and women, respectively, in the month prior to the survey. They also earned 38 and 43 percent less, respectively compared respondents without HIV/AIDs-related disabilities.

Next, the scope of the literature survey is expanded from quasi-experimental studies that explore the disability-poverty nexus to those that investigate the impact of disability on variables such as employment, education or socio-cultural attitudes (all of which, obviously, have implications for falling into poverty). For example, Brzykcy and Boehm (2021) investigate the impact of labelling PWDs as 'severely disabled' on their opportunity for workplace relationship building. They apply a regression discontinuity design (RDD) to a subsample of 845 observations from a larger dataset representative of the German workforce, and observe that being officially labelled as 'severely disabled' creates significant workplace disadvantages for PWDs, compared to those who have similar disabilities but are not officially categorised as such. They point out how disability labelling leads to stigma and ableism within the work place, creating unfavourable outcomes for PWDs labelled 'severely disabled' in workplace relationship building.

Halla and Zweimüller (2013) used secondary data from Austria to study the causal effects of negative health shocks on the labour market outcomes among adults aged 25-50. Like Mohanan (2013), Halla and Zweimüller defined the exposure variable as accidents, although here the type of accidents considered are those met with while commuting to and from work. The authors first employed an exact matching technique to create comparable pre-treatment, treatment and control groups. Then fixed effects difference-in-difference methods were applied to these groups to evaluate the effect of the health shock on the respondents' employment and income. The findings showed that individuals who had met with accidents were significantly less likely to be employed following their health shocks, even after five years following such shocks. Even those who managed to return to work or stay employed incurred earnings losses.

Accordingly, the study concluded that such negative health shocks would lead to individuals leaving employment altogether, or experiencing a compromised career.

A similar study is conducted in Spain by Cervini-Plá et al. (2016), who investigate the effect of negative health shocks (defined as disability due to accidents) on the wages of workers following a matching method for the treatment effect. Drawing secondary data from the Continuous Sample of Working Lives dataset for 2010, Cervini-Plá and colleagues test the hypothesis that the wage gap following a disability will reduce after some time, as the transitory drop in productivity disappears when the PWD adjusts to the new circumstances. The findings indicate a drop in wages following a health shock, but this is more than compensated when both the wages and the disability benefits are taken together. Yet, their wages (defined as wages plus disability benefits) are still below those of the control group (without disabilities). Although the wage gap between the two groups narrows over time, there is a constant wage gap associated with a permanent drop in productivity following disability, which persists over time.

Exploring a different angle of disability on labour market outcomes, Oncel and Karaoglan (2020) look at the differences in probability of LFP among PWDs and non-PWDs in Turkey. They apply propensity score matching (PSM, and probit) techniques to a sample of males aged 25-64 from the 2012 Turkish Health Survey data, and observe that the probability of LFP at every age is lower for PWDs. LFP is lowest among individuals with very severe activity limitations. There is also a negative association between education and disability, reflected in a low LFP among PWDs with low educational attainments, in line with existing evidence.

However, an earlier study conducted by Lechner and Vazquez-Alvarez (2011) on the labour market outcomes among PWDs in Germany showed different results. In an analysis of the German Socio Economic Panel (1984-2002) data, and an application of PSM methods, they observed that there was no significant decline in income or increase in unemployment in West Germany, owing to disability. Instead, only a 9-13 percent reduction in individual employment opportunities was seen, and that too depending on the severity of disability. On the other hand, there was no discernible increase in unemployment rates, alluding to a voluntary withdrawal of PWDs from the labour force. The authors have posited that the evidence points to the success of the German social security system in reducing the economic hardships brought about by disability.

In sum, this literature survey discusses some of the salient and most recent studies that apply quasi-experimental methods to study the impact of disability on poverty itself, or drivers of poverty, using different types of data sets such as primary and secondary data, and multiple-period and single-period cross-sectional data. The causal link from disability to poverty that these studies establish emphasises the importance of looking closely at the poverty-disability nexus in the broader social, economic and development discourse. Importantly, these findings are of higher internal validity as quasi-experimental methods allow to better control for confounding variables than correlational analytical methods (Chiang et al., 2015). Having established correlational links between disability and its economic ramifications on households in preceding analytical procedures, the following section presents the methodology of a modest attempt to establish the causal link between the two variables of interest in the context of Sri Lanka.

7.3 Methodology

Before proceeding to the discussion of the methodology, a preliminary remark is in order. An implicit stance about causal inference is that the data submitted for such procedures should be panel/longitudinal in nature. However, the prejudices against the use of cross sectional data for causal analysis are increasingly challenged[128]. For example, Savitz & Wellenius (2022) argue that it is oversimplistic to assume that specific biases that affect inferring causality from cross-sectional data are absent from longitudinal data which are considered more suited for the purpose. In effect, ignoring the findings of cross-sectional studies based on such assumptions runs the risk of discarding useful evidence for assessing causal relationships (Ibid; see also Wunsch et al., 2010 for a more detailed discussion of the challenges of using longitudinal data for causal inferences). Secondly, as Van der Stede (2014) has reasoned,

> "if we can establish a compelling theoretical causal model …; then find an association between the focal variables …; maintain that one variable, the cause, logically precedes the other, the effect …; and mitigate confounding effects …, [using cross-sectional surveys] we may reasonably confidently, although never assuredly, argue for a causal relationship" (p. 12).

Thirdly, a preliminary analysis of data, background knowledge and hypotheses from relevant prior work and a plausible research model can help establish causal relations using cross sectional data, especially if temporal information is encapsulated in them (Van der Stede, 2014; Wunsch et al., 2010). In any case,

> "reviewers or readers can be rather forgiving about reasonable and/or practical limitations of the method if the results that can be inferred from it are "consistent with" coherent theoretical arguments about the relationships among the studied variables" (Van der Stede, 2014, p. 6).

[128] There is also a summer school conducted by Michael Grätz, lecturer (Maître assistant Ambizione) in sociology at the University of Lausanne titled " Causal analysis with cross-sectional data" See details at: https://www.summerschoolsineurope.eu/course/16628/causal-analysis-with-cross-sectional-data

In summary, causal inferences using cross-sectional data might have its limitations, but are nonetheless useful as long as the research is situated in the light of relevant theory, the regression models are robustly constructed and are informed by background knowledge, and the results are properly analysed and judiciously interpreted using appropriate language (Van der Stede, 2014). The analytical method is discussed next.

Causal inference sets out to test whether a cause-to-effect relationship between two variables exists (e.g., the effects of a new treatment procedure on cancer patients, or the effects of a new type of fertilizer on paddy harvest, or in this case the effects of disability on a household's economic situation). Formally:

$$Y_i = Y_i\, T_i = \begin{cases} Y_{i0} & if, \quad T_i = 0 \\ Y_{i1} & if, \quad T_i = 1 \end{cases} \qquad 7.1$$

where T_i is the treatment of individual i and Y_i is the outcome for individual i being measured.

$$Y_i = Y_i\, T_i \equiv h(T_i, X_i) \qquad 7.2$$

where $X_i = (Y_{i0}, Y_{i1})$ captures all other determinants of Y_i.

This assumption implicitly imposes the Stable Unit-Treatment-Value Assumption (SUTVA) assumption[129] central to making meaningful causal inferences. Using an observational study type as an example, let Y_{i1} be the potential income of individual i if s/he were to participate in a livelihood support programme and let Y_{i0} be his/her potential income if the individual i did not participate in it. T is a dummy variable that takes a value of one for having participated in the programme, and zero otherwise. The treatment effect for the individual i is then measured as follows:

[129] SUTVA is a priori assumption that consists of two parts: (a) there is only one form of the treatment and one form of the control, and (b) there is no interference among units (Rubin, 2003). SUTVA is violated when there are unrepresented versions of treatment or when there is interference between the units (Rubin, 1986).

$$Y_i = Y_{0i} + T_i(Y_{1i} - Y_{0i}) \qquad 7.3$$

The treatment effect is:

$$T = Y_{1i} - Y_{0i} \qquad 7.4$$

However, the fundamental problem of causal inference, as Holland (1986) has called it, is the impossibility to observe the effect of the treatment at the individual level[130]. Of the two solutions available to address this problem, the scientific one is to exploit assumptions of homogeneity and invariance. The statistical solution is to observe the average causal effect (ACE) on the population. Thus, the average treatment effect (ATE, also called ACE) T is:

$$T = E(Y_{1i} - Y_{0i}) = E(Y_{1i}) - E(Y_{0i}) \qquad 7.5$$

The assignment mechanism refers to the method by which individuals are assigned treatment. If it is random, as followed in RCT type studies, the assignment mechanism is said to have strong ignorability (Rosenbaum & Rubin, 1983), and therefore forces the selection bias (i.e., the difference in the Y_i between those who were assigned treatment and not) to be zero. A treatment assignment is considered to be strongly ignorable if 1) the probability of an individual receiving treatment is strictly between 0 and 1; and 2) all possible confounding covariates are measured in X, so that the treatment effect is independent of the potential outcomes, conditional on X. More formally, given a vector of confounding covariates X:

$$0 < Pr\,(T = 1|X) < 1, for\ all\ X \qquad 7.6$$

$$(Y_1, Y_0) \perp T \mid X \qquad 7.7$$

The ATE is based on a random assignment mechanism for deciding who are assigned into treatment and control groups, which is best accomplished with RCT methods in

[130] To use Holland's (1986) own example to illustrate this point, if student i is a fourth grader and the treatment t is the enrolment in a new math programme, and Y_i is the score of the student i on a test at the end of the year, it is not possible to measure both $(Y_i|T = 1)$ and $(Y_i|T = 0)$.

experimental studies. As randomisation results in the generation of a valid counterfactual, or a potential outcome[131], as Rubin (2005) has preferred to call it, RCTs are considered the 'gold standard' of causal inference (Gopalan et al., 2020). However, as discussed earlier, costs, logistics and ethical problems make RCTs less feasible in social research. In the place of RCTs, quasi-experimental methods which allow the researcher to manipulate the main independent variable of interest to mimic experimental conditions, provide a useful, pragmatic alternative for causal inference. A main problem that threatens the internal validity of quasi-experimental designs is the possibility of selection bias. Because the assignment mechanism is nonrandomized, the assumption of strong ignorability no longer holds. As a result, the outcome of a treatment might be potentially explained by the pre-existing conditions of individuals because they are not randomly assigned to specific groups.

For example, an entrepreneurial drive would encourage a person to take up self-employment. It may also motivate them to enrol in a livelihood support programme. If the statistical model does not account for the entrepreneurial spirit of enrolees in the livelihood programme, the estimates will be biased, and the difference in outcome between the treated and control groups will not be an accurate reflection of the impact of the programme (Gunatilaka & Vithanagama, 2018). The selection bias can be presented as follows:

$$E(Y_i|D_i = 1) - E(Y_i|D_i = 0) = E(Y_{1i}|D_i = 1) - E(Y_{0i}|D_i = 0) \qquad 7.8$$
$$= E(Y_{1i} - Y_{0i}|D = 1) + [E(Y_{0i}|D_i = 1) - E(Y_{0i}|D_i = 0)]$$

131 Y_{1i} is the potential score of student i if s/he was enrolled in the math programme; Y_{0i} is the potential score if s/he was not enrolled in the math programme; thus for each student, 2 potential outcomes exist, of which only 1 can be observed. The unobserved outcome is the potential outcome/counterfactual.

The first half of Equation 7.8 shows the ATE on the treated (ATET) and the second half shows the selection bias. The selection bias problem can be circumvented either by randomization (as discussed above), or by devising a modelling strategy that can generate a valid potential outcome that makes it possible to reliably estimate the income of individuals who participated in the skills programme, as if they have not done so. Rubin (1974) has recognized that while randomisation should be employed as much as possible to estimate causal effects of treatment, the use of carefully-controlled nonrandomised data to measure causal effects is both a reasonable and necessary procedure. This is because:

> "the science—the covariates and the potential outcomes—is not affected by how or whether we try to learn about it, whether by completely randomized experiments, randomized blocks designs, observational studies, or another method" (Rubin, 2005, p. 323).

Moreover, Kenny (1975) has likened the difference between true and quasi-experiments to the magnitude of the difference between sight and blindness. Quasi-experimental methods tend to force researchers to "grope in the darkness...but this blindness both forces us to compensate for biases and helps us develop a newfound sensitivity to the structure of data" (p. 360).

The potential outcomes model for observational data is built on three assumptions that are considered to be automatically held when the assignment mechanism is truly random:

1. Conditional ignorability (unconfoundedness): conditioning on the observable covariates makes the outcome conditionally independent of the treatment (Eq. 7.6)
2. Overlap: Each individual has a positive probability of receiving any level of treatment (Eq. 7.7)

3. Independent and identical sampling distribution (i.i.d.): Potential outcomes and treatment status of each individual are unrelated to the potential outcomes and treatment status of all other individuals in the population (Cattaneo et al., 2013; Drukker, 2014).

Assumptions 1 and 2 together make up what Rosenbaum and Rubin (1983) have referred to as strong ignorability. If they hold, the outcome of non-participants that have similar covariates as the participants can be treated as if they were the potential outcomes for the participants (Roberts, 2009). Conditional ignorability is a fairly strong assumption to make, but might be reasonable in some empirical contexts, especially if the vector of covariates X is extensive and detailed, and is often imposed to estimate treatment effects (Cattaneo et al., 2013; Lundberg, 2017). Furthermore, this assumption is often untestable, although qualitative interviews may provide some credibility to the validity of this assumption (Lundberg, 2017). Importantly, however, Wooldridge (2010) has pointed out that weaker versions of the ignorability and overlap assumptions are sufficient for identifying the ATET.

The potential outcome model for the ensuing analysis is as follows, and is drawn from the Stata 14 manual[132] (StataCorp, 2015). Y and T are the observed outcome and treatment effect, respectively. X and W are the vectors of covariates that affect the outcome Y and treatment T, respectively. X and W may have covariates in common. The observed data are Y_i, T_i, X_i, and W_i. The model is specified as follows:

$$Y = (1 - T)\, Y_0 + TY_1 \qquad 7.9$$

Where $Y = Y_o$ when $T = 0$ and $Y = Y_1$ when $T = 1$. The function forms of Y_0 and Y_1 are as follows:

[132] See ‘teffects intro advanced — Advanced introduction to treatment effects for observational data’ available at https://www.stata.com/manuals/teteffectsintroadvanced.pdf#teteffectsintroadvanced for a full discussion

$$Y_0 = X'Y\beta_0 + \varepsilon_0 \qquad 7.10$$

$$Y_1 = X'Y\beta_1 + \varepsilon_1 \qquad 7.11$$

β_0 and β_1 are coefficients to be estimated and ε_0 and ε_1 are the error terms uncorrelated with X or W. Accordingly, each potential outcome is separated into a predictable component $X\beta_t$ and an unobservable error term ε_t. The functional form, while linear here, can take any other form. This is referred to as the outcomes model in the remainder of the discussion.

The treatment assignment is determined as follows:

$$t = \begin{cases} 1\, if\; w'\gamma + \eta > 0 \\ 0\; otherwise \end{cases} \qquad 7.12$$

γ is a vector of coefficeints to be estimated, and η is an unobservable error term that is not correlated with X or W. The treatment assignment process two has two separate components, a predictable part $w'\gamma$ and an unobserved error term, η. This will be treated as the treatment model for the rest of the discussion. The coefficient vectors β_0, β_1 and γ are auxiliary parameters which will be used to estimate the ATE and ATET. After conditioning the covariates, the treatment is assumed to be as good as random (Drukker, 2014). Treatment effects can be estimated using the following models:

Table 7.1: Types of auxiliary models to estimate treatment effect

Model	**Estimator**
Outcome	Regression adjustment
Treatment	Inverse-probability weighting (IPW)
Outcome and treatment	Augmented IPW (AIPW)
Outcome and treatment	IPW RA (IPWRA)
Outcome (nonparametrically)	Nearest-neighbour matching
Treatment	Propensity-score matching

Source: Drukker, 2014.

The Augmented Inverse Probability Weighting (AIPW), Propensity Score Matching (PSM), and nearest-neighbour matching do not support sampling weights and cannot be meaningfully incorporated into population-weighted data. As such, these methods will not be used in the analysis, and therefore will not be discussed further[133]. The remaining estimators are discussed briefly below, and draws on Drukker (2016), Huber and Drukker (2015) and StataCorp (2021b).

7.3.1 Regression adjustment (RA)

RA is best suited when the determinants of outcome are known. The RA method runs separate regressions for each treatment level i. The means of the predicted outcomes over all the data is used to estimate the Potential Outcomes Means (POM). The differences in the estimated POMs are the ATEs. The ATET is the difference in predicted outcomes of the sub-sample of observations for whom $T = 1$. The RA estimators model the outcome without any assumptions about the functional form for the probability of treatment model.

7.3.2 Inverse Probability Weighting (IPW)

IPW uses weighted averages of the observed outcome variable to estimate the mean of the potential outcomes. Each weight is the inverse of the probability that an individual receives some level of treatment. Weights account for the missing data that is central in the potential outcomes model. A weight closer to one is assigned to observations that are not likely to have missing data, and a (much) larger weight than one for observations

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[133] While the user-written STATA command *psmatch2* allows for sampling weights, STATA's own command - *teffects psmatch* - does not allow for sampling weights. However, - *psmatch2* - does not take into account that Standard Errors are not estimated.

that are likely to have missing data. The IPW models the treatment without any assumptions about the functional form of the outcome model.

7.3.3 IPW RA

IPW RA, also known as "Woolridge's doubly robust" estimator, combines the outcome (RA) and treatment (IPW) modelling. It uses the IPW weights to estimate the corrected regression coefficients, which are then used to perform the RA. It has the doubly robust property, in that, the estimates of the treatment effects will be consistent if either the treatment or the outcome model are mis-specified. (Both cannot be mis-specified, however). The next section discusses the variables submitted to the regression analysis.

7.3.4 Variables

Rubin (1986) has explained that "we are not ready to estimate, test, or even logically discuss causal effects until units, treatments, and outcomes have been defined in such a way that SUTVA is plausible" (p. 962). The selection of treatments and outcomes are accordingly thoroughly thought through to ensure that SUTVA is reasonably in place, so this aspect is discussed first.

There are two treatments that are considered separately. The first is whether a household has at least one individual who has had to stop usual activity due to disability (PWD). The treatment variable is dichotomous, and therefore has no multiple treatment levels nor interreferences, thereby satisfying the SUTVA assumption. The second treatment variable considered is whether a household has borrowed from a bank or not. This too is a dichotomous variable, aligned with the SUTVA assumption. Two outcome variables of interest are considered – the log of household income and household SOL, proxied by the MCA index (Chapter 5). The first treatment variable of interest is discussed first.

It follows from the preceding discussion that Inverse Probability Weighting (IPW) can be employed when the determinants of the treatment variable are known. How disability is defined matters to identify such determinants. As discussed at the outset, disability is a condition that results from a combination of an individual's impairment and environmental barriers. In its positioning at the intersection of medical and socio-environmental variables, disability can be modelled as a dependent variable, and a set of covariates that determine disability can be identified reasonably. The HIES data does not gather much disability-focused information, but plausible and meaningful covariates can be constructed with the available data.

The disability variable is defined as having had to stop usual activity (Chapter 5). What factors are associated with a disability variable defined thus? First, whether an individual has a disabling or chronic condition, and for how long s/he has been affected by such a condition are obviously relevant factors. If s/he has been hospitalised for treatment, the duration of hospitalisation is also a relevant variable. The sex, age and education of an individual are also reasonable covariates. At the household level, the household size, and whether the HOH has a white collar job are relevant variables, because such variables speak to one's ability to be able to afford to stop usual activity. Spatial variables can also have an impact by way of environmental and institutional factors. The ability to specify a treatment model allows the use of both IPW and IPWRA techniques in the analysis. As discussed above, only the outcome model needs to be specified in the RA specification.

The covariates in the outcome model can be discussed at the individual, household and spatial level. The individual variables are the same as what would be included in the treatment model. At the household level, the size of the household, whether the HOH is a white-collar worker, and whether the household earns transfer income are included in the model. Spatial variables consist of the sector of residence and a dummy variable for whether the household is located in the Western province or not. The next section presents the regression output based on different specifications of the treatment effect.

7.4 Results (Treatment – Disability)

7.4.1 Treatment model

Before proceeding to investigating whether disability impacts on the household income and SOL, the covariates that would affect disability, as defined above, are identified. A logistic regression is applied as the outcome variable of interest is dichotomous, and the coefficients are estimated by the maximum likelihood method. The model is specified as follows:

$$t_{ij} = \beta X_i + \varepsilon_i \tag{7.13}$$

where t_{ij} is the treatment outcome j of individual i. X_i is a vector of plausible covariates, and ε_i is the error term. j takes a value of one if a household has at least one PWD, and zero otherwise. The model does not look for causality, but only to establish association between the covariates and the outcome variable (Table IV-3 in Appendix IV). By and large, the covariates have turned out as expected and the majority of them are significant at the critical 1 percent threshold. Table 7.2 below summarises the set of covariates used in the treatment and outcome models under each treatment effect specification[134].

7.4.2 RA, IPW and IPWRA estimates

Across all models the treatment variable is whether a household has a PWD or not. The outcome variables are household income and SOL. The results are presented in Table 7.3 below. For IPW and IPWRA estimators of ATE[135], the overlap assumption is not violated[136] (Figure IV-2 and Figure IV-3). In addition, their treatment model is well specified, as the null hypothesis that the covariates are balanced cannot be rejected (Table IV-4)[137].

[134] A preliminary treatment model that included a dichotomous variable that took a value of one if an individual had a disability or chronic condition failed to converge under all three specifications. As a result, it had to be dropped in the final model specification.

[135] Overlap and overidentification tests are only supported for IPW-based estimators as they use a model for the treatment to make the outcome conditionally independent of the treatment. As Regression Adjustment does not specify a treatment model, there is no need for a balance check after RA. Note that the overlap and overidentification tests are run only on the ATE model. There is no matched sample for the treatment levels other than the conditional treatment in the ATET model (StataCorp, 2021. p. 208).

[136] The overlap assumption, as explained in the methodology, is that each individual has a positive probability of receiving any level of treatment. STATA's postestimation *command teffects overlap* is used to examine whether the overlap assumption holds.

[137] STATA's postestimation command *tebalance overid* is used to test whether the treatment model is correctly specified, revealed when the covariates are balanced.

Table 7.2: Covariates included in the treatment and outcome models with disability as treatment and income as outcome

Variables	**RA**		**IWP**	**IWPRA**		
	Outcome model only	Outcome model only	Treatment model only	Outcome model	Outcome model	Treatment model
Dependent variable	Income	SOL	Disability	Income	SOL	Disability
PWD's age	Yes	Yes	Yes	Yes	Yes	Yes
PWD's sex	Yes	Yes	Yes	Yes	Yes	Yes
PWD's education	Yes	Yes	Yes	Yes	Yes	Yes
Duration of disability	No	No	Yes	No	No	Yes
Duration of hospitalization	No	No	Yes	No	No	Yes
HOH is engaged in a white collar job	Yes	Yes	Yes	Yes	Yes	Yes
Household size	Yes	Yes	Yes	Yes	Yes	Yes
Child share	Yes	Yes	No	Yes	Yes	No
Log of HH income	No	Yes	No	No	Yes	No
HH is a *Samurdhi* recipient	Yes	Yes	Yes	Yes	Yes	Yes
At least one HH member gets disability pay	No	No	Yes	No	No	Yes
Sector variable	Yes	Yes	Yes	Yes	Yes	Yes
Lives in the Western province	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author

Table 7.3: The impact of disability on the household income and SOL

	β	**Robust SE**	**95% Confidence Interval**		***β***	**Robust SE**	**95% Confidence Interval**	
Dep var		*Income*				*SOL*		
Regression adjustment								
POM								
PWD = 0	10.1794***	(0.016)	10.148	10.211	47.8222***	(0.254)	47.324	48.321
PWD = 1	9.9930***	(0.038)	9.918	10.068	44.0505***	(0.486)	43.097	45.004
ATET	-0.1492***	(0.034)	-0.216	-0.082	-2.8563***	(0.437)	-3.714	-1.999
ATE	-0.1864***	(0.039)	-0.264	-0.109	-3.7717***	(0.492)	-4.735	-2.808

IPW								
POM								
PWD = 0	10.1805***	(0.016)	10.149	10.212	47.8233***	(0.250)	47.332	48.314
PWD = 1	10.0239***	(0.044)	9.939	10.109	43.4675***	(0.639)	42.215	44.720
ATET	-0.1564***	(0.034)	-0.224	-0.089	-3.7819***	(0.457)	-4.678	-2.886
ATE	-0.1566***	(0.045)	-0.244	-0.069	-4.3558***	(0.648)	-5.626	-3.086
IPWRA								
POM								
PWD = 0	10.1817***	(0.016)	10.150	10.213	47.8422***	(0.254)	47.345	48.340
PWD = 1	10.0177***	(0.039)	9.941	10.094	44.2934***	(0.473)	43.367	45.220
ATET	-0.1612***	(0.034)	-0.228	-0.094	-3.0210***	(0.434)	-3.871	-2.171
ATE	-0.1640***	(0.040)	-0.243	-0.085	-3.5488***	(0.478)	-4.486	-2.611

Source: Author estimates based on HIES (2016), using STATA 14/SE
Notes: N=6,843 for RA and IPWRA; N = 7,063 for IPW; There is no evidence that both IPW and IPWRA models violate the overlay assumption; both models satisfy that there is no overidentification; Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Table 7.4: Impact of disability on base-level POM for control group

		β	**SE**	**95% Confidence Interval**		**β**	**SE**	**95% Confidence Interval**	
Dep var			*Income*				*SOL*		
RA	Δ_1	-0.0183***	0.0039	-0.0259	-0.0107	-0.0789***	0.0102	-0.0988	-0.0589
IPW	Δ_1	-0.0154***	0.0044	-0.0240	-0.0068	-0.0911***	0.0134	-0.1174	-0.0647
IPWRA	Δ_1	-0.0161***	0.0040	-0.0239	-0.0084	-0.0742***	0.0099	-0.0936	-0.0548

Source: Author estimates based on HIES (2016), using STATA 14S/SE
Notes: N=6,843 for RA and IPWRA; N = 7,063 for IPW; Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

All three estimators produce results that are significant at the 1 percent cut off in relation to both income and SOL (Table 7.4). Income coefficients are discussed first. The ATE largest in the RA and smallest in the IPW. According to the RA estimator, the difference in the potential outcome means (POM) in the log of household income between households with and without PWDs is 0.25 points. The ATE based on the RA estimator suggests that in the presence of PWDs, a household is likely to earn 0.19 less of log income than when households do not have any PWDs. This is approximately 0.16 based on IPW and IPWRA estimators. In percentage terms, the RA method estimates that on average, the log of income is likely to be 1.8 percent less if a household has PWDs, compared to if households do not have PWDs. The difference measured by IPW and IPWRA estimates are somewhat smaller at 1.5 percent and 1.6 percent, respectively. The estimated ATET is highest in the IPWRA estimator, and is 0.16 less than the log household income of 10.01 that would be observed if households with PWDs in fact did not have any.

In relation to SOL, the ATE is largest in the IPW estimator and smallest in IPWRA. According to the IPW estimator, households with PWDs tend to score approximately 4.4 points less on the SOL index (as measured by the MCA index) than if households did not have any PWDs. RA measures this difference to be about 4.8, and IPWRA, 3.5 points. In percentage terms, the IPW estimators measure that on average households with PWDs will score about 9 percent less than if all households were without PWDs. The RA measures this to be about 8 percent, and the IPWRA estimates it slightly over 7 percent. The estimated ATET is highest in the IPW estimator, and measures that the SOL among households with PWDs is 3.8 points less than the SOL index of 43.1 that would be observed if households with PWDs in fact did not have any PWDs. In percentage terms, it works out to a little below 9 percent.

These results corroborate with the existing body of evidence about the disability-poverty nexus. Erring on the side of caution about the causal effects of disability on the household economic situation, it can be argued that the presence of disability appears to create greater economic hardships among households as measured by income and SOL differentials between the two groups. How will these observations change if the data were to be disaggregated by the type of household headship? To unpack this issue, a second analysis is undertaken by grouping the models by the HOH's gender.

The results produced from the application of this intersectionality lens are insightful[138]. A cursory glance at POMs exhibits some clear patterns (Table 7.5). The first is that irrespective of which estimator is used, households with PWDs appear to have less income and lower SOL than those without PWDs. The second is that this pattern also holds when the gender of the HOH is considered – FHHs are characterised by lower income and SOL than MHHs. Moreover, MHHs with PWDs appear to be still better off in both income and SOL terms than FHHs without PWDs.

The ATE of income for FHHs has turned up insignificant across all three estimators. In contrast, they are significant at the critical 1 percent cut off for MHHs. The ATE for SOL, however, is significant at the 1 percent threshold for both groups, across all estimators. There are no large divergences in the estimates produced for both income and SOL from the three techniques.

The largest ATE in relation to income is reported by the RA estimator. Based on the RA, MHHs with PWDs tend to report about 0.23 lower log income compared to the log income of 10.31 an MHH would earn if it had no PWDs. The IPW and IPWRA

[138] The IPW and IPWRA estimated models are tested for balance and overidentification. Both assumptions are satisfied. The results are not presented, for brevity.

estimates are close at 0.21 and 0.22, respectively. The ATE for the household income of FHHs is insignificant. However, the estimators indicate that FHHs with PWDs tend to have between 0.09 to 0.13 lesser of log income than an FHH would earn if they had no PWDs. Note that the ATE is much less among FHHs compared to MHHs. In percentage terms, the RA estimates that the log of household income is 2.2 percent lower among MHHs with PWDs compared to if none of the MHHs had PWDs (Table 7.6). The IPW and IPWRA estimates are close at approximately 2 percent. The RA estimates that the log of income among FHHs with PWDs is about 1.3 percent lower, compared to if none of the FHHs had PWDs. The IPW and IPWRA estimates are 0.9 percent and 1 percent respectively.

Table 7.5: The impact of disability on income and SOL by PWD's gender

	RA		**IPW**		**IPWRA**	
Dep var: Log of household income						
POM	MHH	FHH	MHH	FHH	MHH	FHH
0	10.3148***	9.8820***	10.3148***	9.8852***	10.3174***	9.8844***
	(0.018)	(0.031)	(0.018)	(0.031)	(0.018)	(0.031)
1	10.0877***	9.7537***	10.1033***	9.7962***	10.1018***	9.7886***
	(0.042)	(0.077)	(0.045)	(0.089)	(0.042)	(0.077)
ATET	-0.1690***	-0.0875	-0.1705***	-0.1101	-0.1825***	-0.1044
	(0.039)	(0.070)	(0.039)	(0.070)	(0.038)	(0.070)
ATE	-0.2270***	-0.1282	-0.2115***	-0.0890	-0.2156***	-0.0958
	(0.044)	(0.079)	(0.046)	(0.091)	(0.044)	(0.079)
Dep var: SOL						
POM						
0	49.1529***	44.8696***	49.1227***	44.9244***	49.1832***	44.9008***
	(0.306)	(0.449)	(0.301)	(0.443)	(0.305)	(0.449)
1	45.3337***	40.5410***	44.4493***	40.5134***	45.5512***	40.7445***
	(0.580)	(0.850)	(0.669)	(1.245)	(0.576)	(0.795)
ATET	-2.5441***	-3.4395***	-3.5279***	-4.2730***	-2.7907***	-3.6748***
	(0.510)	(0.849)	(0.530)	(0.911)	(0.502)	(0.849)
ATE	-3.8192***	-4.3286***	-4.6734***	-4.4110***	-3.6320***	-4.1563***
	(0.587)	(0.863)	(0.687)	(1.265)	(0.581)	(0.811)

Source: Author estimates based on HIES (2016), using STATA 14/SE
Notes: Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Table 7.6: Impact of disability on base-level POM by household headship

		MHH		FHH	
		β	SE	β	SE
Dep var: Log of household income					
RA	Δ_1	-0.022***	0.004	-0.013	0.008
IPW	Δ_1	-0.021***	0.004	-0.009	0.009
IPWRA	Δ_1	-0.021***	0.004	-0.010	0.008
Dep var: Household SOL					
RA	Δ_1	-0.078***	0.012	-0.096***	0.019
IPW	Δ_1	-0.095***	0.014	-0.098***	0.028
IPWRA	Δ_1	-0.074***	0.012	-0.093***	0.018

Source: Author estimates based on HIES (2016), using STATA 14/SE
Notes: Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

The largest ATE in relation to SOL is reported by the IPW estimator. Based on the IPW, an MHH with PWDs would tend to report an SOL index value that is approximately 4.7 points lower than the average index value of 49.12 that an MHH would enjoy if it had no PWDs. This works out to about 9.5 percent. The corresponding RA and IPWRA estimates are 3.8 (7.8 percent) and 3.6 (7.4 percent), respectively. The IPW estimates that FHHs with PWDs are likely to have an SOL index that is about 4.4 points less (or 3 percent) than an average SOL index of 44.92 that an FHH would enjoy if it had no PWDs. The corresponding RA and IPWRA estimates are 4.3 (1.9 percent) and 4.2 (1.8 percent), respectively. Observe that even without PWDs, FHHs are likely to have a conspicuously lower SOL than MHHs. In the same vein, the effect of disability on both income and SOL seems to be more profoundly negative on MHHs than on FHHs.

7.5 Results (Treatment – Borrowed from banks)

The second analysis takes on whether a household has borrowed from a bank or not, as the treatment variable. As this particular variable is a constituent of the SOL index, the ensuing analysis only studies the log of household income as the outcome variable of interest. There is a sizeable corpus of studies that has recognised a positive association between formal sector borrowings and a household's economic well-being. For example, formal credit has been found to help increase household income, significantly so in lagging areas, promote the reallocation of household labour from agriculture to non-agricultural work, and influence consumption and investment-related behaviour (Kumar et al., 2020; Si et al., 2021). For example, a study using household survey data from Nepal in 2003/04 and 2010/11 observed that households borrowing from the formal sector were more likely to invest in non-agricultural self-employment activities. In contrast, borrowings from informal channels are more likely to be utilised for consumption purposes and agricultural self-employment (Kondratjeva, 2021). Additionally, formal sector credit is also associated with increased household expenditure on healthcare and education (Truong et al., 2020).

Thus, exploring the possible effects of formal sector borrowings – from banks in this case, on the household income among households with and without PWDs is a reasonable line of inquiry. The variables that are included in the final outcome and treatment models are listed in Table 7.7 below. The models using IPW and IPWRA estimators satisfy the overlap assumptions, and are balanced.

Table 7.7: Covariates included in the treatment and outcome models with bank loans as treatment variable

Variables	**RA**	**IPW**	**IPWRA**	
	Outcome model only	Treatment model only	Outcome model	Treatment model
HOH's age	No	Yes	No	Yes
HOH's education	No	Yes	No	Yes
HOH is engaged in a white collar job	Yes	No	Yes	No
HH size	Yes	No	Yes	No
Share of children	Yes	Yes	Yes	Yes
Share of employed adults	Yes	Yes	Yes	Yes
FHH or not	No	Yes	No	Yes
HH owns land	Yes	Yes	Yes	Yes
HH owns computer	Yes	No	Yes	No

HH is a *Samurdhi* recipient	Yes	Yes	Yes	Yes
At least one HH member gets disability pay	Yes	Yes	Yes	Yes
Sector variable	Yes	Yes	Yes	Yes
Lives in the WP	Yes	Yes	Yes	Yes

Source: Author

The results for the POMs (Table 7.8 and Table 7.9) are in line with expectations, and are statistically significant at the stringent 1 percent threshold. A simple POM comparison reveals that households that have borrowed from banks on average are characterised by a higher log household income than those that have not. However, such income tends to be less in the presence of PWDs in a household. The encouraging observation, though, is that households with PWDs tend to report higher log income if they have borrowed from banks, compared to if they have not.

Table 7.8: The impact of having borrowed from a bank on household income by households with and without PWDs

	RA		**IPW**		**IPWRA**	
	β/se		β/se		β/se	
	PWD = 0	PWD = 1	PWD = 0	PWD = 1	PWD = 0	PWD = 1
POM						
Banks = 0	10.1760***	9.8330***	10.1460***	9.7616***	10.1925***	9.8462***
	(0.009)	(0.035)	(0.010)	(0.038)	(0.009)	(0.035)
Banks = 1	10.4385***	10.1634***	10.5017***	10.3082***	10.4179***	10.1604***
	(0.012)	(0.043)	(0.013)	(0.040)	(0.013)	(0.043)
ATET	0.2420***	0.2646***	0.3291***	0.4838***	0.1967***	0.2273***
	(0.013)	(0.049)	(0.015)	(0.056)	(0.013)	(0.049)
ATE	0.2625***	0.3304***	0.3557***	0.5467***	0.2254***	0.3142***
	(0.014)	(0.050)	(0.015)	(0.054)	(0.015)	(0.050)
N	19,306	1,631	19,306	1,631	19,306	1,631

Source: Author estimations on STATA 14/SE using HIES 2016 data
Notes: Standard errors in parenthesis; There is no evidence that both IPW and IPWRA models violate the overlay assumption. The covariates in both models are balanced. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Table 7.9: Impact of disability on base-level POM by whether a household has bank loans or not

		PWD=0		PWD=1	
		β	SE	β	SE
Dep var: Log of household income					
RA	Δ_1	0.026***	0.001	0.023***	0.028
IPW	Δ_1	0.035***	0.002	0.032***	0.038
IPWRA	Δ_1	0.022***	0.001	0.020***	0.025

Source: Author estimates based on HIES (2016), using STATA 14S/E
Notes: Significance level denoted by * $p<0.10$, ** $p<0.05$, *** $p<0.01$

The highest reported ATE is from the IPW estimator. According to the IPW, a household without PWDs that has borrowed from banks tends to report about 0.36 more than the average log household income of 10.15 such a household would have, if it had not borrowed from banks. In percentage terms, this difference works out to about 3.5 percent. The RA and IPWRA estimates the ATE at 0.26 (2.6 percent) and 0.23 (2.2 percent), respectively. Next, the IPW estimates that a household with PWDs that has borrowed from banks tends to report about 0.55 (5.6 percent) over and above the average log household income of 9.76 such a household would have, if it had not borrowed from banks. The RA and IPWRA based ATE estimates are 0.33 (3.4 percent) and 0.31 (3.2 percent) respectively.

7.6 Discussion

Chapter 2 has discussed extensively on the channels through which disability impacts individual and household level poverty. The primary focus of the econometric analysis was to study the economic implications of disability on households, proxied in terms of household income and SOL. The reader is reminded that this is only a modest attempt to tease out the causal effects of disability on the household economic situation, given the cross sectional nature of the data submitted to analysis. However, it must be indicated that the results corroborate the existing evidence on the disability-poverty nexus as well as the small but growing base of evidence on the causal effects of disability on poverty.

The analysis points to some useful insights. First, as mentioned above the household implications of disability as revealed by the preceding analysis is in line with expectations and sits well with findings from elsewhere. In each analysis, households with PWDs are characterised by lower income and a lesser SOL than those without. In effect, households with PWDs are more likely to fall into both income and non-income poverty than those without PWDs. These findings support and extend the findings of Kumara and Gunewardena (2017) who concluded in favour of a higher prevalence, depth and severity of poverty among households with PWDs in Sri Lanka, irrespective of which of the three monetary definitions of poverty or their multidimensional counterparts were applied.

Secondly, the results point to how the intersection of disability with other markers of social exclusion can aggravate its negative economic implications on households. While even in the absence of PWDs, FHHs are likely to earn less than MHHs. In fact, FHHs without PWDs earn even less than MHHs with PWDs, and their incomes are further affected by the presence of PWDs. However, the most profound differences are observed in relation to SOL, which are not just larger in magnitude but also statistically significant. Clearly, FHHs seem to have greater difficulty in converting resources (income) into achievements (SOL) in the face of disability, as reflected in their lower SOL levels. Observe however that the ATE for SOL is larger than for income among both types of households, alluding to the long term economic implications of disability.

Yet, the impact of disability is felt more profoundly by MHHs as reflected in the ATE coefficients on both income and SOL. This stands to reason and corroborates the descriptive evidence from Chapter 4. Disability can have a larger regressive economic impact on MHHs because the opportunity cost of disability might be more in a MHH which would be otherwise relatively more insulated from the kinds of economic vulnerabilities an FHH has to navigate. This is perhaps proxied for in the differences in the log income and SOL levels of MHHs and FHHs without PWDs. While disability adds another layer of complexity to the FHH dynamics, the incremental adverse effect it creates on income does not appear to be of the same magnitude as for MHHs.

On the one hand these findings resonate with the plethora of evidence that shows how disability can impose a 'double jeopardy' for women, or in this case women heading their households. Although not all FHHs are poor, disempowered and marginalised (Buvinic & Gupta, 1997; Oginni et al., 2013), there is still a large body of research that shows that FHHs are more likely face more economic challenges than MHHs due to a number of socioeconomic, cultural, and institutional reasons which are beyond the scope of this study (Chant, 2004; Gangopadhyay & Wadhwa, 2004; S. Rahman, 2000; Snyder et al., 2006). The findings of the preceding analysis indicates that potential adverse economic ramifications of disability on households is more pronounced among FHHs. This conclusion stands to reason as disability in many ways likely compounds and exacerbates the economic challenges FHHs tend to grapple with (Emmett & Alant, 2006; Park et al., 2020; Yoosefi Lebni et al., 2020).

On the other hand, these findings highlight the importance of looking at disability holistically, and not from an individualist perspective because the magnitude of the economic implications of disability is context-specific. While FHHs are more likely to earn less income or enjoy lower SOL in the face of disability than MHHs, the difference that disability can create in the household income and SOL levels is higher among MHHs.

The analysis of the household economic implications of bank borrowings is rather telling. As anticipated, bank borrowings are associated with more household income. Importantly, having borrowed from a bank is associated with greater income for both households with and without PWDs. Thus, clearly formal sector borrowings can be argued to have a positive effect on household income, even in the presence of disability. Such an increase is larger for households with PWDs than for those without PWDs. These results underscore the importance of the role formal borrowings can play in increasing household income, especially for households with PWDs. It can be posited from this analysis that generating opportunities for households to borrow from the formal financial sector for productive purposes can create a positive impact on their household economic situation. However, a note of caution is in order. The ability to borrow from a bank presupposes that a household is in a position to pledge collateral and/or provide documented income sources, which are important criteria for obtaining formal bank loans. Therefore, households that borrow from banks might already enjoying greater economic affluence than households which have not borrowed from banks, even amidst disability. Despite this caveat, one cannot ignore the statistically significant and comparatively large increase in income observed for households with PWDs that have borrowed from banks. The results appear to suggest that formal sector borrowings seem to create a positive economic impact on households with PWDs.

The implications of the above findings for policy are of note, particularly in a country such as Sri Lanka where the approach to disability is still rooted in tenets of the medical and charity models. As disability seems to create distress on households in general, or at least is inversely associational with household economic situations (as measured by income and SOL), it is necessary to understand how social protection measures can be revised and revamped to promote economic empowerment among households with PWDs. It is also important to recognize the fine nuances in the economic implications of disability when it intersects with other markers of social exclusion to devise meaningful protection policy and programmatic interventions targeting PWDs and their households.

To this end, the disability protection schemes should be both individual and household-specific. Much can be done at the individual level. A critical first step is establishing and maintaining a reliable and updated database on PWDs. Investing in their human capital development by way of formal education or vocational training should be a long-term strategy. Adopting a gender-responsive dimension in such initiatives is critical to ensure that both male and female PWDs benefit from such educational and skills development initiatives.

At the household level, it is important that the social protection programmes recognize that disability is not only an individual, but also a household experience. Recognizing a full-time caregiver's unpaid work as paid work and initiating a government pay might contribute towards ameliorating the economic distress households with PWDs grapple with. A mechanism to provide cash grants for households grappling with the most severe forms of disability is also an effective protection measure, as opposed to providing a standard disability pay that is in effect now. But, for such cash grants to be effective, as mentioned elsewhere, up-to-date and reliable data are of utmost importance.

Measures to empower households with PWDs to borrow from the formal financial sector for income-generating purposes, especially for non-agricultural work, are also likely to yield beneficial outcomes. Introducing new loan products with concessionary interest rates and simpler collateral and documentation requirements, with a robust monitoring and follow up mechanism would be one example of how formal financial institutions can open up opportunities for households with PWDs to borrow from them. Most importantly, at the macro-level, it is important, however, that the overall development agenda is inclusive, not just in relation to the physical space, but also the institutional framework for any of the above measures to be meaningful to PWDs and their households.

7.7 Summary

This study applies quasi-experimental methods to HIES (2016) data to unpack the causal links between disability and its economic implications on households. The econometric analysis employs RA, IPW and IPWRA estimators to (i) measure the 'treatment effect' of disability on the log of household income and SOL in the sample as a whole, (ii) between FHHs and MHHs (applying an intersectionality lens) and, (iii) measure the 'treatment effect' of bank borrowings on the log of household income among households with and without PWDs. The cross-sectional nature of the data should prompt the reader to examine the results with caution. Nonetheless, the congruence of the findings with the existing body of evidence on the disability-poverty nexus provides confidence in the reliability of the estimates.

The regression analysis points to the economic distress disability seems to exert on households, as reflected in the lower income and SOL reported for households with PWDs. The effect on SOL is found to be of a larger magnitude underscoring the higher conversion costs households face in turning resources into achievements. This difficulty appears to be more profound for FHHs with PWDs than MHHs with PWDs, as reflected in their lower income and SOL compared to the latter. However, the extent of the economic ramifications of disability tends to be greater for MHHs than for FHHs. The analysis also underscores the positive role formal sector borrowings can play in increasing household income, particularly among households with PWDs. The greater positive impact bank borrowings appear to have on households with PWDs is especially insightful and makes the case for an ideological shift in the perception of PWDs and their households in Sri Lanka.

The results point to several policy suggestions. At the individual level, investing in the human capital development of PWDs can be especially beneficial if such initiatives are also devised to be gender-sensitive. At the household level, it is important to recognise and compensate for the labour of full-time caregivers. Targeted disability payments would benefit households grappling with the most severe forms of impairment. Encouraging formal sector borrowings for productive purposes among PWDs can also be an effective mechanism to help ameliorate some of the economic distress of households with PWDs. However, to achieve this, the need of a robust and reliable database on PWDs is reiterated. The long-term success of such progressive protection measures clearly hinges on the macroeconomic development agenda which should promote an inclusive external environment for PWDs.

Chapter Eight: Income and SOL disparities between households with and without PWDs - a decomposition analysis

8.1 Introduction

The preceding discussions based both on HIES (2016) and MDS (2014/15) have clearly established that households with PWDs are typically characterised by lower income and SOL than those without. The results have also shown that, when controlled for household level, HOH-related and spatial characteristics, the magnitude of the inverse association of the disability variable with both income and SOL outcome variables becomes much smaller. Secondly, the results show that many of these control variables included in the models have strong, independent, and statistically significant associations with both outcome variables of interest.

Such patterns allude to the disparities that underpin income and SOL differentials among households with and without PWDs; and provide a compelling reason to investigate what factors are driving these income and SOL disparities. This is accomplished by applying decomposition techniques to HIES (2016) data. The remainder of this chapter is organised as follows. The next section (8.2) provides a brief overview of the methodology. This is followed by a presentation of the regression estimates (8.3) , and an analysis of results (8.4). Section 8.5 summarises.

8.2 Oaxaca- Blinder decomposition methodology

Oaxaca-Blinder (OB) decomposition is a statistical methodology that allows for an investigation of the differences in the mean values of an outcome variable between two groups. The method pioneered by Blinder (1973) and Oaxaca (1973) separately, to estimate gender wage discrimination, has since been applied to investigate reasons underpinning other types of disparities related to, for example, health outcomes (Sen, 2014; Taber et al., 2016), educational outcomes (Barrera-Osorio et al., 2011; Borooah & Iyer, 2005), household income (Bourguignon et al., 2007), access to technology (Liao et al., 2016; Shita et al., 2020) and social welfare (Abid et al., 2016; Foster et al., 2011; Huber & Oberdabernig, 2016). The methodology, explained in detail in Blinder (1973; see also Jann, 2008; Oaxaca, 1973), is summarised below.

A linear model with an outcome variable Y, and a vector of X predictors and a constant, and an error term ε (8.1) can be estimated separately for two groups as follows:

$$Y_i = \beta X_i + \varepsilon_i \tag{8.1}$$

$$Y_i = \beta^A X_i^A + \varepsilon_i^A \tag{8.2}$$

$$Y_i = \beta^B X_i^B + \varepsilon_i^B \tag{8.3}$$

Where β contains the intercept and slope parameter coefficients, $i \epsilon (A, B)$ and $E(\varepsilon_i) = 0$. In the analysis A is the group of households without PWDs and B is those with PWDs. From (8.2) and (8.3), we can estimate the raw differential (8.4), which can be elaborated further (8.5):

$$\beta^A X_i^A - \beta^B X_i^B \tag{8.4}$$

$$\beta^A \bar{X}_i^A - \beta^B \bar{X}_i^B = \beta^B(\bar{X}^A - \bar{X}^B) + \bar{X}^B(\beta^A - \beta^B) + (\bar{X}^A - \bar{X}^B)(\beta^A - \beta^B) \tag{8.5}$$

where $\beta^B(\bar{X}^A - \bar{X}^B)$ is the portion of the differential attributable to differences in endowments possessed by the two groups and $\bar{X}^B(\beta^A - \beta^B)$ is the portion that is attributable to differences in coefficients between the two groups, and $(\bar{X}^A - \bar{X}^B)(\beta^A - \beta^B)$ is the interaction effect i.e., the simultaneous effects of the differences in endowments and coefficients between the two groups[139].

[139] Although Blinder (1973) argued that "the interaction term has no obvious interpretation" (p. 438), subsequent studies (See Daymont & Andrisani, 1984; Jones & Kelley, 1984) have highlighted the importance of looking at and interpreting the interaction term. Jones and Kelly (1984) have pointed out

The preceding methodology is built on the premise that either Group A or B has the most desirable outcome and the other group has to try to attain the same. An alternative "twofold" OB decomposition method popular in discrimination literature assumes that there is a non-discriminatory condition, estimated by a nondiscriminatory vector of coefficients β^{*}, which both groups should try to attain. The decomposition equation can now be written as:

$$(\bar{X}^{A} - \bar{X}^{B})\beta^{*} + \bar{X}^{A}(\beta^{A} - \beta^{*}) + \bar{X}^{B}(\beta^{*} - \beta^{B}) \qquad 8.6$$

Where $(\bar{X}^{A} - \bar{X}^{B})\beta^{*}$ is the endowment effect (quantity effect) and $\bar{X}^{A}(\beta^{A} - \beta^{*}) + \bar{X}^{B}(\beta^{*} - \beta^{B})$ is the discrimination effect (Rahimi & Hashemi Nazari, 2021), although it does subsume the effects of differences in unobserved predictors as well (Jann, 2008).

8.2.1 Econometric models

The OB decomposition employs two outcome variables of interest, namely the log of household income and SOL. Independent variables include characteristics of the household, of the HOH, and spatial characteristics. The explanatory variables are, all but one, the same in both regression models. When SOL is the outcome variable of interest, the log of household income is introduced as a household level covariate, as income is hypothesized as a resource to achieve a given level of SOL (Zaidi and Burchardt 2005). The first analysis looks at the entire sample to study the factors underpinning the income and SOL differentials between households with and without PWDs. An intersectionality lens is applied in the second analysis to delineate the nuances in the drivers of income and SOL disparities between FHHs and MHHs. For this purpose, the sample is restricted to only those with PWDs, in the second model

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that in Blinder's model, the interaction effect is subsumed under the endowment term, which has resulted in a larger endowment effect ($30), than when the interaction term is separated (which results in an endowment per say value of $25 and an interaction value of $5).

specification. The statistical procedure is implemented in STATA using the user-written command -*oaxaca*-[140]. Results obtained from both the threefold and twofold decomposition analyses are presented in Section 8.3.

8.3 Results of the OB decomposition

Table 8.1 below presents the twofold decomposition output for both income and SOL[141] among households with and without PWDs. The former is the base group[142]. Both mean income and SOL are lower for households with PWDs, and the differences are significant at the stringent 1 percent cut off, as are the explained and unexplained parts of their differentials. A little less than two thirds of the income differential and close to three fourths of the SOL differential are explained by the vector of predictors.

The characteristics of the HOH plays largest role in the explained part of income differential. Household and spatial characteristics contribute relatively less. Overall, tertiary or higher education of the HOH is the most dominant contributor to the income disparity between the two groups (Figure 8.1 and Table V-1). Observe that primary educational outcomes contribute much more to the disparity than secondary educational outcomes. In fact, a U-shape pattern (reminiscent of the U-shape hypothesis put forth by Goldin (1994) on the relationship between the educational outcomes and female LFP) can be traced among the primary secondary and tertiary educational outcomes of the HOH and their relative contribution to income inequality between the two groups. That tertiary education or more contributes the most to income inequality stands to

[140] The -*oaxaca*- command developed by Kit Baum allows for the normalisation of categorical variables, which replaces the categorical option that was available in the older command (Jann, 2010).
[141] Only the results of the MCA based index are presented and discussed here for brevity.
[142] The decomposition analysis is carried out from the point of view of households with PWDs (Jann, 2008).

reason, as labour market returns are typically highest for tertiary education (compared to primary or secondary education) (Montenegro & Patrinos, 2014), and is the most important for income disparities (Rodríguez-Pose & Tselios, 2009). However, it is somewhat counterintuitive that primary education is more of an aggravator of income inequality than secondary education. However, a World Bank study that analysed comparable data from 140 countries (and involved an 800-household survey) observed that returns to primary education were about 10 percent, which declined to a little over 7 percent at the secondary education level, and more than doubled to 15 percent at the tertiary level, echoing the U-shape pattern on how education contributes to income inequality observed here (Montenegro & Patrinos, 2014). Employment in a white-collar job makes the second largest contribution to explained income inequality.

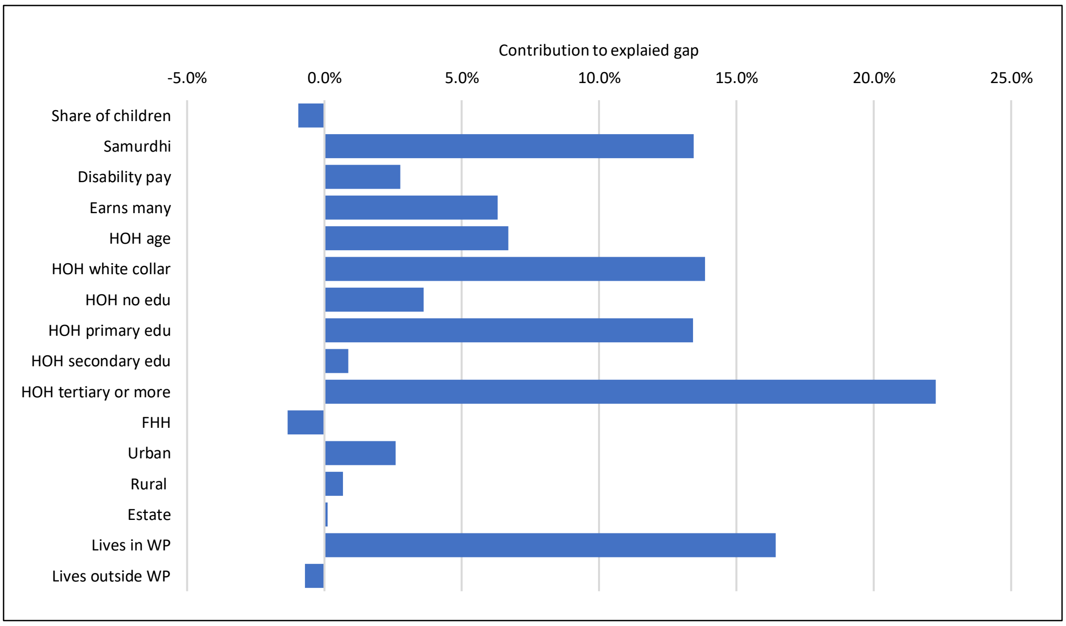
Table 8.1: Twofold OB decomposition results of income and SOL disparity between households with and without PWDs

	Income	**SOL**
	β/se	β/se
HH without PWDs	9.9310***	39.9674***
	(0.032)	(0.477)
HH with PWDs	10.2631***	47.0159***
	(0.012)	(0.314)
Difference	-0.3321***	-7.0485***
	(0.033)	(0.477)
Explained	-0.2112***	-5.2280***
	(0.014)	(0.389)
%	63.6	74.2
Unexplained	-0.1209***	-1.8205***
	(0.031)	(0.327)
%	36.4	25.8
Contribution to the explained portion		
Household characteristics	0.0456	0.8970
%	21.6	17.2
Log of household income	NA	1.8886
%	NA	36.1
HOH's characteristics	0.1254	1.4251
%	59.4	27.3
Spatial characteristics	0.0403	1.0172
%	19.1	19.5

Source: Author estimates based on HIES 2016 data using STATA SE/14
Notes: N = 20,896; Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, ***, p<0.01

From the household characteristics, receipt of *Samurdhi* income is an aggravator of the explained income differential, while the share of children appears to suppress such a differential, albeit marginally. Spatial characteristics show that residence in the Western Province contributes to the explained part of income disparity, while the net effect of living outside the Western Province tends to help lower it.

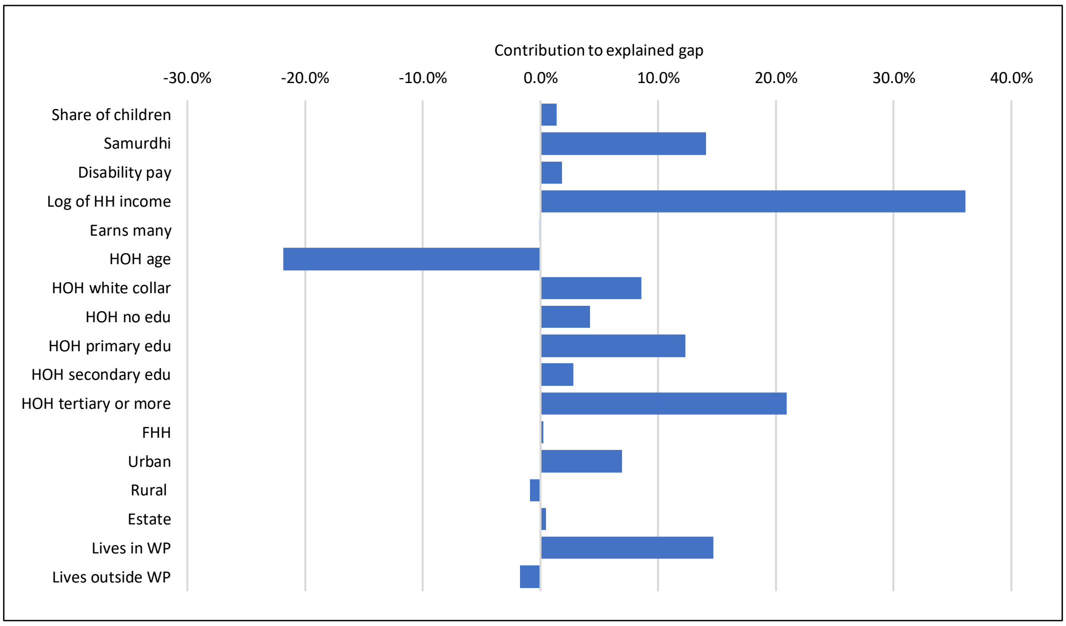
Figure 8.1: Contribution of predictors to the "explained" portion of the mean difference in household income



Source: Author estimates based on HIES 2016 data using STATA SE/14
Note: The contribution of Colombo, Gampaha and Kalutara districts are aggregated and presented as "Lives in WP [Western Province]". The contribution of other districts is aggregated and presented as "Lives outside WP". This is because individually, the contributions from districts outside the WP are negligible. This note applies also for Figure 8.2, Figure 8.3 and Figure 8.4.

As expected, the largest driver underpinning the SOL differential between the two groups is household income. It contributes to 36 percent of the explained portion of the disparity, while the characteristics of the HOH also contributes to a little over a fourth of such disparity. The contribution of the HOH's educational outcomes to the explained SOL differential is similar to what was observed for income (Figure 8.2). Note, however, that now the HOH's age is a substantial suppressor of the SOL differential. Living in the rural sector or outside the Western Province also contribute marginally to reducing the SOL disparities. Among household variables, the receipt of *Samurdhi* appears to contribute the most to the SOL differential.

Figure 8.2: Contribution of predictors to the "explained" portion of the mean difference in household SOL



Source: Author estimates based on HIES (2016) data using STATA SE/14

Next, the output from the threefold OB decomposition is briefly discussed (Table 8.2). The estimates suggest that if households with PWDs had the same traits as those without, the log of their income will be higher by a statistically significant 0.25[143], and SOL will be higher by a statistically significant 4.5 points (endowment effect); and that the two outcome variables would rise by a statistically significant 0.12 (log of household income)[144] and 1.8 points (SOL) respectively, if the coefficients of non-PWD households are applied to the characteristics of households with PWDs (coefficients effect).

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[143] Or 18.9 percent when results are re-transformed to LKR, using the -*eform*- option

[144] Or 7.9 percent when results are re-transformed to LKR, using the -*eform*- option

The interaction term indicates that there is an additional effect of -0.04 (see footnote 145) and 0.7 in income and SOL, respectively, when both endowments and coefficients are changed simultaneously. But, the negligible contribution of the interaction effect to the total differential compared to the endowment and coefficient effects of both income and SOL, the interaction effect can be considered of little relevance in this context[145]. Overall, the endowment effect accounts for the bulk of the differentials of both outcome variables of interest (75 percent and 65 percent respectively for income and SOL).

Table 8.2: Threefold OB decomposition results of income and SOL disparity between households with and without PWDs

	Income	**SOL**
	β/se	β/se
Endowments	0.2502***	4.5545***
	(0.026)	(0.452)
%	*75.3*	*64.6*
Coefficients	0.1230***	1.7710***
	(0.031)	(0.327)
%	*37.0*	*25.1*
Interaction	-0.0411*	0.7229**
	(0.022)	(0.328)
%	*-12.4*	*10.3*

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: N = 20,896; Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

For further insights, these effects are disentangled and elaborated in Table 8.3 (Table V-1 in Appendix V). Looking first at the log of household income, the characteristics of the HOH play a deterministic role in the aggregate endowment effect of income differential, contributing 55 percent to the endowment effect. Spatial variables tend to dominate the coefficients effect of the income differential. In relation to the SOL differential, the endowment effect is dominated by the log of income and the

145 Of note is also the fact that the interaction effects have turned out to be significant for income and SOL, respectively at 10 and 5 percent only, compared to at 1 percent for endowment and coefficient effects, for both outcome variables. The negative interaction effect for the log of income (-0.04) suggests that the interaction effect suppresses the income differential.

characteristics of the HOH. Together they make up approximately 80 percent of the endowment effect. The contribution from household characteristics is rather negligible. Household's, HOH's and spatial covariates contribute positively to the coefficients effect, but are offset by negative contributions from household income and a large constant capturing unobserved factors.

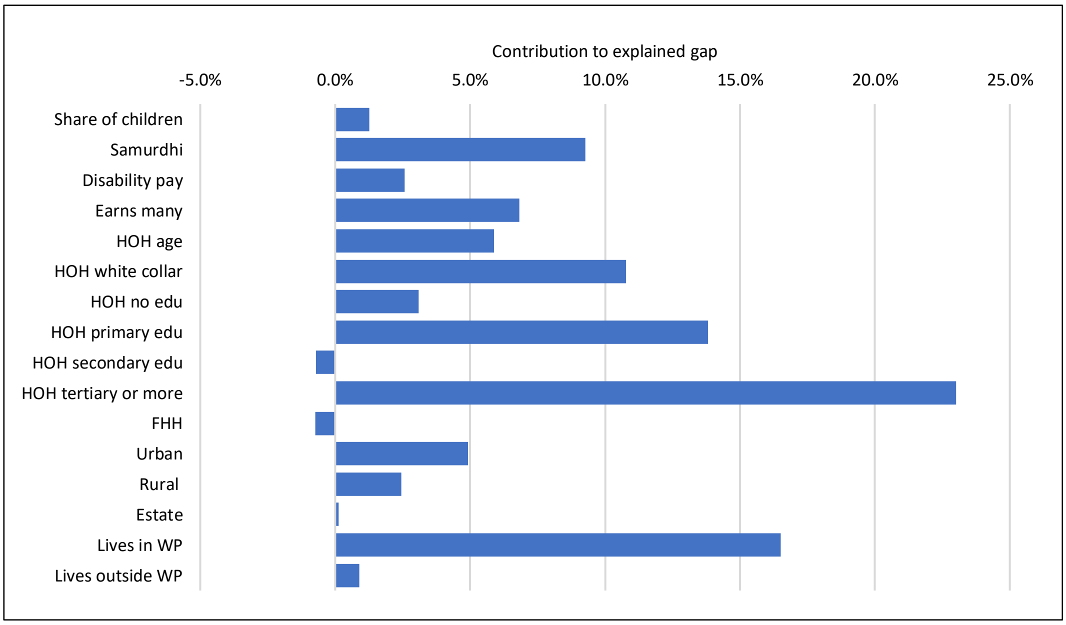
Table 8.3: Three-fold decomposition - Contribution of groups of variables to the income and SOL differential

	Endowments	Coefficients	Interactions	Total
HH income				
HH characteristics	0.0499	-0.0464	-0.0046	-0.0011
%	20.0	-37.7	11.3	-0.3
HOH characteristics	0.1380	0.0193	-0.0133	0.1440
%	55.1	15.7	32.3	43.4
Spatial characteristics	0.0623	0.1163	-0.0232	0.1555
%	24.9	94.6	56.4	46.8
Constant	NA	0.0337	NA	0.0337
%	NA	27.4	NA	10.2
Total	0.2502	0.1230	-0.0411	0.3321
%	75.3	37.0	-12.4	100.0
SOL				
HH characteristics	0.2933	0.3205	0.6505	1.2643
%	6.4	18.1	90.0	17.9
Log of HH income	1.8974	-0.2620	-0.0088	1.6267
%	41.7	-14.8	-1.2	23.1
HOH characteristics	1.7103	7.3199	-0.3097	8.7205
%	37.6	413.3	-42.8	123.7
Spatial characteristics	0.6535	1.3269	0.3909	2.3713
%	14.3	74.9	54.1	33.6
Constant	NA	-6.9343	NA	-6.9343
%	NA	-391.5	NA	-98.4
Total	4.5545	1.7710	0.7229	7.0485
%	64.6	25.1	10.3	100.0

Source: Author estimates based on HIES (2016) data using STATA SE/14

Figure 8.3 and Figure 8.4 graph the contribution of covariates to the endowment effects of the household income and SOL differential, respectively. The human capital endowment of the HOH contributes most profoundly to the income disparity (Figure 8.3). The HOH's tertiary education contributes to slightly less than a fourth of the endowment effect. Employment in a white-collar job also contributes a little over a tenth towards the endowment effect. Being an FHH and the HOH having only a secondary education contributes to reducing the endowment effects portion of the income differential, although the coefficients are insignificant. Among spatial variables, living in the urban sector contributes more to the income differential compared to living in the rural or estate sectors. Similarly, residence in the Western Province contributes to the endowment effect more substantially than living elsewhere.

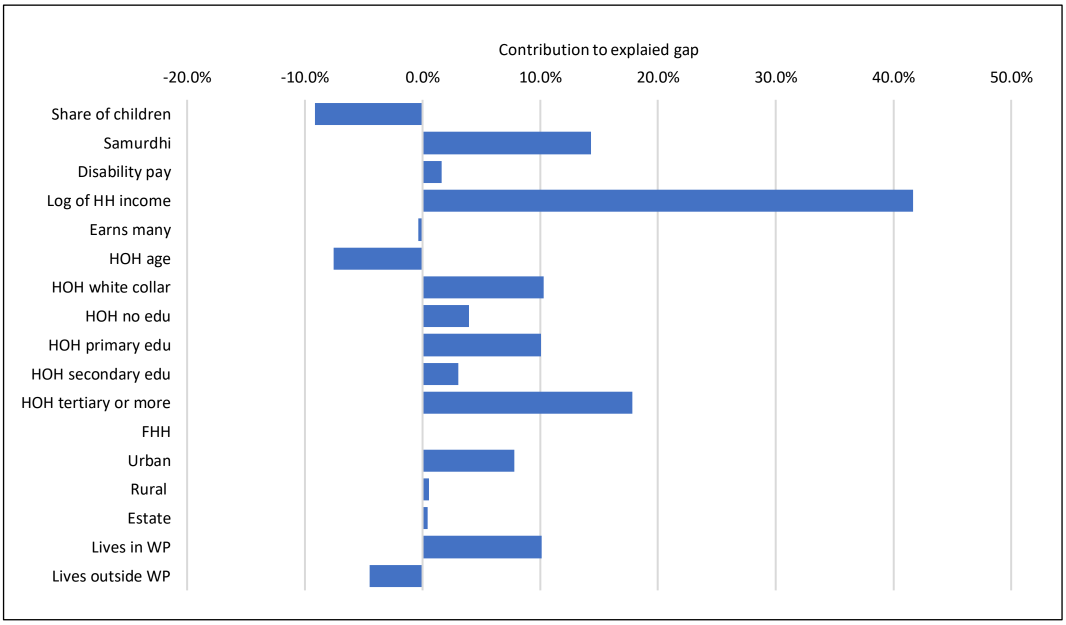
Figure 8.3: Contribution of predictors to the endowment effect of the mean difference in household income



Source: Author estimates based on HIES (2016) data using STATA SE/14

As expected, the household income contributes the most to the endowment effect of the SOL disparity (Figure 8.4). Among educational variables of the HOH's characteristics, tertiary education contributes the highest to the disparity. Unlike before, the HOH's age helps limit the SOL differential. So does living in the rural sector, or living outside the Western Province. At the household level, the receipt of *Samurdhi* income contributes sizably to the endowment effect of the SOL differential.

Figure 8.4: Contribution of predictors to the endowment effect of the mean difference in household SOL



Source: Author estimates based on HIES (2016) data using STATA SE/14

Table 8.4: Twofold OB decomposition results of income and SOL disparity by household headship

	Income	**SOL**
	β/se	β/se
MHH	10.0046***	40.6539***
	(0.035)	(0.542)
FHH	9.6972***	37.9230***
	(0.065)	(0.908)
Difference	0.3074***	2.7309***
	(0.071)	(1.040)
Explained	0.1231***	2.4866***
	(0.028)	(0.660)
%	40.0	91.1
Unexplained	0.1843***	0.2444
	(0.068)	(0.829)
%	60.0	8.9

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: N = 1,612; Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

To implement an intersectionality lens, a second OB decomposition analysis is conducted by looking at the sub-sample of households with PWDs by the type of household headship (Base category: MHH). The results (Table 8.4) indicate that as anticipated, MHHs are characterised by higher income and SOL than FHHs. The mean differences and their explained portions are statistically significant at the 1 percent threshold. Much of the income differential remains unexplained in contrast to the SOL differential of which only 9 percent remains unexplained.

The detailed results (Table V-2) shows that getting income from multiple sources (19.3 percent) and the HOH's employment in a white-collar job (11.2 percent) are the largest contributors to the income differential between the two groups. The HOH's age (7.1 percent) and the receipt of *Samurdhi* income (4.7 percent) are the only other statistically significant contributors to the income differential. The log of household income contributes the most (71 percent) to explaining the SOL differential. The HOH's employment in a white-collar job (22 percent) and receipt of *Samurdhi* income (11 percent) are the other significant contributors to the SOL differential. The next section attempts to make sense of these findings, engaging with existing literature, and in the context of the findings of empirical work in the preceding chapters.

8.4 Discussion

The OB decomposition analysis has brought to light several salient points. Perhaps, the most compelling, and the most encouraging among them is that much of the income and SOL differential between households with and without PWDs are explained by the model. The remaining inequality due to discrimination or other unobserved predictors not included in the model is comparatively less. Similar results obtained from the three-fold decomposition speaks to the robustness of the covariates. Here too, the bulk of the income and SOL differential are attributable to the endowment effect. What is positive about these findings is that they point to the possibility that much of the income and SOL inequality reported between households with and without PWDs can be bridged through proper policy and programmatic interventions. In other words, something can be done about these disparities, as they are attributable to observable characteristics. Next, as to 'what can be done' is delineated by focusing on the three groups of covariates – characteristics of the HOH, the household and spatial elements.

A large majority of the explained income and SOL inequalities between households with and without PWDs stem from differences in the human capital endowments of the HOH – the main aggravators of inequalities are a tertiary level education and employment in a white-collar job. This is observed in both the two-fold and three-fold decomposition results. Together, these findings point to the adverse effects of unequal access to education and labour market opportunities on the income and SOL of households with PWDs. A worrisome implication is how this problem might continue to persist in the long run as households from higher income brackets might be better situated to provide a quality education for their children than those from lower income brackets (Wicaksono et al., 2017).

However, the role education can play in ameliorating income inequalities is not universal, is dependent on the level of development of a country (Coady & Dizioli, 2018). Addressing educational inequalities for reducing income inequality is more important for developing countries than for advanced economies (Ibid). The importance of creating formal labour market opportunities for reducing income and SOL inequalities among households with and without PWDs is rather straightforward. In addition to higher incomes, formal sector employment (proxied by white collar jobs here) is characterised by direct and ancillary benefits such as health insurance, pension or other compulsory retirement savings, protection of formal labour laws, and stronger social networks, which might be particularly beneficial for households with PWDs.

An HOH's age tends to augment income disparity which in turn alludes to the role of experience and expertise acquired over time. This is congruent with Deaton and Paxson (1994) who reasoned that income inequality should increase with age, as individuals have more opportunities to diversify their income distribution. However, the HOH's age is a moderator of household SOL inequalities. Two plausible reasons come to mind. First, if the PWD in the household has acquired the disability at later stages in life, a household would have acquired a certain level of SOL by then. The second explanation points to the long-term nature of acquiring a given level of SOL. Unlike income, SOL mirrors what has likely been acquired over a period of time. Thus, at more advanced ages of the HOH, the SOL differential might be less pronounced between the two groups.

Among the household characteristics, the log of household income alone explains over a third of the SOL differential between households with and without PWDs. It clearly underscores the idea that any measures to improve the SOL among households with PWDs should entail strategies to increase their income. This premise has important implications for policy and programmes on creating livelihood opportunities for vulnerable households, especially those with PWDs. The most obvious is the substantial positive effect well thought out livelihood intervention programmes can create on the SOL among households with PWDs, by improving their household income. A second is the strong case that these findings make for rolling out livelihood support programmes for households with PWDs. This could be made part of an existing social protection programme assistance package, or a new initiative of its own, but clearly there is strong impetus to design and implement livelihood assistance programmes, especially targeting households with PWDs (and other vulnerable households). A third is the overarching ideological shift on disability that these findings call for – that households with PWDs should be given the tools to earn an income in addition to government handouts. Clearly, this would require more inclusionary and empowering attitudes towards PWDs than those rooted in the medical/charity model that permeate the existing state support for PWDs.

The receipt of *Samurdhi* (and disability payments) also feature rather prominently as drivers of income and SOL disparities. These observations are concerning and point to room for improvement in beneficiary targeting of social protection programmes. They also contest the idea that the country's social protection programs are generally appropriately targeted (Newhouse et al., 2016).

The spatial variables underpinning income and SOL differentials are emblematic of the problems of regional economies, labour markets, services and infrastructure. Residence in rural or estate sectors or outside the Western Province are moderators of the explained inequalities of both income and SOL. This is in line with patterns of income and SOL inequality elsewhere. For example, the 2021 World Social Report estimates that in 44 out of 56 countries for which estimates are available, income inequality is lower in rural areas compared to urban areas (UN Department of Economic and Social Affairs, 2021). Thus, it is reasonable to posit that moderating effects stem from a lack of opportunities for improving income and SOL for both sub-groups, and the incremental disadvantage of disability is therefore less pronounced in the rural and estate sectors than in the urban sector where there are more job opportunities, better access to education, more advanced infrastructure and therefore greater opportunities for enhancing a household economic situation.

The intersection of disability with the type of household headship within the sub-sample of households with PWDs produces further insights. Much of the income differential remains unexplained here, which of course would invariably subsume some of the effects of the differences in unobserved predictors (Jann 2008). Nonetheless, the results alert to the possibility that discrimination might be a greater barrier for FHHs than MHHs in finding opportunities to earn income. Such a proposition is also in agreement with the findings of Bella and Dartanto (2018), Lamichhane et al. (2014), and Parish et al. (2012) who observed in their studies of data from Indonesia, Nepal and the US, respectively, that FHHs with PWDs were typically poorer than MHHs. Thus, it might be posited from these results that income handicap is a bigger challenge for FHHs with PWDs due to effects of "discrimination" than for MHHs. In contrast, the unexplained portion of the SOL disparity is much less, alluding to a much smaller role that discrimination possibly plays in such disparity.

The potential role "discrimination" plays in the relatively larger unexplained portion of the income differential between MHHs and FHHs merits some broader policy-related reflections. It can be reasonably argued that at least some of the unexplained differential is in fact attributable to both covert and overt discrimination in society, against both women and disability. That the conception of disability in Sri Lanka is largely informed by the medical model and cultural ideologies also corroborates this hypothesis. Planned or unintentional exclusionary practices tend to take place at schools and other places of education, in the labour market, and other formal and informal institutions, which can place women and PWDs at a disadvantage, even when inclusionary values and language are espoused in policies and regulatory frameworks. Such exclusionary practices are often channelled through institutional values and norms, social closures or unruly practices (the gap between policies and how they are practiced) (Kabeer & Kabir, 2009). Ensuring that the inclusive policy measures transcend the institutional values and norms is therefore a difficult, but critical necessity in sustainably bridging income and SOL gaps between households with and without PWDs.

Some commonalities can be observed in the income and SOL disparities observed in the larger sample of households with and without PWDs and the sub-sample of MHHs and FHHs with PWDs. For example, HOH's employment in a white-collar job contributes to aggravating income and SOL inequalities among MHHs and FHHs with PWDs. These findings further underscore the important positive influence of high educational outcomes and formal sector employment on household income and SOL, even in the presence of disability. Note however, that gathering income from multiple sources tends to worsen the income disparities between the two sub0groups, but seems to moderate, albeit minutely, the SOL differential. Thus, receiving income from multiple sources might in fact be symptomatic of underlying economic distress of a household. While income from many sources might be a necessity for the household to keep afloat, not much might be left over for elevating the household SOL. Finally, the contributory role that the receipt of *Samurdhi* (and disability, although negligible) plays in driving income and SOL disparities reinforces concerns of lapses in beneficiary targeting in existing social protection measures.

8.5 Summary

This chapter attempted to unpack the factors underpinning the income and SOL disparity between households with and without PWDs. This was accomplished by applying the OB decomposition methodology to the HIES (2016) data. An intersectionality lens was adopted to study the implications of the type of household headship on the income and SOL outcomes among the sub-sample of households with PWDs. The results showed that much of the income and SOL disparity between households with and without PWDs was explained by the vector of covariates on household, HOH and spatial characteristics submitted to the analysis. In the three-fold decomposition, much of this difference was attributable to the endowment effect. In contrast, the two-fold decomposition of the income and SOL differential between FHHs and MHHs within the sub-sample of households with PWDs showed that much of the income differential remained unexplained. While some of it is likely due to unobserved predictors, the potential role of discrimination also cannot be discounted.

By and large, the results were encouraging in that first, much of the SOL differential is explained, and is attributable to household income. In effect, the results highlight that measures to improve household income, i.e., help households with PWDs (and FHHs with PWDs) can be particularly effective in improving their SOL. Secondly, in line with human capital theory, high educational outcomes and formal sector employment contribute much to the income and SOL differential. These patterns call for a greater effort by the government and other stakeholders in reducing the inequalities in access to education and improving labour market opportunities for individuals with higher educational outcomes. Removing gender barriers in this regard is particularly important given how income and formal sector employment also contributes profoundly to the income and SOL differential between FHHs and MHHs with PWDs.

The contribution of government social protection programmes to income and SOL inequality is somewhat baffling and point to the weaknesses in their targeting. The spatial factors indicate that living in rural or estate sectors or outside Colombo and Gampaha districts are suppressors of income and SOL inequalities. This could be because unlike in urban areas, the opportunities for economic advancement are less in these regions, even for households without PWDs. As such, the incremental challenge of disability might be less in these regions compared to urban regions. Finally, the possible role discrimination plays in driving income inequality between FHHs and MHHs with PWDs calls for a closer examination of how the inclusive policies and regulations are implemented on the ground.

Chapter Nine: Factors associated with the economic implications of disability - A mixed method analysis

9.1 Introduction

The preceding chapters have established that disability clearly has negative economic implications among households. The overall findings thus far confirm that households with PWDs face a coupling of disadvantages due to both income and conversion handicap. Not only is disability associated with income deprivation, but also in converting income into achieved functionings, measured in SOL terms. This chapter limits its focus to the sub-sample of households with PWDs, and examines the different factors that shape their economic realities. To do so, it employs a mixed methods approach drawing on the HIES (2016) data for the quantitative analysis and the 10 in-depth interviews for the qualitative study. The rest of the chapter is organized as follows. Section 9.2 lays out the methodology for data analysis. Sections 9.3 and 9.4 presents the results of the regression output and the qualitative data analysis. The insights from both methods are brought together and discussed next (9.5). Section 9.6 summarises.

9.2 Methodology

The economic implications of disability on households are complex and nuanced. In its investigation of the economic implications of disability at the household level, much of the empirical analytical work of this thesis has looked at the material deprivation among households with PWDs. However, as mentioned at the outset, the economic ramifications of disability far exceed what can be observed and quantified, and are certainly more nuanced than what is revealed through observed income or SOL variables. The methodological flexibility of qualitative research are better suited to examine such indirect, non-quantifiable and non-material economic implications of disability on households.

As such, in this final empirical chapter, I attempt to follow a mixed methods approach to exploring the factors that underpin the economic realities among households with PWDs. As the name implies, a mixed method study is one where at least one quantitative and one qualitative research method is used in a single study to collect, analyse and report findings (Creswell, 1999). The quantitative methods typically look for generalizable observations while qualitative methods probe into the lived experiences of respondents in relation to a given phenomenon (Carroll & Rothe, 2010). Combining both approaches allows a researcher to both 'look at' and 'look in' the issue at hand at the same time leading "to a more holistic understanding of those phenomena and to a more comprehensive view on how phenomena change and evolve" (Ibid, p. 3483). In other words, a mixed methodology helps "achieve a more complete picture of empirical reality" (Russek & Weinberg, 1993, p. 134).

Creswell (1999) has discussed three models of a mixed-methodology design. The first is the convergence model in which data is gathered using both quantitative and qualitative methods simultaneously and then examines both types of data to come up with findings. The second is the sequential model in which the data analysis is conducted sequentially. Data collected from one method is analysed, and used to inform the second data collection method. The instrument-building model begins with qualitative data analysis. The findings are used to prepare the quantitative data collection instrument. In this study, the mixed methodology followed is a hybrid between the convergence and the sequential models. To the extent that the preceding analytical work informed the preparation of the interview guides, it can be thought of as sequential. To elaborate, some of the quantitative analysis was already done when the constructive feedback in the upgrading seminar motivated the undertaking of a qualitative research study to enrich the findings of the quantitative analysis. By then, some of the preliminary quantitative analysis was being carried out, which provided some useful insights into the drafting of the qualitative interview guide. However, at the time of conducting the interviews, the quantitative analysis undertaken in this chapter had not been carried out. Therefore, to that extent, the mixed methodology approach used here is convergent. However, as the data integration takes place not at the analysis stage, but at the interpretation stage (Creswell 1999), this study is best described as following a convergent mixed methodology.

A note of caution when employing mixed methods in a research study is that the term is not used misleadingly, in that one methodology is left in the shadow of the other. A strong concern in the application of mixed methods in empirical studies is that qualitative methods and findings are often relegated to the margins of the overall analysis (See Walker & Baxter, 2019 for a full discussion; see also Giddings, 2006 for a critique of mixed methodology in empirical research). Although the quantitative methodological dominance in a mixed methods study is not a problem in itself, it is important that the qualitative findings are not left on the "cutting room floor" in the analysis (Walker & Baxter, 2019, p. 11).

Thus, to ensure that the findings of each methodology is feature fairly in the analysis, the econometric strategy is implemented to unpack the ways in which covariates are correlated to the observed economic outcomes (namely log of household income and SOL) among households with PWDs. Parallelly, the qualitative inquiry attempts to delineate the complex interconnections between these covariates and other unobserved, and non-measurable factors that underpin the economic implications of disability at the household level. Put differently, the qualitative analysis will elaborate, extend and clarify the observations emerging from the econometric models (Rossman & Wilson, 1994). The two data analysis strategies are briefly discussed next.

9.2.1 Econometric specification

An OLS regression is implemented to tease out the ways in which various predictors are associated with the income and SOL among households with PWDs, and is specified as follows:

$$Y_i = \beta X_i + \varepsilon_i \tag{9.1}$$

The outcome variables of interest (Y_i) are 1) the log of household income and 2) the SOL measured by TPCA. X_i is the vector of independent variables classified into four broad categories – characteristics of the PWD, household, HOH and spatial characteristics. β represents the estimated parameter coefficients of the regressors X_i and a constant. ε_i is the error term. In a household with more than one PWD, the individual with the longest duration of disability is considered for the PWD's characteristics. As discussed in Chapter 5, the district FE model controls for inter-district differences:

$$Y_i = \beta X_i + \alpha_i + \varepsilon_i \tag{9.2}$$

where α_i $(i = 1,2,3 \ldots n)$ is the unknown intercept for each district. By controlling for district FEs, the model is able to assess the associations of the covariates with the independent variable at the household level, without potential interferences from inter-district variances.

One concern is that in some households the PWD is the HOH[146], and in such instances some of the variables constructed to capture the characteristics of the PWD also holds for the HOH, which can result in multicollinearity. Therefore, tests were performed after running each econometric specification to check for multicollinearity[147]. The Variance Inflation Factor (VIF) for individual covariates turned out to be well below the threshold of 10 beyond which is traditionally considered problematic[148]. The preliminary analysis focuses on the entire subsample of households with PWDs. The application of an intersectionality perspective is accomplished by a subsequent analysis of intra-group differences within the sub-sample of households by household headship. By and large, the discussion will be limited only to statistically significant results. The results are presented in Section 9.3.

9.2.2 Qualitative data

As explained in Chapter 1, the qualitative component of the research study as a whole is modest. The sample size was determined following a rapid review of relevant literature. There are no specific recommendations on what the sample size should be for in-depth interviews (Dworkin, 2012). But an important criterion for determining an adequate sample size is theoretical saturation, beyond which no new insights tend to emerge[149]. However, in an analysis that systematically documented the point of

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[146] Summary statistics for covariates for models presented in Table 9.2 and Table 9.3 are in Table VI-1 and Table VI-2 of Appendix VI.

[147] Using *-vif-* command in STATA.

[148] The rule of thumb for values of VIF, beyond which the regression models are deemed problematic varies in the literature. However, in general, a VIF<10 is considered safe. Moreover, even higher VIFs by themselves do not discount the regression results (O'brien, 2007). However, in this case, all models reported VIFs of 5.5 or less.

[149] The concept of theoretical saturation, introduced by Glaser and Strauss in their book titled The Discovery of Grounded Theory has been increasingly used in qualitative research work to determine the number of interviews that are required to conduct a qualitative study. Its use for this purpose however is contested (Low, 2019; B. Saunders et al., 2018), a detailed discussion of which is outside the scope of this study.

saturation from a study of 60 in-depth interviews with women in two West African countries, Guest and colleagues (2006) concluded that saturation occurred within the first 12 interviews. They also argued that the interview structure, content and the homogeneity of the respondents would be important factors in reaching saturation.

Thus, a sample size of 10 was deemed adequate, especially given that the qualitative study was part of a mixed methods analysis. Further steps were undertaken to ensure that this sample size was meaningful from a point of saturation. To this end, some structure was established in the interviews through interview guides, and the content was fairly well contoured (in that the focus was on economic implications of disability)[150]. The interviews were conducted with the principal female respondents (PFR) in households with PWDs who were also the primary caregivers to the PWDs. The sample was restricted only to households with PWDs with physical impairments to preserve some homogeneity in the sample. It was decided that choosing PFR as the interviewee was most sensible because it is likely that she would know about the household situation better than a respondent chosen at random or the PWD himself/herself[151].

It is expected that following this purposive sample selection strategy has allowed to generate qualitative data to support a rich and complex analysis. Households were selected from the Colombo district (of the Western Province) and Jaffna district (of the Northern Province). Table 9.1 below provides a complete sampling frame for the in-depth interviews. Several considerations underpinned the choice of these two districts:

[150] See Table VI-3 for the interview guide

[151] A preliminary idea to interview the PWDs (50 percent of the sample) and their caregivers (remaining 50 percent) was dropped due to concerns whether such respondents would have the level of awareness of the household situation that would be necessary to answer the kind of questions asked, which in turn may result in varying levels of depth and quality of the responses. However, if the PWD herself is the PFR, in that case, the respondent is also the PWD.

1) differences in the socio-economic characteristics, and the ethno-religious composition; 2) differences in the regional labour markets, educational opportunities and other infrastructure facilities; and, 3) likely differences in disability experiences between the two districts, as households in the North have had a higher risk of acquiring a disability during the protracted armed conflict. The urban-rural divide was deemed necessary, in the light of the findings of the preceding quantitative analyses. Accordingly, the final categorisation of the sample can be summarised as follows.

Table 9.1: Sample selection for in-depth interviews

Selection criteria	**Composition of sample**
Physical disability	Yes
District	Colombo = 5 Jaffna = 5
Gender of PWD	Male = 5 Female = 5
Sector of residence	Urban = 6 (4 from Colombo; 2 from Jaffna) Rural = 4 (3 from Jaffna; 1 from Colombo)

Source: Author

The qualitative interview guide along with the consent form underwent a rigorous ethical review process at the Ethics Review Committee for Social Sciences and Humanities (ERCSSH) at the Faculty of Arts, University of Colombo. Ethical clearance was obtained following two rounds of revisions, following which the data collection took place. Sample selection was assisted by two grassroots level organisations located in Colombo and Kilinochchi districts. A Tamil-speaking research assistant was recruited to conduct the interviews, transcribe and translate them into English. The research assistant signed a confidentiality agreement which was drafted to protect the privacy of respondents, and the content of the interviews, prior to data collection. All transcripts were anonymised and are saved as password protected documents accessible only to me and my supervisors. All physical notes have been destroyed at this point.

Data analysis was conducted on MS-Excel. The application of the intersectionality framework in the analysis was accomplished in a three-step process. The first involved teasing out all the different factors that played a role in the economic experiences of households with PWDs. The second step was to categorise these factors into thematic areas. The third step involved delineating how these themes intersected with each other in influencing household economic experiences. The methodological flexibility allowed the analysis to consider important non-monetary dynamics of household disability experiences. In fact, the objective of undertaking the qualitative analysis was to probe into the complex non-monetary implications of disability which are difficult to be captured using quantitative tools. The analysis is presented in Section 9.4.

9.3 Results of the OLS regression

The regression output for the sub-sample of households with PWDs is presented in Table 9.2. The first group of characteristics pertains to the PWD. Many of the coefficients have turned out to be insignificant, but some patterns can be noted. First, the gender variable indicates that having a male PWD is associated with lower household income and SOL; the direction of its association is preserved and the magnitude is somewhat increased when district FEs are introduced for both income and SOL. In line with expectations, lower educational outcomes of the PWD do not bode well for income or SOL. The results for the latter are significant at the critical 1 percent threshold. When the PWD is the spouse or a child compared to another relative, there is a rather profound and significant negative effect on both income and SOL.

At the household level, an increase in the share of children has a negative effect on household SOL. The receipt of *Samurdhi* is inversely associated with both income and SOL. Even though the direction of association is the same for disability pay, the results are insignificant. As expected, land ownership and bank borrowings are positively associated with income among households with PWDs. Earning income from multiple sources appear to help household incomes, but not SOL. This stands to reason, given that multiple income sources might in fact be a coping strategy out of income poverty, which in turn can lead to time poverty with an adverse effect on SOL. Household income, as seen elsewhere is positively and significantly associated with SOL.

The associations of the characteristics of the HOH with income and SOL, respectively, are in line with expectations. Age, higher levels of education and being employed in a white-collar job are favourable for income and SOL. Where the PWD is the HOH, there is an adverse effect on both outcome variables, and the results are significant at the stringent 1 percent threshold across all models. The HOH being a female is inversely associated with both household income and SOL. Only the income coefficients have turned out significant, however. The ethnicity variables appear to have no bearing on income. However, other things being held constant, Moor households enjoy a higher SOL compared to the reference group of Sinhalese. Indian Tamil households are worse off in terms of SOL (and income), compared to Sinhalese. Residence in the rural and estate sectors, compared to the urban sector is inversely correlated with both income and SOL. However, the strength of the inverse association is greater in the rural sector, compared to the estate sector. Yet, residence in the estate sector appears to be the least favourable in relation to SOL.

Controlling for district FEs have mixed effects on the size of the coefficient estimates, but the direction is preserved. For example, once the district level differences are absorbed, the inverse association between gender and SOL becomes statistically significant at the 10 per cent cut off and is stronger i.e., PWD being a male has a higher inverse effect on SOL, other things held constant. In effect, a failure to control for district level heterogeneities would understate the negative effect of male disability on household income. Similarly, a failure to account for district FEs would overstate the negative effects of living in the rural or estate sector on both income and SOL. The sectoral associations are significantly reduced when district FEs are absorbed.

Table 9.2: Regression output for income and SOL as dependent variables

	Income		SOL	
	OLS	**District FE**	**OLS**	**District FE**
	β/se	β/se	β/se	β/se
Characteristics of the PWD				
Gender	-0.0771	-0.0965	-1.3686	-1.6713*
	(0.078)	(0.076)	(0.894)	(0.904)
Age	-0.0006	-0.0005	0.0229	0.0224
	(0.002)	(0.002)	(0.028)	(0.028)
No education or primary only	-0.0178	-0.0014	-3.1961***	-3.1368***
	(0.065)	(0.065)	(0.734)	(0.726)
Relationship to HOH: Child^	-0.2921**	-0.2608*	-3.9269**	-3.5086**
	(0.133)	(0.136)	(1.577)	(1.647)
Relationship to HOH: Spouse^	-0.3989***	-0.3660***	-5.2759***	-5.0750***
	(0.101)	(0.101)	(1.285)	(1.274)
Household characteristics				
Share of children in the household	0.0016	0.0014	-6.6991**	-6.9153**
	(0.228)	(0.224)	(2.734)	(2.750)
Household gets Samurdhi	-0.3012***	-0.2604***	-6.3087***	-6.2286***
	(0.059)	(0.060)	(0.744)	(0.743)
Household gets disability pay	-0.1451	-0.1464	-1.1482	-0.7822
	(0.129)	(0.127)	(1.794)	(1.808)
Has borrowed from banks	0.4434***	0.4405***		
	(0.056)	(0.056)		
Owns land	0.2175**	0.2379**		
	(0.101)	(0.100)		
Log of household income			5.6214***	5.5097***
			(0.355)	(0.355)
Earns income from many sources	0.7276***	0.7347***	-0.6739	-0.7301
	(0.067)	(0.068)	(0.963)	(0.990)
Characteristics of the HOH				
HOH's age	0.0042	0.0035	0.0753**	0.0657*
	(0.003)	(0.003)	(0.035)	(0.035)
HOH's education	0.2254***	0.2167***	3.6040***	3.6352***
	(0.043)	(0.043)	(0.665)	(0.655)
Whether HoH has a white collar job	0.2503***	0.2439***	5.3782***	5.0230***
	(0.086)	(0.087)	(1.311)	(1.374)
HOH has stopped activity	-0.4253***	-0.3859***	-3.6609***	-3.1586***
	(0.092)	(0.090)	(0.957)	(0.960)
FHH	-0.1953**	-0.2131**	-0.7560	-1.1048
	(0.083)	(0.082)	(0.863)	(0.829)
SL Tamil‡	0.1568	0.0789	-2.6192**	-0.4843
	(0.097)	(0.147)	(1.020)	(1.556)

Indian Tamil‡	0.0434	-0.0116	-2.1038	-0.5504
	(0.210)	(0.220)	(1.819)	(2.012)
Moor‡	0.1189	0.1389	3.1540***	4.4070***
	(0.109)	(0.118)	(1.108)	(1.192)
Sector				
Rural§	-0.6042***	-0.3823***	-7.5886***	-6.3725***
	(0.078)	(0.091)	(1.294)	(1.433)
Estate§	-0.3986***	-0.1300	-11.6012***	-10.7812***
	(0.150)	(0.179)	(1.846)	(2.055)
Constant	9.7000***	9.5131***	-16.3725***	-16.2795***
	(0.277)	(0.284)	(5.274)	(5.169)
r2	0.2311	0.2526	0.4499	0.4628
F	26.0807	23.5506	67.5108	46.0385
p	0.0000	0.0000	0.0000	0.0000
AIC	4655	4610	12731	12693
BIC	4774	4728	12844	12806

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: N = 1,612;Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Reference categories are as follows – ϒ other relative; † HOH is married; ‡ Sinhala; § Urban sector. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Next, the subsample of households with PWDs is grouped into those headed by women (FHH) and men (MHH). The regressors are modified accordingly. The variable denoting whether the household is an FHH is now dropped. From among the variables capturing the HOH's relationship to the PWD, only 'child' is retained as there are only a few observations for FHHs in relation to the other two variables. Ethnicity variable is excluded for the same reason[152]. Tests confirmed that the coefficients and the intercepts for the two sub-samples were significantly different from each other, justifying the estimation of separate models for each sub-group[153]. Overall, the results point to some similarities in the factors associated with income and SOL among the two sub-groups, but also some intriguing differences (Table 9.3). They are briefly discussed below, and is limited largely to statistically significant results only.

[152] Including a variable with a few observations runs the risk of overfitting the model, and producing misleading results (Babyak, 2004)
[153] Wald test results indicated that not only are the coefficients significantly different from each other, but also that the two equations are different from each other as well. The null hypotheses were rejected at 1 percent and 5 percent thresholds, respectively, in relation to income and SOL-based models.

Table 9.3: Regression output for household income and SOL by type of household headship

	Household income				**SOL**			
	FHH		MHH		FHH		MHH	
	OLS	**District FE**	**OLS**	**District FE**	**OLS**	**District FE**	**OLS**	**District FE**
	β/se	β/se	β/se	β/se	β/se	β/se	β/se	β/se
Characteristics of the PWD								
Gender	-0.4131**	-0.4105**	0.1683*	0.1159	-6.6754***	-6.4235***	1.3251	0.9372
	(0.201)	(0.193)	(0.089)	(0.092)	(2.026)	(2.048)	(1.487)	(1.417)
Age	-0.0001	0.0014	0.0032	0.0034	-0.0332	-0.0105	0.0970***	0.0884***
	(0.004)	(0.005)	(0.003)	(0.003)	(0.043)	(0.044)	(0.034)	(0.033)
No educ/primary educ. only	-0.2229	-0.2326	0.0683	0.0778	-4.3051***	-4.4874***	-2.4484***	-2.2749**
	(0.153)	(0.151)	(0.069)	(0.069)	(1.585)	(1.622)	(0.917)	(0.902)
Relationship to HOH: child	-0.4138*	-0.3631*	0.0611	0.0804	-5.8439**	-5.0467*	0.7129	1.0853
	(0.229)	(0.214)	(0.141)	(0.144)	(2.446)	(2.643)	(1.621)	(1.640)
Household characteristics								
Share of children in HH	-0.1053	-0.1628	0.0263	0.0018	-11.6686**	-11.5812**	-5.1778*	-5.2143*
	(0.468)	(0.492)	(0.249)	(0.247)	(5.463)	(5.784)	(3.069)	(3.045)
Gets *Samurdhi* pay	-0.4694***	-0.4449***	-0.2278***	-0.1901***	-6.1598***	-6.2677***	-6.3957***	-6.2342***
	(0.126)	(0.128)	(0.066)	(0.067)	(1.520)	(1.514)	(0.803)	(0.812)
Gets disability pay	0.0982	0.1070	-0.2151	-0.2339*	3.8630	3.5811	-2.5653	-2.2789
	(0.279)	(0.287)	(0.139)	(0.136)	(3.213)	(3.380)	(1.871)	(1.866)
Owns land	0.5567***	0.5683***	0.3907***	0.3848***				
	(0.136)	(0.141)	(0.063)	(0.063)				
Has borrowed from banks	0.4090**	0.3827*	0.1016	0.1366				
	(0.200)	(0.204)	(0.113)	(0.109)				
Log of household income					5.9395***	5.7627***	5.4414***	5.3496***
					(0.559)	(0.589)	(0.440)	(0.430)
Many income sources	0.9492***	0.9843***	0.6758***	0.6794***	-1.4827	-1.3604	-0.4277	-0.7350
	(0.185)	(0.199)	(0.070)	(0.072)	(2.501)	(2.827)	(1.049)	(1.060)

Characteristics of the HOH								
HOH's age	0.0068	0.0018	-0.0023	-0.0020	0.1003	0.0633	0.0024	-0.0032
	(0.005)	(0.006)	(0.004)	(0.003)	(0.066)	(0.068)	(0.041)	(0.039)
HOH's education	0.1913**	0.1342	0.2392***	0.2415***	2.9755***	2.7529***	3.9608***	3.9948***
	(0.090)	(0.094)	(0.047)	(0.047)	(0.838)	(0.928)	(0.836)	(0.802)
HOH has a white collar job	0.1109	0.0773	0.2775***	0.2905***	1.9885	1.4432	6.0025***	5.7372***
	(0.295)	(0.301)	(0.091)	(0.094)	(4.569)	(5.403)	(1.352)	(1.430)
HOH has stopped activity	-0.6493***	-0.5638***	-0.3543***	-0.3087***	-7.0576***	-5.8312***	-2.2616	-1.7097
	(0.187)	(0.192)	(0.107)	(0.110)	(1.710)	(1.962)	(1.516)	(1.451)
Spatial characteristics								
Rural§	-0.8121***	-0.4829**	-0.5780***	-0.3917***	-10.1736***	-9.0837***	-7.6440***	-6.7158***
	(0.218)	(0.234)	(0.080)	(0.103)	(2.047)	(2.413)	(1.532)	(1.615)
Estate§	-0.2401	0.0775	-0.5200***	-0.3118	-15.2631***	-13.2556***	-14.8146***	-12.9370***
	(0.313)	(0.326)	(0.169)	(0.201)	(2.682)	(3.374)	(1.962)	(2.111)
Constant	9.7449***	9.7780***	9.5846***	9.3503***	-10.6092	-9.1734	-19.9637***	-19.3407***
	(0.568)	(0.602)	(0.269)	(0.286)	(8.114)	(8.043)	(6.163)	(5.986)
r2	0.2693	0.3211	0.2101	0.2332	0.5152	0.5381	0.4179	0.4365
F	8.8117	7.5094	22.5903	18.6689	31.7139	17.5950	66.6920	51.2724
p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AIC	1228	1199	3426	3389	3131	3112	9628	9589
BIC	1296	1266	3512	3476	3195	3176	9710	9671
N	395	395	1217	1217	395	395	1217	1217

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Spatial variables reference category– § Urban sector. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

The first set of variables pertain to the characteristics of the PWD. When the PWD is a male, both income and SOL among FHHs are adversely affected. The statistical significance of coefficients is robust to the removal of district FEs. The association between the two variables reversed for MHHs, but the results are mostly insignificant. The PWD's age has a positive and significant effect on the SOL among MHHs. Low educational attainments of the PWD have a negative effect on SOL, irrespective of the type of household headship, and the coefficients are significant. The magnitude, though, is expectedly larger for FHHs. Both income and SOL variables of FHHs are negatively affected when the PWD is a child of the HOH. The corresponding coefficients for MHHs are insignificant.

Moving on to the household level variables, an increase in the share of children has a sizeable and significant adverse effect on SOL among both sub-groups. The magnitude, understandably, is larger for FHHs. The variable on *Samurdhi* income has turned out to be inversely related to both income and SOL for both sub-groups; the results are significant at the stringent 1 percent cut off across all model specifications. The variable capturing the receipt of disability pay produces mixed results. Although largely insignificant, how the disability pay-related coefficients have turned out is of importance. The results indicate that although the size of the association is miniscule, getting disability pay bodes well for both income and SOL among households. The reverse is true for MHHs. Getting disability pay is associated with lower income and SOL among MHHs.

Land ownership is favourable for the income of both sub-groups, but more so for FHHs, and the results are significant at the stringent 1 percent cut off across all specifications. Formal sector borrowings are significantly and positively associated with the income of FHHs. The receipt of income from multiple sources is positively correlated with household income among both groups, but its magnitude is greater for FHHs. As observed earlier, its association with SOL is negative for both sub-groups, although the coefficients are insignificant. Household income is significantly and favourably correlated with SOL among both sub-groups, a little more so among FHHs.

Among the HOH's characteristics, the education variable works well, and is positively correlated with income and SOL among both sub-groups, as anticipated. Note however, that once district FEs are removed, the education coefficient in relation to income among FHHs ceases to be significant. However, the corresponding coefficients for MHHs retain their statistical significance at the 1 percent cut off even after accounting for district FEs. The magnitude of the association is also larger for MHHs. White-collar employment is favourable for income and SOL among both households, but is statistically significant only for MHHs. The strength of the association is also larger for MHH, as was observed for the HOH's education. The HOH's own disability adversely affects the income of both FHHs and MHHs, but the severity is more for FHHs. While its association with SOL is also negative, the coefficients are significant only for FHHs.

Finally, the spatial characteristics reveal that residence in the urban sector bodes well for the income and SOL in both sub-groups. The results also suggest that living in the estate sector might be better for household income among FHHs, but such income does not seem to convert into SOL, as reflected in the larger inverse association observed between the estate sector and SOL, compared to the rural sector.

9.4 Economic implications of disability – qualitative analysis

The qualitative analysis is presented along three overarching thematic strands encapsulating the ways in which households experience the economic implications of disability. Each theme is then analysed through an intersectionality lens to unpack and interrogate the extent of such implications when disability criss-crosses other markers of social exclusion and vulnerability.

9.4.1 Reduced worker effect

A common theme permeating all in-depth interviews is how disability affects the ability of the household members to engage in gainful employment. All PWDs except one were economically inactive. One male PWD was engaged in a subsistence, home-based livelihood, but the work was largely seasonal. The common factors that keep PWDs from seeking and finding paid work include the exclusionary physical environment (including transportation, access to buildings, poorly maintained and managed roads), the non-availability of work that is compatible with what PWDs can do, the unwillingness among employers to recruit PWDs on various concerns including productivity, safety, and the inconvenience, as well as PWDs' own human capital limitations such as the lack of a formal education or skills. These factors also seem to catalyse PWD's unwillingness to seek work. The PWD is often not expected to take up paid work by the family or the community. Such ideologies tend to be internalised by caregivers and PWDs themselves. Thus, the voluntary refrain from participating in the labour force appears to be the norm for PWDs. To elaborate, one respondent stated:

> *"My husband's left hand and right leg have been incapacitated from the age of two. He was taken care of by his mother until he got married. Now I look after him. He does not look for work outside home, because he cannot work for long hours. He tried to work at a construction site, but the contractor was not happy*

> *because he can't do work for long. He can't walk or take the bus either."* (Jaffna, 45)

The PWDs refrain from LFP due to both real and perceived barriers has a direct negative effect on household labour supply. However, further detrimental effects on the household economic situation are created when other adults, especially the PFR in this analysis, also have to give up paid work to care for the PWD. Several factors affect the PFR's ability to earn income: (i) the severity of the disability which determines the extent of the care burden; (ii) the ability to substitute unpaid care work with paid help or through family support; and (iii) the gender ideologies that pervade the caregiving expectations of the PFR. The following quotes from two respondents from Colombo and Jaffna respectively show how hands-on care responsibilities can make it difficult for a woman to take up paid work. The following quotes are insightful in this regard:

> *"I am unable to work at all because I have to take care of my husband and my children and do the cooking and cleaning at home. We get a 5,000-rupee allowance from the government. The church also helps us"* (Jaffna, 49)

> *"I have to clean his [PWD's] bedsheets each morning because he has urinated on them and sometimes even defecated in them. It is very tiring to wash his sheets and feed him and dress him. I don't have the energy to do anything after tending to him in the morning. He also has an insatiable sweet tooth, and I try to cook what he enjoys eating"* (Colombo 43)

If the PFRs are employed, their ability to do so is predicated on their ability to factor in the responsibilities of caring for the PWD into their paid work. This could either be in the form of paid help or family support, or through home-based self-employment which gives PFR the flexibility to attend to the PWD while engaging in livelihood activities. Ironically, PFRs from the poorest households in the sample are unable to meet any of these conditions and are reliant on remittances from children, extended family and support from charities and religious institutions for household expenses. In fact, only one PFR in the sample was able to afford paid help. She is engaged in a managerial position at a private company, and has a paid full-time caregiver for her mother. However, she is expected to assume care giving responsibilities in the absence of such help:

> *"When my maid is there, I have no problem going to work. But when she goes home for holidays or festivals, I become the maid. I can't be too strict about her [maid's] leave because I am helpless without her. I will have to give up the job if I don't have someone like her to do my mother's work."* (Colombo, 40)

These implicit expectations are rooted in gender roles where a disproportionately high burden of unpaid care is placed on women. The following quotes underscore not only the expectations of the community and family members, but women's own internalised values about caring for the PWD:

> "*I am the sister. I will take care of my brother. It is my duty. What will the others say if I abandon him to go to work? I have six other brothers who are married. They give us money from time to time." (Colombo 38)*

> *"Everyone expects me to take care of my husband – my children, my in-laws, my neighbours. Sometimes I am tired, but I would feel very guilty if I can't take care of my husband well." (Jaffna, 57)*

Thus, the non-participation of the PFRs in the labour market stems from a number of complex factors which are shaped by financial affluence, social capital and their support (such as supportive husband, remittances from relatives etc), and one's own internalised values about caregiving roles and responsibilities. Thus, the intersection of disability experience with low income and resources/poverty tends to exacerbate their existing economic situation. There are non-monetary costs too on the women's own well-being. To quote one PFR:

> *"Sometimes I am tired and lonely. I have no one to talk to. I wish we had more money. Then I cry alone. I am sad when I think this will be my life, always"* (Jaffna, 45)

9.4.2 Lost opportunities

While arguably the preceding discussion can be subsumed under this thematic area, a failure to delineate the more direct effects of disability on household economic implications from the more complex, convoluted and nuanced ones would undermine the purpose of taking on a qualitative analysis. As such, although the lost opportunities certainly include the opportunity costs of the income foregone due to non-participation in the economy by both PWDs and their caregivers, this thematic strand looks at other examples. All three PWDs in the sample who have acquired a disability when small have not had a formal education. Economic destitution has led one of them to learn some rudimentary livelihood skills. The lack of opportunities for human capital development among PWDs was often related to low or no parental education, poverty, weak social networks, the PWD's gender and attitudes and stigma towards disability. Even when PWDs have acquired some education, such human capital acquisitions were not perceived as a means to an end for the PWD. This is particularly true at the intersection of gender, disability and stigma towards disability:

> *"I come from a fairly wealthy family. Because I was a girl with polio, my family did not think it was necessary for me to have ambition. I was home-schooled, but my parents did not think it was necessary for me to pass exams. They thought they will have enough savings for me. I think they were embarrassed by my polio."* (Colombo 69)

In Jaffna, the intersection of disability with forced displacement due to the war has not only taken away the PWD's opportunity to acquire an education, but also the opportunity to grow up with ambition and hope.

> *"My husband has attended school till he was 9 years old. Because of the war, going to school in his condition has become very difficult. His family was too poor to afford transport. Then there was constant displacement. School was the last priority then."* (Jaffna 42)

The PFR as a full-time caregiver also grapples with lost opportunities. Apart from having to give up paid work if they desire so, they are often compelled to plan their day-to-day life and engagements around caregiving responsibilities. The ability to take up recreational activities, participate in social gatherings, or to take care of their own health are often the opportunity costs incurred by the PFRs as primary caregivers. Some respondents also feel they miss out on the opportunity to fulfil their roles as spouses and parents because of their caregiving responsibilities to the PWD. The following quote elaborates these observations:

> *"I can't remember the last time I went on a trip with my husband. If I go, I have to plan everything for my mother. I am worried when I leave her alone with the maid. I am not at peace and I can't enjoy the holiday."* (Colombo 40)

The drudgery of care work often leaves women with a sense of helplessness and isolation and takes a toll on their physical and emotional well-being too. Because of the enormity of the care burden on a daily basis, PFRs often relegate their own well-being to a secondary status in fulfilling the care work of the PWDs. The following quotes elaborate these points:

> *"My back aches from lifting him [PWD] every day. I go to bed in pain every day. Sometimes if I have the energy, I will apply oil to my legs. I am constantly worried what will happen to him [PWD] if I fall sick"*(Jaffna 33)

> *"Sometimes I feel guilty that I spend so much time caring for my brother. I am guilty that I am not paying enough attention to my husband or my son."* (Colombo 42)

The intersection of poverty with the war have taken away opportunities from PFRs too. For example, at the intersection of displacement, poverty and low educational outcomes, they had little bargaining power over choosing who they got married to:

> *"I myself have a hearing problem. My parents were very poor and not interested in my education. When we were displaced, they thought I would not be a*

> *responsibility to them if I had married someone. Without a dowry, I did not have much of a say in who I married."* (Jaffna 57)

The children often miss out on opportunities too, especially in poor households, speaking to the intergenerational effects of disability. As PFRs are primarily focused on caregiving responsibilities, children are often neglected and left to fend for themselves. At extreme ends, children lose out on opportunities for acquiring their own human capital, by way of an education or skills. This was a recurrent theme emerging from the interviews from Jaffna:

> *"Our church supports my children's education, but I can't afford to send them for tuition. Without tuition, it is difficult to pass exams and go to university. My biggest worry is that I won't be able to give a good education to my three children"* (Jaffna 49).

> *"He wants his children to have the life he did not, but we can't afford to do a lot [for their education]" (Jaffna 42)*

In other instances, children – especially girls – might be assigned some of the domestic care burden; might be denied opportunities to engage in recreational activities/hobbies and pastimes, both due to time and resource constraints; they might be stigmatised or marginalised in society due to their parents' disability. The following quotes illustrate these points:

> *"I try my best to do everything on my own. But sometimes when I am just too tired, I ask my daughter to make dinner or wash some clothes (in the washing machine)."* (Colombo 43)

> *"In a way COVID was good because I at least got to spend some time with my children. We watched TV together, something we couldn't do at other times. It's always the same routine and we can't do anything together as a family"* (Colombo 42)

> *"My children don't want their father to come to school. They love him but I think they are worried about what other children would say"* (Jaffna 49)

In summary, households experiencing disability tend to miss out on opportunities to fully participate in daily activities, which can clearly contribute to serious economic ramifications at the household level, and sometimes with intergenerational effects. While not all of the lost opportunities discussed above can be directly traced to economic implications of disability, they point to a sense of loss or longing for a different/better life, as expressed by the following respondent:

> *"I am not resentful. But sometimes I wonder what it would be like to go to Canada or somewhere with my husband and son. I will never do that though. I don't trust anyone else to care for my father".* (Colombo 42)

9.4.3 'Othered' from society

A common thread weaving through all interviews albeit rather inconspicuously is how PWDs tend to be marginalised from the mainstream society in every possible way. While poverty tends to exacerbate the exclusionary effects of disability, PWDs from financially affluent households might also experience marginalisation from society, for other different, complex reasons:

> *"When I was young, Polio was a taboo so I was not allowed to go for classes to learn the violin, even when we had a driver who could drop and pick us. Had I learned to play the violin, I could have done classes at home. My nieces and nephews send me money for expenses now."* (Colombo 69)

The acceptance of the lost opportunity to acquire an education/skill almost as a given underscores the extent to which households with PWDs have internalised disability as an individual-centric problem. While PFRs discuss some of the barriers that have affected the educational attainments of the PWDs they care for, there is also a sense of an almost unequivocal submission to those barriers. These observations emphasise how households with PWDs are desensitised to the idea that they are excluded from socioeconomic activities that others take for granted. As one respondent explained:

> *"My brother has dropped out of school because of his condition. We have nine siblings in the family. My parents were not in a situation to spend on his education. There was nothing they could do. I think they decided to do that because there was no point spending on his education anyway…and now my other siblings help with his expenses"* (Colombo 38)

There appears to be also a concern on the returns to education for PWDs, even when affordability is not a constraint. Thus, exclusion can come from within the family itself. For example, one PFR pointed out:

> "*I wanted to do science. But my father was not sure I would be able to go to the medical faculty in my condition. My older sisters were sent to a better school than me because I think he believed they had better prospects than me. I think he expected my older sisters to look after me"* (Colombo 69)

A similar observation is made in the discussions about transportation and employment. Many PFRs recognise that barriers to transportation is a significant challenge for the mobility of PWDs which in turn affects their prospects for employment, access to healthcare, education and the ability to engage in recreational activities with their families. Yet, curiously, they do not seem to think of the lack of accessibility as a denial of the rights of the PWDs. Instead, they think the best way for the government to support PWDs is by way of increased handouts.

> *"It is good if buildings can have ramps and railings. But it is more useful if the government can give proper monetary assistance to families like us. Even if my husband can't go in a bus, or go to a building, we will still have money to eat and educate our children".* (Jaffna, 57)

The expectations of cash handouts permeating the discussions with poorer households suggest that the immediate monetary requirements among households with PWDs are far greater than the need for an inclusionary physical and institutional environment. In effect, households with PWDs can be argued to be willing to trade being marginalised for financial aid given their economic distress. This stands to reason, particularly if they their human capital endowment is weak. Even if the external environment were to be more inclusive, they would still find it difficult to find jobs and earn income without many marketable skills. In contrast, cash handouts would be a more convenient and a stable income source. The preference for short-term monetary assistance over more transformative macro-level inclusive measures points to the inability of households to rationally evaluate the long-term benefits that would accrue to PWDs and their households. Nonetheless, their reservations about the benefits of long-term inclusive measures for PWDs is justified, given their experiences of continued systematic marginalisation.

Stigmatisation of disability and the negative connotations associated with it at a societal and cultural level also seem to play a role in creating acceptance of exclusion of PWDs from mainstream society.

> *"Neighbours and my religious leaders and even my close relatives say that the economic difficulties and the loss of the sister's limb were a warning from the Lord."* (Jaffna 49)

> *"I know that my father and even my older brother was embarrassed that I could not walk properly because of polio. I remember when a gentleman came to see my older sister for a marriage proposal, I was asked to sit in a bedroom and not come out to the living area till the visitors were gone."* (Colombo 69)

Thirdly, the caregiving role performed by PFRs and the sense of duty and guilt permeating their domestic work, on the one hand towards the PWD and on the other hand towards the other members in their care also speaks of the acceptance of disability as an individual-centric burden, and an inconvenience to others, that should be contained within the household. For example, the two PFRs who care for PWDs who are their own family members express gratitude towards understanding spouses.

> *"My husband helps my son with homework if I am too tired or watches TV with him. Most days I am both guilty and angry. I will never ill-treat my father. But*

I am also guilty I am neglecting my family. I am angry at myself because I can't balance both" (Colombo 43)

Moreover, both PFRs argue that they would not be able to look after the PWDs in their care if they were not married, and worse if their spouses were not supportive. This sense of gratitude towards the partner speaks of the vulnerability of women who are caregivers to extended family and how women might be at a disadvantage in caring for PWDs in the absence of male support or under pressure from an unsupportive spouse.

> *"I don't know how I would have looked after my mother if I wasn't* married – *not just married, but also married to my husband. I don't have to think too much now because I feel financially more secure to take care of my mother."* (Colombo 38)

It is clear that the gendered expectations of women from the outside, and women's own internal values push the PFRs to vicariously assume the "guilt" and burden of disability onto them so as to not to inconvenience, mainly their spouses, but also grown children, siblings and neighbours. In the process, PFRs themselves are also marginalised from participating in society to a larger extent, along with the PWDs they care for.

9.5 Analysis and discussion

As Creswell (1999) has explained, the quantitative and qualitative methods are integrated at the interpretation stage in a convergent model of mixed methodology. Thus, in this section, I bring together the findings from both the quantitative and qualitative sections to generate insights on factors that play a role in how the economic implications of disability play out at the household level.

First, the intersection of gender and disability in producing unfavourable economic outcomes for households with PWDs is quite conspicuous (Emmett & Alant, 2006;

Wehmeyer & Rousso, 2006). The regression results have shown that the presence of a male PWD is more disadvantageous towards household income and SOL than a female PWD. Expectedly, such a disadvantage is more pronounced for FHHs. The FHHs in the sample as a whole are characterised by a lower number of adults in the household; this difference is more pronounced within the sub-sample of households with PWDs. Thus, clearly, the potential household labour supply is less for FHHs than MHHs. This obvious quantitative disadvantage is further exacerbated in the labour market due to gender discrimination in the labour market both in terms of opportunities and returns to participation. Therefore, when the PWD is a male, especially in a FHH, the economic ramifications are likely to be more profound than when the PWD is a female. Furthermore, economic disadvantages are worsened for FHHs when the HOH is the PWD, further underscoring their vulnerability in the face of disability.

The complex and subtle ways in which the gender-disability intersection plays out on the household economic situation is captured more holistically in the qualitative analysis. Social norms of what is expected of men and women, and PWDs play a deterministic role regarding their ability to take up paid work. Generally, there is an intrinsic norm/acceptance pervading all interviews that PWDs do not participate in the labour force, because the external environment – both physical and institutional components – do not accommodate them. Nonetheless, because men are expected to bring home an income, the inability to provide for the family is a “guilt” that male PWDs seem to grapple with; but for caregiving women, “guilt” is associated with participating in the labour force. The higher moral value ascribed to caregiving for a PWD, than bringing home an income, makes it difficult if not impossible for caregiving women to engage in paid work. In fact, their ability to take up income-earning activities is contingent upon whether they can balance both paid work and unpaid care work, and prioritise the latter at all times.

The role of education and formal sector employment in influencing the household economic realities in the presence of disability is rather straightforward. The positive correlation between educational variables (both of the PWD and the HOH) and income and SOL variables, observed in the qualitative analysis, is in line with the human capital theory, and makes a strong case for investing in an affordable, inclusive education system (Lamichhane & Sawada, 2013; Vanniasinkam & Vitharana, 2020). Nonetheless, adverse effects of a PWD's poor educational outcomes are far greater on FHHs. Conversely, the positive effects of higher educational outcomes of the HOH are lower for FHHs, alluding to the greater difficulty such households face in converting their education outcomes into more income and better SOL (Paweenawat & McNown, 2014). Together, these observations indicate that among households with PWDs, FHHs have lesser opportunities to leverage education to earn more income and increase SOL. This is another example of how the interaction and the overlapping of the inequalities of gender and disability can exacerbate vulnerability among FHHs to deprivation (Emmett & Alant, 2006).

The qualitative analysis however suggests that the relationship between education and economic outcomes among households with PWDs is more convoluted. Resource constraints tend to discourage parents from providing an education to children with disabilities because they do not expect such an investment to yield returns. Instead, a more pragmatic strategy is to provide education to the siblings of the PWD who do not have disabilities, who will then take care of the PWD in the future. The uncontested perception that disability is a fixed barrier to participating in economic activities that permeates all interviews, discounts the importance of education as a means to an end for PWDs. Therefore, even when households are financially capable of providing a good education to PWDs, they might not be interested in doing so. In the qualitative sample, disability and household financial and social affluence seems to have played a bigger role in PWDs' educational outcomes than gender. The exclusionary mainstream context makes education a redundant factor in accessing labour market opportunities. In Jaffna, the disruption to education due to the war and multiple forced displacements have also prevented human capital acquisition among PWDs.

Next, the disproportionately large burden for the caring of PWDs that tends to fall on FHHs might explain why such households experience a negative effect on household income and SOL when the PWD is a child. For example, a study conducted by Cohen and Petrescu-Prahova (2006) using 2000 census data found that in the US, children with disabilities (CWD) were more likely to live with single parents, mostly mothers, or FHHs if such children were not with their biological parents. The authors posited that these results were consistent with the idea that if child care is perceived as women's work, it is even more so in the case of CWDs who might have additional care needs. The challenge of caring for a CWD is also likely to limit the time and opportunities available for a woman heading a household in the labour market to earn income, and convert such income into a higher SOL.

The complexity of the care burden is further illustrated in the qualitative analysis, although not in relation to caring for CWDs. A common theme connecting most respondents with parents/siblings with disabilities is their inner struggle of balancing their care responsibilities towards the PWD and their spouses and children. Strategies to work around caregiving demands can be exhausting, expensive and still end up in feelings of inadequacy. At its worst, the caregiving responsibilities lead to the neglect of children (their education), and the transfer of some domestic chores, especially to girl children. These challenges are more pronounced in the absence of financial affluence and/or formal sector employment that makes it possible to obtain paid help, a support system by way of accommodating spouses, adequate housing, financial assistance from extended family and relatives etc.

The drudgery of care work and domestic chores often takes a toll on women’s own physical and social well-being and worsen their time poverty. In fact, women who engage in income-earning activities are the worst off in this regard. Moreover, fulltime caregiving responsibilities can be an isolating experience which can often leave women exhausted, lonely, cut off from society, disempowered, discontent with her life, hopeless and uncertain about the future. These are among non-material and invisible costs of disability (Palmer et al., 2015). For women who have brought family members who are PWDs to their marital home, the added stress of not inconveniencing their partners symbolises their patriarchal ideologies. The implications of the caregiving burnout on respondents are truly grave because a break in her health can have serious repercussions that far exceed the economic costs on the household and children who depend on her for nutrition and safety, nutrition and survival.

These observations point to the less clear-cut economic implications of disability and demonstrate the disproportionate burden of disability on household members. They also underscore the importance of the study of disability from a household perspective. Caregiving responsibilities women take up are not only imposed from outside, but also internalised.

The consistency of the association between the receipt of *Samurdhi* and household income and SOL observed in the econometric analysis corroborates the concern that Sri Lanka's social protection programmes are less generous than those given by other comparable countries (Newhouse et al., 2016). It is clear that the receipt of such social assistance does not resolve household income, or SOL issues. Note however, that the disability pay appears to be positively associated with income and SOL among FHHs. These results suggests that if properly targeted with improved generosity, disability pay can help improve the income and SOL among FHHs with PWDs.

But a pertinent question is how adequate are social protection programmes in addressing capability deprivation. It was rather obvious from the analysis of in-depth interviews that PFRs prefer cash handouts over an enabling external environment to support their households. It could be posited that from their vantage point, the pathways connecting an inclusionary environment to better economic outcomes for their households are far too disconnected to be meaningful. Cash grants on the other hand bring immediate economic relief and are malleable to households' immediate necessities.

Access to physical and financial capital bode well for the income and SOL among households with PWDs, as revealed by the regression results. The positive effects seem to be greater for FHHs. On the other hand, getting income from multiple sources is positive for income of both sub-groups, but negative for SOL, implying that economic hardships might be the reason why households resort to earning income from many sources. This sheds further light on why women might prefer cash grants over accommodating physical spaces to help households with PWDs. Such grants might not only alleviate some of the household economic distress, but also provide a reliable safety net for PWDs who may be otherwise dependent on the benevolence of extended family and relatives for survival.

The usefulness of physical and financial assets, and the vulnerability in the absence thereof evident in the qualitative interviews supports and extends the quantitative findings. Mobility is not as big a challenge when the PWD comes from an affluent household with access to mechanized transportation. House ownerships also provides stability and safety for PWDs, and the lack of a house ownership is a source of uncertainty and fear among PFRs. Access to credit is important for households with PWDs to set up livelihood activities, although the size of borrowings appeared to be rather small and the source of borrowings, mainly the *Samurdhi* loan scheme. Social capital and safety nets are more critical to households with lower physical and financial asset endowment.

The overall strong and positive association of household income with SOL, a little stronger among FHHs than MHHs, observed from the econometric estimates is encouraging. It reiterates the idea that an increase in the SOL among both FHHs and MHHs with PWDs is attainable, through targeted interventions for improving their household income.

But the qualitative analysis suggests that the pathways are not so direct. This is predominantly due to the complex ways in which the non-measurable aspects of SOL are affected by the presence of disability in the household. Clearly, an improvement in income is likely to alleviate the economic distress that poorer households with PWDs grapple with. It might even contribute to their material well-being. However, income alone cannot address the conversion gaps stemming from deep-rooted patriarchal ideologies, attitudes towards disability or the exclusionary environment that play a pivotal role in affecting the non-material SOL of households with PWDs.

Spatial factors from the quantitative analysis show that living in the rural or estate sector, compared to the urban sector has disadvantageous economic outcomes for FHHs. While FHHs living in the estate sector might earn more income than those living in the urban sector, much of that income seems to spent on survival, leaving little income to be used for improving SOL. These observations stand to reason. First, highest overall and female LFP is reported from the estate sector (DCS, 2021). But the highest multidimension poverty index, both in terms of headcount and intensity, is also reported from the estate sector (DCS, 2022). Clearly, these patterns imply that estate sector residents find it more difficult to convert their gains from LFP into a higher SOL.

The qualitative analysis did not look at the estate sector due to the small sample size. Moreover, the districts chosen for the qualitative research work do not have an estate sector. The urban-rural comparison within the sample showed that the economic disadvantages faced by households due to the external environment were by and large common to both urban and rural sectors – for example, the mobility challenges were common to households from the urban or rural sectors in Colombo or Jaffna districts. Feelings of anxiety or hopelessness were more prevalent among respondents from rural areas, and in the Jaffna district compared to those from urban areas and in Colombo. Such sentiments might be attributed to the lack of opportunities for economic advancement, scarcity of employment opportunities, higher regional poverty and the greater rigidity of gender norms embedded in rural societies (Freudenburg & Davidson, 2007), which can be particularly disempowering for households with PWDs. The patriarchal values that permeate the society in Jaffna, and persistent adverse ramifications of the war experience might also explain feelings of hopelessness among the respondents in Jaffna.

However, the overarching and the most poignant contributor to household economic implication of disability, that which is not revealed in the quantitative analysis, is the ways in which households with PWDs are desensitised to the exclusionary nature of the external environment they live in, including physical spaces, societal values and institutional frameworks. The respondents' acceptance of the de facto external environment, the inability to articulate how it can change to be more inclusive of PWDs, the resignation with which respondents accept disability as a divine message, the subordination to social and familial pressure to care for the PWD at the cost of one's own physical and emotional well-being, and the perceptions that cash handouts are the most important support from the state for their household economic situation are all emblematic of the outdated individual-centric ideals of disability entrenched in society at large. The acceptance of the 'otherness' seems to push households with PWDs to take on the burden of disability alone, without challenging in what ways the external environment has to change to become inclusionary. At the crux of the economic implications of disability at the household level observed and discussed throughout this thesis are the misconceptions about disability at micro, meso and macro levels of society.

9.6 Summary

Using a mixed method approach and an intersectionality lens this study attempts to investigate how economic implications of disability at the household level are shaped by the characteristics of a household including those of the HOH and spatial factors. The application of an intersectionality lens was achieved in the quantitative analysis by dividing the sub-sample into FHHs and MHHs. The qualitative data analysis was particularly useful in understanding ways in which the intersection of disability with other markers of social exclusion to invisible and non-quantifiable economic challenges that households with PWDs grapple with.

The quantitative analysis has clearly shown the adverse effects of disability at its intersection with gender. While disability might affect women more at the individual level, the presence of disability in a male is more disadvantageous for the household economic situation. The negative implications are worse when the PWD is a child or the spouse rather than another relative. The human capital variables work well and underscore the importance of a good education in general, and for PWDs. The returns to education and formal employment however seem to be lower for FHHs with PWDs, pointing to the underlying discriminatory practices in the labour market. By and large asset ownership and access to formal credits is beneficial for households with PWDs, slightly more so for FHHs. The inverse correlations of transfer pay with household income and SOL point to problems in the generosity of social protection programmes, but there is some weak evidence that such income is useful for FHHs with PWDs. The disproportionate burden of care taken on by women is proxied by a higher adverse effect of an increase in the share of children in an FHH with PWDs. The results also show that getting income from multiple sources does not necessarily translate into SOL; on the contrary, it is in fact indicative of economic distress of households. The same can be said in relation to residence in the estate sector. Although it might help households with PWDs, especially FHHs obtain more income, the conversion handicap is more in the estate sector than the rural or urban sectors as reflected in the inverse association between residence there and household SOL.

The qualitative analysis enriches the quantitative findings by supporting, challenging and interrogating them. The analysis concurs with the quantitative findings that disability indeed has negative economic implications for households with PWDs. However, the pathways are far more complex, nuanced and dynamic than what is observed from the measurable outcome variables used in the econometric analysis. Clearly, the economic implications of disability are far worse among households from poorer households, with lesser social affluence and a low endowment of human, physical, social and financial capital. Other negative experiences such as protracted displacement further exacerbate the adverse effects of disability on households.

Quite apart from the somewhat obvious opportunity cost of the income foregone by the primary caregiver, there are other hidden costs that evade measurement that can profoundly affect the household economic situation. One example is the impact of fulltime caregiving on women's physical and emotional well-being. Another is the time poverty they grapple with in meeting the demands of caring for the PWD and her other domestic chores. In worst cases, the economic implications might run the risk of being transmitted intergenerationally through the neglect of children. The intersection of gender and disability yields unfavourable economic implications for women, even when PWDs come from affluent socioeconomic backgrounds. Stigma surrounding disability, the moral values ascribed to caregiving for PWDs, gender ideologies about women's role within the household also play a defining role in the ways in which economic implications of disability pan out at the household level. However, the most profound observation from the qualitative study is how caregivers seem to have internalised and accepted their 'otherness'. The idea that disability is individual-centric and a burden that should be contained within the household permeates all narratives, alluding to perhaps the most profound cause underpinning the negative effects of disability on a household's economic situation. Such an idea fails to question and challenge the role of the external environment in producing inequitable economic outcomes for households with PWDs, and the fact that external factors can contribute to creating socioeconomic equity for households with PWDs.

Chapter Ten: Synthesis and conclusions

10.1 Introduction

Challenging the idea that disability is a personal problem necessitates an expansion in in its scope beyond the individual. In this study, this was accomplished by looking at the meso level, i.e., the household. Following, predominantly quantitative methods, this thesis undertook an analysis of the economic implications of disability at the household level in Sri Lanka. The study is informed and inspired by the CA as an overarching conceptual framework and the methodology is inspired by the seminal work of Zaidi and Burchardt (2005), especially in relation to the operationalisation of CA using secondary quantitative datasets. An intersectional lens is applied to the data analysis, where possible. Throughout the several empirical analyses conducted, the log of household income (resources) and household SOL (achieved outcomes or functionings) are the main outcome variables of interest. As SOL is typically an unobserved latent variable, it is proxied for by an index which has been constructed in four ways using both data-driven and normative techniques.

The HIES (2016) and the MDS (2014/15) data used in the quantitative analysis have their own merits and limitations. The HIES is not designed for the purposes of gathering information on disability, resulting in limited availability of data on the issue but contains detailed information on household income and other household characteristics. The MDS (2014/15), on the other hand, has collected detailed data on different dimensions of disability as discussed in the ICF framework, but the information on household income and other characteristics is relatively thin. Fortunately, however, the HIES's health schedule contained sufficient information to improvise a construct of disability close to the ICF's definition. The MDS data facilitated the measurement of disability on a continuum, and were amenable to numerous constructs of disability for analytical purposes.

The complexity of disability as a human experience which is methodologically impossible to be captured using quantitative strategies impelled a qualitative component to be built into the thesis to complement and enrich the findings from the quantitative analysis. Accordingly, a modest qualitative data collection by way of 10 in-depth interviews were also conducted to interrogate the findings of the quantitative analysis.

Comparisons are drawn between households with and without PWDs throughout this study, using these data sources. The next section attempts to synthesise their key findings, and provide a summary overview of the economic implications of disability at the household level in Sri Lanka. These findings also generate several policy-related insights on issues of social protection, education, vocational training, employment, and macroeconomic development in Sri Lanka, but relevant also more broadly for countries with similar socioeconomic characteristics. They are outlined in Section 10.3. The next section (10.4) discusses some of the lessons that can be learned from the analytical work conducted in this thesis, and impetus for future research.

10.2 A synthesis of findings

The descriptive profile of the PWDs discussed in Chapter 4 using data from both HIES and MDS datasets confirmed the salient patterns associated with disability, observed elsewhere in the world. As expected, the risk of acquiring a disability is greater with age, and the prevalence is higher among women and individuals with low educational attainments. The majority of the PWDs are economically inactive. But disability is a greater barrier for the labour force participation (LFP) among men than women. In other words, disability is a significant deterrent to male LFP, but is only one of the many factors that tend to keep a woman away from the labour force. The MDS analysis shows that norms, attitudes and social capital contribute profoundly to increasing the severity score of one's disability experience. Moreover, the constituents of the disability barriers are nuanced across gender, age groups and spatial parameters, underscoring the heterogeneity of the disability experience.

Chapter 5 implements the methodological procedures introduced by Zaidi and Burchardt (2005) to estimate the extra cost of disability incurred by households with PWDs, using both HIES and MDS data. A preliminary OLS regression analysis confirms the hypothesis that households with PWDs are indeed characterised by lower income and SOL, a pattern that holds robustly for both datasets, and across different constructs of income, SOL and disability. An inquiry into the extra cost of disability at the household level is thus justified. The findings illustrate that to obtain a given level of SOL, households with PWDs typically have to incur a non-trivial extra cost of disability. The estimates however vary depending on how stringent or loose the definition of disability is. In fact, at lower thresholds an 'extra benefit' of disability is observed, although the underlying coefficients of such estimates are insignificant.

The quantile regression analysis shows that the magnitude of the extra cost of disability also varies depending on where a household falls in the SOL distribution. The results have also shown that a failure to recognise spatial heterogeneities can lead to over- or underestimates of the extra cost of disability. However, it has to be highlighted that the true extra cost of disability which would also include numerous invisible, non-quantifiable and non-economic costs is likely to be much higher than what the estimates of this analysis suggest.

Chapter 6 uses the retrospective recall information on the duration of disability in the HIES (2016) and implements a survival analysis procedure to look at the long-term economic implications of disability. Such implications are operationalised as household income poverty and non-income poverty (using SOL) using several simple absolute poverty definitions. The univariate analysis is limited only to income poverty, and the results show that the highest risk of falling into poverty are marked at the disability onset and in the long-term. Such risks are heightened for households with female PWDs, FHHs and households living in the rural and estate sectors. These results point to the economic fragility of households at the intersection of disability and gender. Households with greater financial affluence (as proxied by asset ownership) are at a lower risk of transitioning into poverty due to disability.

The multivariate analysis is performed in relation to both income and non-income poverty. The results sit well with the evidence on the disability-poverty nexus, and point to the importance of human capital in mitigating the risk of a household falling into both income and non-income poverty in the face of disability. The presence of a female PWD increases the risk of a household falling into both income and non-income poverty, as does an increase in the share of children. As expected, there are higher risks of households receiving transfer payments from the state falling into income poverty. On the other hand, access to formal credit, and asset ownership lowers the risk of a household with PWDs falling into poverty. Spatial patterns are also telling, and point to the greater vulnerability of households living in areas with relatively smaller regional economies to fall into income and non-income poverty.

The analytical methods employed up to Chapter 6 did not correct for endogeneity and did not speak for the causal directions. In a bid to tease out potential causal links between disability and its household economic implications, a quasi-experimental procedure is implemented in Chapter 7. As earlier, the economic situations are looked at in terms of income and SOL. Two ‘treatments’ are considered – whether a household experience disability or not and whether households have borrowed from a bank or not. The latter treatment is only run for household income because whether a household has borrowed from a bank is a constituent of the SOL. Given the cross sectional nature of data, the findings are synthesised with caution.

The results show evidence to support the economic distress disability can exert on households with PWDs. However, the effects of disability appear to be more profound among women as reflected in their lower POMs on both income and SOL. The findings also resonate with the concept of double jeopardy of disability women grapple with. However, of note is the fact that the effect of disability on income is higher among MHHs. These patterns tie with the conclusions drawn in earlier chapters that the incremental negative effect of disability on the household economic situation might be lower in the presence of female PWDs than male PWDs. But the FHHs encounter more challenges in converting resources (income) into achieved outcomes/functionings (SOL) in the face of disability. Results on the treatment effects estimations with bank borrowings are encouraging, in that they point to the positive role formal credit can play in improving the income of households with PWDs. The results show that not only do borrowings boost the incomes of households with PWD, but also that the positive impact of bank borrowings on household income is greater among those with PWDs.

An Oaxaca Blinder (OB)-decomposition was undertaken in Chapter 8 to assess the potential inequalities in income and SOL among households with and without PWDs, and factors underpinning such inequalities. The first analysis was conducted for the sample as a whole. Next, the sample was restricted to only those with PWDs, and an intersectionality lens was applied to unpack the sources of income and SOL disparities between FHHs and MHHs. The findings suggest that much of the income and SOL disparities between households with and without PWDs are attributable to observed variables. In other words, the unexplained portion or the effects other than endowment (for two-part and three-part decomposition, respectively) of the income and SOL differential is smaller than what is explained or due to the endowment effect. For example, much of the income disparities stem from differences in the human capital endowment of the HOH, and most of the SOL disparities are attributable to differences in household income.

However, in the subsample restricted only to households with PWDs, the unexplained portion of the income differential between FHHs and MHHs is greater than what is explained. Although much if it could be stemming from variables unobserved in the model, the existing evidence suggests that discrimination might play a role in the income disparities between households with and without PWDs. In contrast, most of the SOL differential is explained by differences in household income. Together, these results suggest that FHHs with PWDs tend to grapple more with an income handicap than a conversion handicap. Spatial variables indicate that regional economic disadvantages also play a role in creating inequitable income and SOL outcomes for households with PWDs, especially FHHs.

Chapter 9 follows a mixed method approach to untangle the factors associated with household income and SOL among households with PWDs. This is accomplished by following an OLS procedure on the subsample of households with PWDs, and an analysis of in-depth interviews. An intersectionality lens is applied to both methods. In the quantitative analysis, the strong and significant associations both income and SOL share with a good education and employment underscores the important role human capital can play to support the economic situation of households with PWDs. Yet the returns to such human capital endowments are conspicuously lower among FHHs compared to MHHs, implying the gendered complexities of the labour market. The findings also show that having a male PWD is particularly disadvantageous to FHHs. However, income is positively associated with SOL highlighting that an increase in income can help ameliorate the conversion handicap among households with PWDs. The stronger negative association between the presence of children and SOL among FHHs compared to MHHs alludes to the disproportionately higher care burden placed on women.

The qualitative analysis fleshes out these patterns in greater detail, and showcases the complexities and nuances in many of the correlations discussed above. The loss of income is not only a direct result of a reduction in household labour supply, but also the lack of resources and restricting gender ideologies. Access to physical, financial and social capital might alleviate some of the economic pressure, but internalised values on gender roles and disability play a pivotal role in shaping caregivers' attitudes and behaviours, even if they have high educational outcomes. The caregiver burnout, anxiety and frustration are some of the non-monetary economic implications of disability. However, the most telling illustration of the underlying drivers of economic distress among households with PWDs appears to be the uncontested acceptance of the ‘otherness’ of PWDs, the exclusionary external environment, and the internalisation of disability as an individual-centric problem.

10.3 Reflections for policy and practice

The empirical findings discussed above confirms the central hypothesis of this thesis and corroborates and adds to the corpus of evidence on the economic implications of disability at the household level. Households with PWDs are characterised by lower income and SOL. There is a sizeable extra cost of disability associated with households with PWDs. Even without accounting for the extra cost of disability, the prevalence of absolute poverty measured by falling below certain thresholds is greater among households with PWD. Disability is also associated with the long-term economic risks faced by households. Moreover, there is also evidence that disability in fact leads to low income and SOL among households. The income and SOL inequalities between households with and without PWDs are underpinned by a number of factors that seem to be unfavourable for households with PWDs. In addition to what is observed in quantitative data, there are important but invisible, non-measurable, non-monetary costs associated with household level disability experiences. The opportunity costs, not just in terms of the lost and foregone income, but also through the many ways in which PWDs and their caregivers miss out on experiencing life stem from not only disability, but its intersection with other disempowering experiences such as poverty, low socioeconomic status, displacement, and misconceptions about disability, including stigma, and that it is principally ‘one’s own problem’. Reflecting on these findings leads to several implications on policy and practice on disability inclusion and empowerment.

While there is a plethora of initiatives that have been put in place to create better socioeconomic outcomes for PWDs, they have not been very successful in achieving their objectives. This is due to many reasons, a first of which is a fundamental lack of understanding of the implications of disability on an individual's full participation in society. This clearly stems from an outdated perspective on disability rooted in both the medical and charity models. As a result, disability is often relegated into a lesser position within the policy realms. This is perhaps also reflected in the disability policy formulation-implementation gap. Although there have been progressively more documents adopting the 'correct language', there has been no significant improvement in the rights of PWDs. As surmised at the outset, the significant disconnect between the ideologies upheld within policy documents, the prescriptive and top-down social protection and assistance measures in place, and the overwhelmingly exclusionary external environment could be partially blamed on the lack of knowledge and information on the socioeconomic realities of PWDs and their households.

Thus, a useful first reflection, enveloping all ensuing thoughts on policy and practice, and predominantly associated with the quantitative work of this thesis, is the important role of definitions, parameters and thresholds in examining the economic implications of disability among households. Intrinsic to an objective evaluation is some form of quantification of both these key concepts. However, any quantification of disability is inherently flawed in that it cannot truly reflect the dynamism of disability as a human experience. As such, while acknowledging that the spectrum of disability is vast, some type of codification of disability is crucial for estimating its economic implications (and even other quantifiable effects). Clearly, dichotomising disability is naïve and oversimplistic. A severity score on a spectrum is a more realistic measurement of disability. Even then, some threshold, often determined subjectively, is required to determine the extent of severity. One way to circumvent the application of thresholds is to express disability in Basic Daily Activities of Living (BDAL) and Instrumental

Daily Activities of Living (IDAL) terms. Even then, one has to decide what BDALs/IDALs or how many of them are deemed necessary to define disability, which again is a subjective judgement.

The second pertains to the determination of thresholds below which households are considered to be at an economic disadvantage. A discussion on poverty threshold is outside the scope of this thesis, but much of the empirical work carried out here has shown that the economic implications of disability are very much reliant on not just the definition of disability but also what the cut offs are for income and non-income poverty. In recognition of the implications of these subjective judgements on the outcomes, the study has used different definitions of disability and thresholds for income and non-income poverty. In turn, a range of estimates are produced for the issues being investigated. While the magnitudes of the associations may differ, by and large their correlation directions are robust to different constructs of the key variables of interest when they are strictly defined. With less parsimonious constructs, certain interesting, thought-provoking and counterintuitive outcomes are generated. For example, in the MDS, at lesser levels of disability severity, there appears to be an extra benefit of disability. Disability defined as the presence of a disability/chronic illness also leads to similar results, which begs the question if some deterioration of health is the result of the stress and strain of striving for greater income and higher SOL; if the acquisition of a chronic condition is the opportunity cost that households pay for better economic conditions.

This kind of a nuanced analysis is possible because the key variables of interest are malleable to different constructs. The resultant estimates clearly echo the important notion that disability is not a homogeneous experience; nor are its economic implications on households. Therefore, from a programmatic perspective, it is important to look at disability holistically in the context of other household and spatial characteristics. At the same time, it would be good to evaluate the anticipated outcomes of programmes/interventions targeting PWDs, using more than one definition of disability by way of a sensitivity analysis. Such an effort need not necessarily be quantitative. A simple scenario analysis should encourage formulating meaningful and effective intervention measures. For example, what would be the benefits of a livelihood support programme for a household with PWDs living with severe impairments, compared to a household with PWDs with lesser impairments? How would a cash handout given to a PWD have to be different across different types of impairment and at different severities? The ability to factor in the nuances of disability, in some simple way, is likely to yield more effective outcomes than a preconceived static conception of what disability is.

At the same time, one has to be pragmatic about what information can actually help create effective social protection programmes for households, especially under budget constraints. As the findings suggest clearly the existing disability transfer payment in place does not seem to be doing much to help the incomes and SOLs of households with PWDs, and point to improvements in the initiative both in terms of targeting and generosity. Strengthening the targeting of disability payments has two pre-requisites. The first is to put in place reliable, and up-to-date databases on PWDs in the country.

Thankfully, addressing the paucity of robust data on PWDs can be achieved in a cost-effective manner simply by strengthening the health schedule on the HIES survey. In fact, from 2016 to 2019, the HIES’ health schedule has in fact expanded to include questions on functional limitations. The approach to data gathering is still rooted in the medical model of disability, but the expansion of the health schedule is a step in the right direction of strengthening available data on PWDs. However, the HIES questionnaire still pools together disability and chronic illness together into one question, which makes the information collected from this question quite redundant. As the two conditions are distinct from each other, the data fails to produce an accurate picture of either the prevalence of disability or of chronic illness in the country. Simply splitting these two health conditions into two questions can significantly strengthen the reliability of disability data collected in the HIES.

The health schedule can be further improved by adding some of the relevant and salient questions from the WG questionnaire which would not only allow for data on PWDs to be collected periodically at zero-additional cost, but also have data that is comparable regionally and internationally. It must be noted that the need for reliable data on PWDs has been recognised as far as a decade ago in the 2012 National Human Resource and Employment Policy (NHREP). The policy document has enumerated the establishment of a database of PWDs as a key priority towards the goal of empowering them. The inaction of these priorities for almost a decade highlights the slowness in policy uptake discussed earlier.

The second is to identify an appropriate definition or a threshold of disability that determines a person's entry into the disability transfer pay programme. An administrative definition of disability should be strict in order for adequate financial support to be provided to the most vulnerable PWDs and their households. A strict definition, but with proper targeting and sufficient generosity is more likely to be of greater use to PWDs and their households monetarily, than a tokenistic and meagre transfer payment distributed over a larger number of recipients. A robust database can also help the state identify PWDs experiencing extreme impairments. This in turn would allow for a more substantial and comprehensive support package to be provided to them and their households. Examples include support for medicine and health expenditure, nutrition-related support, educational aid for children living in such households, and subsidised transport facilities. Sri Lanka already has in place many of these measures. They can be strengthened and upgraded to become more inclusive towards PWDs, and vulnerable groups in general.

Another possibility is to introduce a social protection programme to the primary and full-time caregivers of the PWD, considering their care work as full-time employment. Given that the current budgetary provisions for PWDs in Sri Lanka are rather scanty, there is room to increase the share allocated for the well-being of PWDs and their households, especially if PWD-targeting is strengthened. These resources can be used by households to invest in skills development, education, build up savings or as an added household income.

While transformational policies and practices are crucial for promoting long-term and sustainable inclusion of PWDs into the mainstream context, more immediate support from social protection programmes needs to be acknowledged. Globally, only a little over a quarter of PWDs with severe disabilities receive disability benefits, with large underlying regional variances (International Labour Organisation 2017). The findings from this research study concurs, given the insignificant and negligible role that disability transfer payments seem to have on the economic outcomes of households with PWDs. Thus, effective social protection programmes are essential for the economic security of households with PWDs, especially at times of economic crises and fragility when the risk of falling into poverty is further heightened.

A strict definition of disability might be administratively realistic in devising social protection measures, but is certainly inadequate for informing broader economic and development policy and institutional practice. As the International Classification of Functionings (ICF) explains, disability is an experience at the intersection of impairments with the external environment – both physical spaces, and norms and values. Therefore, it is necessary to understand how society, in terms of physical, social and attitudinal barriers contribute to disability in Sri Lanka. The findings make a strong case for examining these facets extensively, if Sri Lanka were to truly move from a medical/charity-based approach to disability to a rights-based model, nearly six years after the ratification of the UNCRPD.

The greater economic disadvantages faced by households with PWDs living in the estate or rural sector or outside the Western Province underscores the exclusionary nature of Sri Lanka's development agenda. The disability-blind (and blind to other drivers of social exclusion) 'one-size-fits-all' development programmes are only likely to exacerbate existing economic inequalities and vulnerabilities that the poorest households face. This is in fact a reality that the country is grappling with now in the face of its gravest economic crisis since independence. Therefore, it is important to develop inclusionary and disability-sensitive infrastructure, services, labour market and other economic development frameworks and interventions to create an empowering and enabling external environment to PWDs, and by extension, their households. A commitment to these long-term efforts in turn is likely to relieve some of the pressure on the state social protection expenditure on PWDs.

The question then is how to gather the more extensive information, as collected in the MDS, into dimensions of disability other than impairments. Conducting additional surveys is one possibility, but can be expensive. An alternative is to use mobile technology to gather data on issues of accessibility barriers, experiences of discrimination, denial of rights etc. Another is to gather information through simple data collection forms, such as accessibility or service satisfaction surveys, in places such as the hospital, post office, the central bus stand or the railway station. The central idea here is that this kind of information is necessary to ensure that development infrastructure is not defined in a vacuum. To this end, it is also important to create awareness among institutional structures about disability, and overcome material and ideological barriers to the realisation of the rights of PWDs. Simultaneously, PWDs should also be made aware of their rights in order for them to understand that disability is not an individual-centric problem, and to claim their rights.

In addition, a mechanism to legally enforce the UNCRPD and other inclusionary endeavours is also vital. In their absence ‘social closure’ and ‘unruly practices’ tend to persist, even when the most inclusionary ideals are espoused within the policy realms. As discussed in earlier chapters, policies themselves are ineffective in the absence of their legal enforceability within institutional processes and practices. The clarity of definitions and consensus among policymakers, institutions, partitioners, interventionists, PWDs and the general public about the concept of disability is critical for this purpose.

The returns to education and formal sector employment observed consistently throughout the thesis corroborates the idea that educational credentials are important in the labour market in Sri Lanka (Himaz & Aturupane, 2011). They call for investments in human capital development among households with PWDs, which can be accomplished by strengthening formal education, but also by developing vocational education and skills development. The latter can benefit adults who are past the ages of formal education, but are seeking to develop livelihood skills. Although Sri Lanka strives to create inclusive education, there is a significant implementation gap between policy and practice. Many complex reasons including resource constraints, disparities in the quality of education at the regional level, stigma and misconceptions about disability, and a lack of conceptual consensus among policy makers and other stakeholders on what inclusive education can contribute to the challenges in promoting education for PWDs (Hettiarachchi & Das, 2014; Muttiah et al., 2016).

Measures to strengthen the education for CWDs is a key priority, as an acquisition of disability at a young age can be particularly detrimental to the human capital development of a person. However, concerted efforts should be made to ensure that PWDs have the ability to convert education as a resource to an independent life as an achieved functioning. While recognising the value of education as an end of its own, its utilitarian value as a means to an end, or an empowering factor that allows PWDs to make autonomous choices must be underscored. For this, the labour market should adapt to the needs and capacities of the PWDs. Clearly, the quota systems have failed to produce much of a meaningful change in the employment of PWDs in the formal sector in Sri Lanka. Tying up such a quota system with accountability/reward measures is critical for effective adherence. Examples include tax incentives or breaks for companies that comply with such quota requirements, or other benefits and state recognition that would encourage employers to recruit PWDs into their workforce.

At the same time, one cannot ignore the gendered nature of returns to higher education and formal sector work that was observed in the quantitative inquiries. For the same level of education, or type of formal work (as proxied by white-collar work) FHHs are characterized by lower returns than MHHs. Gendered inequities of Sri Lanka's labour market have been discussed at length (See for example Gunatilaka, 2013a, 2013b; Gunewardena, 2015; Seneviratne, 2020). The findings underscore the importance of addressing these labour market inequities through effective policy measures and institutional reforms. This is especially important for households grappling with the challenges of disability.

Another point of caution from a policy perspective is how gendered gaps in access to and returns to LFP can affect female PWDs. The findings clearly pointed out that household economic ramifications are worse when the PWD is a male. Thus, a household might not have an incentive to invest in the skills and education of girls and women with disabilities, if the returns to investing in their human capital are not economically meaningful for a household. This gives further policy impetus to look for ways to improve opportunities for and returns to returns to female LFP. Other broader policy implications involve addressing the gender biases in the labour market, and developing regional labour markets that create employment opportunities for those with moderate levels of educational attainment. These suggestions have been covered extensively in empirical studies on female LFP (Gunatilaka, 2013a, 2013b; Gunewardena, 2015; Madurawala, 2009).

Next, the research findings call for improved targeting and greater generosity of *Samurdhi*, the national poverty alleviation programme in Sri Lanka to be more effective in ameliorating household economic distress. The importance of updated and relevant data, that was discussed at length earlier is relevant here too. It is also important to implement graduation benchmarks for the participants of these social protection programmes. However, such graduation should not simply be a withdrawal of support, but accompanied by a support package and skills development programmes that helps sustain and bolster the livelihoods and incomes of participants in the long-run. These support packages should match the capabilities and factor in the limitations of the recipients, and have long term follow up modalities to be successful. Better targeting is also likely to help improve the generosity of financial aid due to reduced waste.

The small and often insignificant correlations between disability pay and household income and SOL point to their ineffectiveness in supporting the economies of households with PWDs. Yet, the results also showed that this income can be more beneficial for households grappling with more than one driver of vulnerability. While acknowledging the importance of long-term support packages, one should not ignore the day-to-day struggles of households grappling with most severe forms of disability or households with PWDs facing other drivers of vulnerability as well. However, instead of providing a blanket payment to all households with PWDs, which is the current practice, designing a mechanism to provide a disability payment that is better aligned to the economic realities of different types of households might be more effective in relieving the economic distress of the most vulnerable households.

Another important takeaway on the policy front is the importance of using an intersectionality lens when developing policy and practice on disability. While increasingly more political manifestos, policies and frameworks use an inclusive and a rights-based language in relation to disability, it is discussed often in isolation, separate from other important issues such as gender, disasters, displacement, old age etc. Clearly, this sort of segregation fails to account for how the effects of disability are influenced at its intersection with these other challenges. Disability might create more detrimental effects on FHHs than MHHs, or those from a lower socioeconomic background than from a relatively more affluent one. Compartmentalisation of disability in policy and practice hinders it being perceived as a cross-cutting issue, which might negatively affect the outcomes of even the most well-intended interventions.

The policy insights emerging from the spatial variables also deserves some serious thought. They point to overarching structural issues that catalyse and drive vulnerability among PWDs and their households. The smaller regional labour markets, the lower quality of education and educational opportunities, in rural and estate sectors, compared to the urban sector, and the uneven distribution of infrastructure and facilities, exacerbate and reinforce the many forms of vulnerability faced by households with PWDs, and contribute to the socio-economic exclusion of PWDs. The important question is to understand the role disability-blind policy-led infrastructure and regional economic development initiatives have played in creating such disparities. Thus, in addition to initiatives that specifically target PWDs and their households, and closing the gaps between policy and practice in relation to disability inclusion (as well as the inclusion of gender, and other relevant markers), the overall macroeconomic development agenda must espouse values of disability inclusion in order to create meaningful and sustainable economic and non-economic benefits to PWDs and their households.

Finally, from a CA perspective it is manifestly clear that households with PWDs not only face greater income deprivation, but also grapple with a greater conversion cost in translating their income into SOL than those without. Furthermore, FHHs with PWDs face a higher income handicap than MHHs with PWDs. Simultaneously, it is also obvious from the findings that income is the single most important factor to elevate the household SOL. Yet, obtaining income from multiple sources is not a solution either, as found in this study. It is often a sign of economic distress among households. These observations make a strong case for creating sustainable livelihood opportunities targeting PWDs, especially FHHs. However, a note of caution is that livelihood intervention programmes must be sensitive to and reflect the needs and capabilities of target beneficiaries, as a failure to do so might result in counterproductive outcomes (Baffoe & Matsuda, 2017; Khan, 2019), or reinforce existing inequalities. The positive association between the ownership of land and formal sector borrowings and income among FHHs further point out that livelihood interventions should aim to generate assets and connect households with the formal financial system for such programmes to be empowering to vulnerable households. However, any measures to help improve the household economic situation among households with PWDs, by way of cash grants, social protection programmes, skills development or livelihood development interventions, should be paralleled by a fundamental paradigm shift in the outlook on disability from its current medical/charity-based approach to one of rights. In fact, this transformation is yet to be seen, 15 and six years following the signing and the ratification, respectively, of the UNCRPD in Sri Lanka.

10.4 Impetus for future research

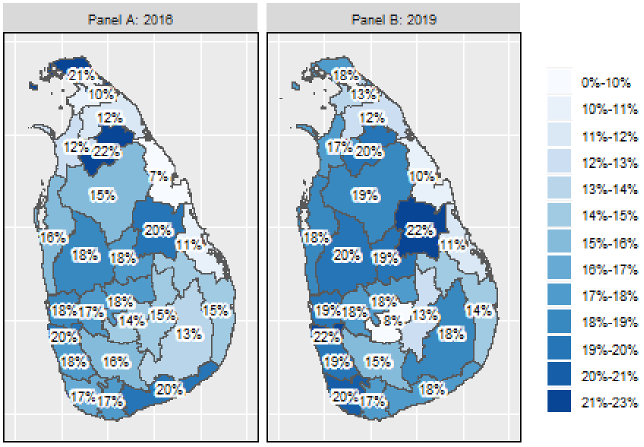
This research study has taken on a topic on which there is a gaping dearth of empirical evidence in Sri Lanka. Regionally, too, not much has been done on the topic of disability in relation to its economic implications, especially using quantitative methods. As expected, the study contributes to bridging this lacuna of empirical evidence on the topic in Sri Lanka, and adds to the existing body of empirical evidence on the economic implications of disability, globally, the findings call for further research on the disability-poverty nexus in Sri Lanka. For example, this study is expected to motivate further analysis into how the economic implications of disability are affected by the type of impairment. Another line of inquiry is the longitudinal effects of disability.

An analysis of the effects of disability at the individual level, especially in relation to the educational and employment outcomes of PWDs would also be of significant policy relevance. Furthermore, an inquiry into the economic costs of disability in the former war-affected Northern and Eastern Provinces would also be useful, particularly given that the topic is hardly unpacked using quantitative methods. Time use studies involving both households with and without PWDs would also be particularly insightful to understand the care burden and time poverty dynamics of households with PWDs. DCS conducted a nationally representative time use survey in 2017 (DCS, 2020), the first of its kind in Sri Lanka. However, it does not specifically look at households with PWDs. Expanding the survey to look at the time use among households with PWDs will be quite useful for investigating time poverty among households with PWDs, a non-monetary cost of disability.

The predominantly quantitative nature of this research study, as well as practical constraints related to resources and time, made it necessary to narrow the scope of the qualitative research component in order for it to be feasible. However, the rich and nuanced findings even this limited qualitative research work has produced is encouraging and makes a strong case for further in-depth inquiry into the socioeconomic ramifications of disability at the household level in Sri Lanka. Two areas that were not investigated in the qualitative interviews of this research study, that are in fact best probed into using qualitative methodologies such as case studies, come to mind. The first is on disabilities related to intellectual development and other developmental delays. The second is on the economic effects of disability among households in the estate sector. While a mixed methods approach will be particularly useful to look at general patterns and to unpack the underlying nuances, a strong qualitative analysis into these under-researched disability-related topics will provide a much-needed start.

Appendix I

Figure I-1: Disability/chronic condition prevalence based on HIES



Source: DCS, 2018, 2022; Maps created using R

Table I-1: Summary statistics of the physical environment score

	Mean	**Robust SE**	**95% confidence interval**	
Overall	13.149	0.128	12.898	13.400
By Gender				
Male	12.954	0.235	12.486	13.421
Female	13.332	0.300	12.734	13.929
By Age group				
29 or less	11.453	0.351	10.753	12.153
30-44 years	11.414	0.240	10.936	11.892
45-59 years	12.701	0.335	12.033	13.369
60 or more	17.734	0.554	16.630	18.839
By Province				
Western	12.621	0.305	12.014	13.229
Central	13.080	0.579	11.925	14.235
Southern	11.643	0.506	10.636	12.651
NW	13.005	0.559	11.890	14.119
NC	15.385	1.131	13.131	17.639
Uva	13.942	0.557	12.833	15.052
Sabaragamuwa	13.259	0.606	12.052	14.467
Northern	14.118	1.102	11.922	16.313
Eastern	14.598	1.117	12.371	16.824

Source: Author calculations on MDS (2014/15) data, using STATA SE/14

Table I-2: Summary statistics of the personal assistance score

	Mean	**Robust SE**	**95% confidence interval**	
Overall	0.370	0.016	0.339	0.400
By Gender				
Male	0.370	0.045	0.279	0.460
Female	0.369	0.047	0.275	0.464
By Age group				
29 or less	0.284	0.063	0.158	0.409
30-44 years	0.246	0.043	0.160	0.332
45-59 years	0.331	0.050	0.232	0.431
60 or more	0.676	0.060	0.556	0.796

By Province				
Western	0.228	0.039	0.150	0.307
Central	0.304	0.037	0.230	0.377
Southern	0.445	0.086	0.274	0.615
NW	0.188	0.043	0.102	0.275
NC	1.169	0.135	0.899	1.439
Uva	0.449	0.116	0.217	0.680
Sabaragamuwa	0.463	0.133	0.198	0.728
Northern	0.543	0.143	0.257	0.828
Eastern	0.218	0.050	0.118	0.318

Source: Author calculations on MDS (2014/15) data, using STATA SE/14

Table I-3: Summary statistics of the assistive devices score

	Mean	**Robust SE**	**95% confidence interval**	
Overall	1.329	0.034	1.262	1.396
By Gender				
Male	1.395	0.087	1.221	1.568
Female	1.268	0.067	1.133	1.402
By Age group				
29 or less	0.434	0.063	0.307	0.560
30-44 years	0.663	0.062	0.540	0.786
45-59 years	1.714	0.108	1.499	1.929
60 or more	2.572	0.127	2.319	2.824
By Province				
Western	1.123	0.076	0.972	1.274
Central	1.522	0.153	1.217	1.827
Southern	1.108	0.148	0.812	1.404
NW	1.117	0.127	0.863	1.370
NC	1.519	0.238	1.044	1.993
Uva	1.632	0.453	0.729	2.536
Sabaragamuwa	1.151	0.109	0.934	1.369
Northern	1.546	0.113	1.320	1.772
Eastern	2.132	0.328	1.477	2.786

Source: Author calculations on MDS (2014/15) data, using STATA SE/14

Table I-4: Summary statistics of the family support score

	Mean	**Robust SE**	**95% confidence interval**	
Overall	4.252	0.061	4.131	4.373
By Gender				
Male	4.271	0.071	4.129	4.412
Female	4.235	0.064	4.108	4.362
By Age group				
29 or less	4.119	0.092	3.936	4.303
30-44 years	4.111	0.078	3.955	4.267
45-59 years	4.336	0.093	4.152	4.521
60 or more	4.467	0.086	4.296	4.638

By Province				
Western	4.258	0.081	4.096	4.419
Central	4.189	0.052	4.086	4.293
Southern	3.901	0.116	3.670	4.132
NW	4.032	0.160	3.713	4.352
NC	4.560	0.276	4.010	5.111
Uva	4.429	0.273	3.885	4.972
Sabaragamuwa	4.509	0.143	4.223	4.794
Northern	5.079	0.259	4.562	5.596
Eastern	3.955	0.227	3.504	4.407

Source: Author calculations on MDS (2014/15) data, using STATA SE/14

Table I-5: Summary statistics of the attitudes score

	Mean	**Robust SE**	**95% confidence interval**	
Overall	16.086	0.348	15.392	16.779
By Gender				
Male	15.902	0.346	15.213	16.591
Female	16.259	0.393	15.475	17.043
By Age group				
29 or less	16.571	0.425	15.725	17.417
30-44 years	15.446	0.364	14.721	16.172
45-59 years	15.805	0.439	14.931	16.680
60 or more	17.039	0.437	16.168	17.909
By Province				
Western	14.915	0.384	14.150	15.680
Central	18.351	1.406	15.550	21.153
Southern	14.804	0.433	13.942	15.666
NW	14.623	0.279	14.068	15.179
NC	17.381	0.976	15.436	19.325
Uva	16.501	1.254	14.003	19.000
Sabaragamuwa	14.488	0.450	13.591	15.385
Northern	17.370	0.775	15.826	18.915
Eastern	16.086	0.348	15.392	16.779

Source: Author calculations on MDS (2014/15) data, using STATA SE/14

Table I-6: Summary statistics of the information access score

	Mean	**Robust SE**	**95% confidence interval**	
Overall	1.783	0.074	1.637	1.930
By Gender				
Male	1.766	0.082	1.601	1.930
Female	1.800	0.073	1.655	1.944
By Age group				
29 or less	1.636	0.087	1.462	1.810
30-44 years	1.694	0.078	1.539	1.849
45-59 years	1.769	0.093	1.585	1.954
60 or more	2.058	0.088	1.882	2.233
By Province				
Western	1.579	0.083	1.413	1.745
Central	2.130	0.299	1.535	2.725
Southern	1.595	0.145	1.305	1.884
NW	1.390	0.059	1.274	1.507
NC	1.934	0.259	1.418	2.450
Uva	1.993	0.332	1.331	2.654
Sabaragamuwa	1.526	0.084	1.358	1.694

Northern	3.013	0.295	2.425	3.600
Eastern	2.069	0.128	1.814	2.324

Source: Author calculations on MDS (2014/15) data, using STATA SE/14

Table I-7: Summary statistics of the aggregate functioning score

	Mean	**Robust SE**	**95% confidence interval**	
Overall	253.066	4.229	244.337	261.794
By Gender				
Male	246.729	5.375	235.635	257.823
Female	259.013	4.226	250.290	267.736
By Age group				
29 or less	211.002	3.341	204.106	217.899
30-44 years	216.040	3.930	207.930	224.150
45-59 years	256.084	5.329	245.085	267.083
60 or more	339.520	9.942	319.001	360.040
By Province				
Western	244.811	7.549	229.231	260.391
Central	275.191	12.089	250.241	300.141
Southern	232.789	4.818	222.846	242.733
NW	253.064	8.232	236.073	270.054
NC	269.965	15.550	237.872	302.059
Uva	254.251	1.987	250.149	258.353
Sabaragamuwa	257.040	2.527	251.824	262.255
Northern	248.392	7.637	232.630	264.153
Eastern	263.364	21.974	218.012	308.717

Source: Author calculations on MDS (2014/15) data, using STATA SE/14

Table I-8: Summary statistics of the aggregate health-induced functioning limitation score

	Mean	**Robust SE**	**95% confidence interval**	
Overall	24.097	0.333	23.434	24.759
By Gender				
Male	23.496	0.390	22.718	24.274
Female	24.663	0.401	23.864	25.462
By Age group				
29 or less	19.392	0.312	18.771	20.014
30-44 years	20.267	0.258	19.754	20.781
45-59 years	24.702	0.530	23.645	25.758
60 or more	32.903	0.800	31.309	34.498
By Province				
Western	23.953	0.603	22.751	25.156
Central	26.445	0.910	24.632	28.259
Southern	22.493	0.556	21.386	23.601
NW	23.920	0.976	21.975	25.864
NC	25.264	1.273	22.728	27.801
Uva	23.047	0.912	21.228	24.865
Sabaragamuwa	24.790	0.523	23.748	25.832
Northern	22.287	0.715	20.862	23.712
Eastern	23.733	1.232	21.277	26.189

Source: Author calculations on MDS (2014/15) data, using STATA SE/14

Table I-9: Summary statistics of the chronic conditions (individual factors)

	Mean	**Robust SE**	**95% confidence interval**	
Overall	5.741	0.210	5.322	6.161
By Gender				
Male	5.363	0.237	4.890	5.836
Female	6.097	0.249	5.601	6.593
By Age group				
29 or less	1.936	0.148	1.640	2.231
30-44 years	3.470	0.207	3.057	3.883
45-59 years	7.392	0.311	6.771	8.013
60 or more	10.146	0.363	9.423	10.870
By Province				
Western	6.004	0.289	5.427	6.581
Central	6.328	0.646	5.041	7.615
Southern	4.938	0.703	3.537	6.339
NW	5.982	0.580	4.826	7.138
NC	4.665	0.532	3.606	5.725
Uva	5.414	1.105	3.212	7.617
Sabaragamuwa	6.111	0.504	5.107	7.115
Northern	5.368	0.327	4.717	6.019
Eastern	5.637	0.882	3.880	7.394

Source: Author calculations on MDS (2014/15) data, using STATA SE/14

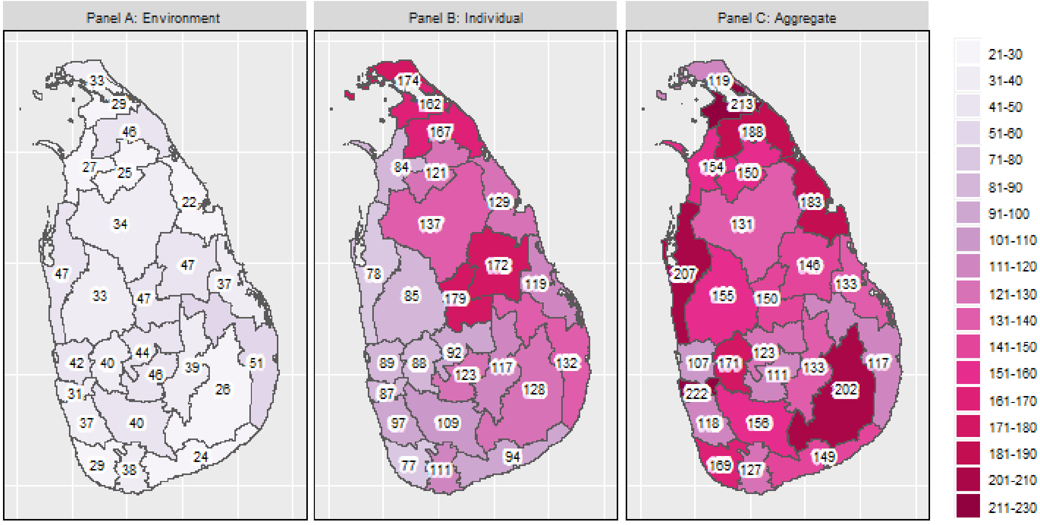
Table I-10: Summary statistics of the disability severity score[154]

	Mean	**Robust SE**	**95% confidence interval**	
Overall	141.495	4.240	133.044	149.946
By Gender				
Male	139.255	4.806	129.676	148.833
Female	143.616	4.695	134.260	152.973
By Age group				
29 or less	101.981	4.834	92.347	111.615
30-44 years	107.485	4.382	98.751	116.218
45-59 years	147.103	6.174	134.797	159.408
60 or more	218.338	7.769	202.854	233.822
By Province				
Western	125.933	5.527	114.918	136.948
Central	160.763	13.550	133.758	187.767
Southern	123.486	10.908	101.746	145.225
NW	119.574	7.871	103.888	135.261
NC	183.409	11.040	161.407	205.411
Uva	154.345	6.518	141.353	167.336
Sabaragamuwa	139.950	7.863	124.279	155.620
Northern	180.633	13.912	152.906	208.359
Eastern	165.001	8.583	147.896	182.106

Source: Author calculations on MDS (2014/15) data, using STATA SE/14

[154] Disability severity score is the sum of the rescaled sub-domains related to environmental factors and individual factors

Figure I-2: District-wise distribution of overall disability severity score



Source: Author estimates on MDS (2014/15) data, using STATA SE/14; Maps created on R

Appendix II

Table II-1: Index construction methodology

i. Tetrachoric PCA

Kolenikov and Angeles (2009) showed that the traditional PCA can be improved upon by incorporating procedures to suitable for discrete data. These include retaining the ordinal variables without breaking them down into dummy variables as Filmer and Pritchett (2001) do, or using polychoric correlations (Ibid). The user-written STATA ado file - *polychoric* – can be implemented easily to obtain the polychoric correlation matrix (Kolenikov, 2016). The PCA is then conducted as usual. Tetrachoric PCA is a special case of polychoric PCA which consists only of dummy variables. Its functional form is:

$$H_i = \sum_{k=1}^{K} W_k I_{ik} \qquad \text{II.1}$$

Where H_i is the SOL index of the ith household, K is the number of variables ($k = 1,2,3 \dots K$), W is the vector of weights for the K variables derived from the first principal component and I_{ik} is the binary score on the variable k for the ith household.

Two tests were performed to check the appropriateness of the data for the purposes of conducting a tetrachoric PCA. The Bartlett's test of sphericity is large and significant. The KMO value is 0.85. As a rule-of-thumb, a KMO value above 0.6 suggests that sampling is adequate (Ramaul & Ramaul, 2016). Together, these tests support the implementation of the tetrachoric PCA.

The tetrachoric correlation matrix was specified to be positive semi-definite if required, as it is a mathematical property of a proper correlation matrix[155]. This correlation matrix (was then submitted to the PCA. The weights for the indicators are derived from the factor loadings pertaining to the first principal component which has an eigen value of 7.87 and explains 33 per cent of the total variance. The SOL index is constructed for each household Yi based on these weights (Table B-1).

ii. MCA

The same set of variables used in the tetrachoric PCA are applied to the remaining three indices (Howe et al., 2008). However, some variables are reconstructed ordinally for the MCA. The functional form of the index can be specified as follows:

$$H_i = \frac{1}{K} \sum_{k=1}^{K} \sum_{j_k=1}^{J_k} W_{j_k}^{k} I_{j_k i}^{k} \qquad \text{II.2}$$

With

$$W_{j_k}^{k} = \frac{s^k}{\sqrt{\lambda_1}} \qquad \text{II.3}$$

155 This can be specified using the *-posdef-* command in Stata

Where k is the number of variables (dimensions) with $k = (1,2,3 \ldots K)$, j is the number of modalities for each dimension with $j = (1,2,3 \ldots . J)$, and I is the binary indicator of each modality. W is the weight derived from the MCA procedure, which is the factor score on the first axis normalised by the eigenvalue λ with $s = factor\ score$. In summary, the SOL index is the simple average across the variables of the weighted sum of each of the binary modalities of each variable (Ezzrari & Verme, 2012).

The MCA[156] results with the Burt matrix and adjustments shows that the first factorial axis alone explains at least 85.4 per cent of the total inertia of the variables. However, the first factorial axis can be taken as the SOL index if and only if it meets the monotonicity axiom i.e. . the SOL index must be monotonically increasing in each of its constituents I_k (Asselin, 2009; Asselin & Anh, 2008) [157]. Put differently, if household i improves its situation for a given primary indicator I_k, then the index value increases, and vice versa (Asselin, 2002; Asselin & Anh, 2008).

The final index preserves the monotonicity axiom (Table B-2)[158]. The weights given by MCA correspond to the standardized scores on the first factorial axis (Asselin, 2009). An MCA-based index has the property of being negative in its lowest part (Asselin, 2002). One option is to rescale the weights (Ibid). The other is to rescale the index (Ezzrari & Verme, 2012), which is employed in this study.

iii. Inverse proportion index

Here, the weight assigned for each indicator is the inverse of the number of households that own it (Mack & Lansley, 1985; Subramanian et al., 2006). For example, if an asset is owned by 40 per cent of households, the asset will be assigned a weight of 60 per cent (1-0.40). This means that the assets owned by a large number of households will be assigned a smaller weight and vice versa. The weights are then aggregated into a linear index. Each household is then assigned a score depending on the assets it owns. Accordingly, the functional form of the household index asset Hi is:

$$H_i = f(\Sigma(v_j * a_{ij}) \qquad \text{II.4}$$

Or

$$H_i = (v_1 * a_{i1}) + (v_2 * a_{i2}) + \cdots (v_k * a_{ik}) \qquad \text{II.5}$$

156 Specified to return that coordinates are returned in standard normalization.

157 The monotonicity axiom is satisfied if two conditions are met: 1) First Axis Ordering Consistency – there must be an ordinal consistency in the ordering of categories and the ordering of weights of categories in a decreasing or increasing order (FAOC- I) and 2) Global First Axis Ordering Consistency (FAOC- G) – for all constituents, FAOC – I is met with the same orientation (Asselin & Anh, 2008; Ezzrari & Verme, 2012).

158 The FAOC – I is satisfied as the ordering of categories and corresponding weights show ordinal consistency. FAOC – I is always satisfied in binomial indicators (Asselin & Anh, 2008). The first classification of the 2 ordinal indicators failed to meet the FAOC – I condition. As such, they were reconstructed and submitted to the MCA. As seen in Table 6 below, these variables now preserve the FAOC – I condition. Better outcomes under each indicator are associated with increasing weights. FAOC – G is met as FAOC – I is preserved in all indicators and they have the same orientation with respect to the first axis.

where j represents the enumerated assets and v is the weight assigned to each asset j for household i (Table II-3).

iv. Equal proportion index

Each indicator is assigned equal weight. Accordingly, the total index value is the sum of the number of indicators which ranges from 0 to 25.

Table II-2: TPCA weights derived from the 1st Principal Component

	Factor loading	Weight
Has 2 or more bedrooms	0.188	0.035
Toilet with water seal	0.115	0.013
Exclusive toilet	0.187	0.035
Water inside premises	0.197	0.039
Sufficient water for drinking	0.117	0.014
Sufficient water for other purposes	0.126	0.016
Cooks with fuel	0.244	0.059
Truck collects garbage	0.158	0.025
Borrowed from a bank	0.061	0.004
Pawned jewellery	0.017	0.000
Borrowed from a lender	-0.053	0.003
Took a finance lease	0.083	0.007
Owns land	0.056	0.003
Owns a radio	0.127	0.016
Owns a TV	0.235	0.055
Owns a VCD	0.185	0.034
Owns a sewing machine	0.219	0.048
Owns a washing machine	0.297	0.088
Owns a fridge	0.298	0.089
Owns a cooker	0.290	0.084
Owns electric fan(s)	0.259	0.067
Owns mobile phone(s)	0.223	0.050
Owns a computer	0.267	0.071
Owns a camera	0.264	0.070
Owns car or van	0.273	0.075
Total	0.188	0.035

Source: Author estimates on HIES (2016) data using STATA/SE14

Table II-3: MCA weights (Dimension 1)

Variable	Modality	Dim 1
Toilet with water seal	Yes	0.0459
	No	-1.7333
Toilet types	Exclusive for household	0.1992
	Shared	-2.2605
	Public or other	-2.3859
Number of bedrooms	0	-2.4546
	1-2	-0.8360
	3-4	1.0028
	More than 4	2.8518
Cooks with gas, kerosene or electricity	Yes	2.1803
	No	-0.8877
Garbage picked up by lorry	Yes	1.7005
	No	-0.4344

Drinking water inside premises	Yes	0.7696
	No	-1.3983
Enough water to drink	Yes	0.1209
	No	-1.6849
Enough water for other purposes	Yes	0.1703
	No	-1.5993
Has taken a loan from a bank	Yes	0.4186
	No	-0.2195
Has pawned jewellry	Yes	0.1815
	No	-0.0430
Has borrowed from a lender	Yes	-0.6990
	No	0.0346
Has borrowed from a finance company	Yes	0.9285
	No	-0.1355
Household owns land	Yes	0.0820
	No	-0.6106
Owns radio	Yes	0.5252
	No	-0.8651
Owns TV	Yes	0.4268
	No	-2.5075
Owns VCD	Yes	1.3029
	No	-0.7336
Owns sewing machine	Yes	1.5447
	No	-0.9490
Owns washing machine	Yes	3.1697
	No	-0.7469
Owns fridge	Yes	1.6259
	No	-1.6759
Owns a cooker	Yes	1.5768
	No	-1.6950
Owns electric fan(s)	Yes	1.1464
	No	-1.7553
Owns mobile (s)	Yes	0.3262
	No	-2.4844
Owns computer(s)	Yes	2.7734
	No	-0.6704
Owns camera(s)	Yes	4.0510
	No	-0.2516
Owns car or van	Yes	3.8126
	No	-0.3590

Source: Author estimates on HIES (2016) data using STATA/SE14

Table II-4: Inverse proportion index weights

	Mean	Weight
Has 2 or more bedrooms	0.441	0.559
Toilet with water seal	0.974	0.026
Exclusive toilet	0.920	0.080
Water inside premises	0.645	0.355
Sufficient water for drinking	0.933	0.067
Sufficient water for other purposes	0.904	0.096
Cooks with fuel	0.289	0.711
Truck collects garbage	0.203	0.797
Borrowed from a bank	0.344	0.656
Pawned jewellery	0.191	0.809
Borrowed from a lendeer	0.047	0.953
Took a finance lease	0.127	0.873

Owns land	0.882	0.118
Owns a radio	0.622	0.378
Owns a TV	0.855	0.145
Owns a VCD	0.360	0.640
Owns a sewing machine	0.381	0.619
Owns a washing machine	0.191	0.809
Owns a fridge	0.508	0.492
Owns a cooker	0.518	0.482
Owns electric fan(s)	0.605	0.395
Owns mobile phone(s)	0.884	0.116
Owns a computer	0.195	0.805
Owns a camera	0.058	0.942
Owns car or van	0.086	0.914

Source: Author estimates on HIES (2016) data using STATA/SE14
Note: Weight = 1 - Mean

Table II-5: Internal coherence: Proportion of HHs on variables in the indices

Tetrachoric PCA					
	Index quantile				
	1st	2nd	3rd	4th	5th
Has 2 or more bedrooms	13.21	35.27	47.12	57.65	74.62
Toilet with water seal	94.07	97.90	98.42	98.67	99.33
Exclusive toilet	76.76	91.94	94.69	97.57	99.50
Water inside premises	30.88	54.41	68.95	80.69	92.52
Enough water for drinking	84.82	92.32	94.41	96.45	98.46
Enough water for wash/bath	79.00	88.42	91.68	95.12	97.75
Cooks with fuel	2.26	7.80	22.02	44.21	77.09
Truck collects garbage	5.85	10.01	17.43	26.97	46.83
Borrowed from a bank	22.89	32.20	36.66	38.53	39.37
Pawned jewellery	13.05	19.14	22.51	23.31	17.69
Borrowed from a lendeer	5.88	5.72	5.37	4.10	1.98
Took a finance lease	4.96	9.78	14.41	15.70	18.63
Owns land	80.30	88.81	89.37	89.86	89.97
Owns a radio	39.20	59.50	63.68	72.42	81.83
Owns a TV	53.61	89.86	93.80	97.15	98.69
Owns a VCD	6.95	26.29	37.21	48.02	66.20
Owns a sewing machine	4.92	20.46	39.42	55.21	75.86
Owns a washing machine	0.11	0.88	4.38	20.09	76.56
Owns a fridge	2.31	20.79	57.48	86.88	98.29
Owns a cooker	4.53	22.37	57.18	88.38	98.40
Owns electric fan(s)	10.53	43.07	71.01	87.80	95.88
Owns mobile phone(s)	61.17	89.32	95.04	97.22	99.13
Owns a computer	0.95	3.20	8.84	23.34	65.66
Owns a camera	0.06	0.27	0.95	3.53	26.46
Owns car or van	0.03	0.46	2.16	5.35	38.68
MCA					
Has 2 or more bedrooms	13.97	35.87	47.43	56.81	73.78
Toilet with water seal	93.93	98.01	98.40	98.69	99.36
Exclusive toilet	76.51	91.90	94.91	97.71	99.44
Water inside premises	31.29	54.40	68.61	80.91	92.21
Enough water for drinking	83.71	92.98	94.52	96.77	98.49
Enough water for wash/bath	77.97	88.74	91.97	95.43	97.85
Cooks with fuel	2.21	7.50	21.26	44.86	77.51
Truck collects garbage	5.79	9.70	16.69	27.88	47.02

Borrowed from a bank	22.75	32.76	37.53	37.47	39.14
Pawned jewellery	12.78	19.42	22.55	23.49	17.45
Borrowed from a lender	5.88	5.80	5.31	4.00	2.07
Took a finance lease	4.69	9.65	14.55	16.03	18.55
Owns land	80.35	88.70	89.50	89.80	89.96
Owns a radio	40.15	58.88	64.18	72.08	81.33
Owns a TV	53.53	89.62	94.30	97.19	98.47
Owns a VCD	7.39	25.54	37.96	48.46	65.31
Owns a sewing machine	4.95	20.69	39.70	55.43	75.05
Owns a washing machine	0.05	0.83	3.71	20.48	76.94
Owns a fridge	2.46	21.33	57.66	86.42	97.83
Owns a cooker	4.67	22.36	57.20	88.43	98.14
Owns electric fan(s)	11.16	43.02	71.20	87.47	95.40
Owns mobile phone(s)	60.85	89.58	95.23	97.05	99.16
Owns a computer	0.70	3.19	8.38	23.38	66.32
Owns a camera	0.03	0.19	0.75	3.12	27.18
Owns car or van	0.03	0.21	2.02	4.93	39.49

Source: Author estimates using STATA/SE14

Table II-6: External coherence - mean of SOL by log of household income quintile

	SOL quantile				
Household income (LKR)					
	1st	2nd	3rd	4th	5th
Tetra PCA	34.45	40.50	46.55	53.76	66.36
MCA	33.69	39.17	44.67	51.32	63.59
Inverse prop	23.09	28.50	34.54	41.52	54.33
Equal weight	37.34	42.98	48.53	54.67	65.47
Food expenditure (LKR)					
Tetra PCA	36.25	43.20	48.44	52.49	60.20
MCA	35.31	41.65	46.50	50.28	57.71
Inverse prop	25.09	31.55	36.54	40.24	47.46
Equal weight	39.58	45.74	50.07	53.28	59.38
Non-food expenditure (LKR)					
Tetra PCA	31.09	41.01	47.69	54.86	66.09
MCA	30.71	39.61	45.68	52.30	63.30
Inverse prop	19.14	28.30	35.05	43.07	55.48
Equal weight	34.16	43.31	49.14	55.79	65.79

Source: Author estimates using STATA/SE14

Table II-7: Measures of association between the disability and SOL variables (See Khamis, 2008; Wagner & Gillespie, 2019)

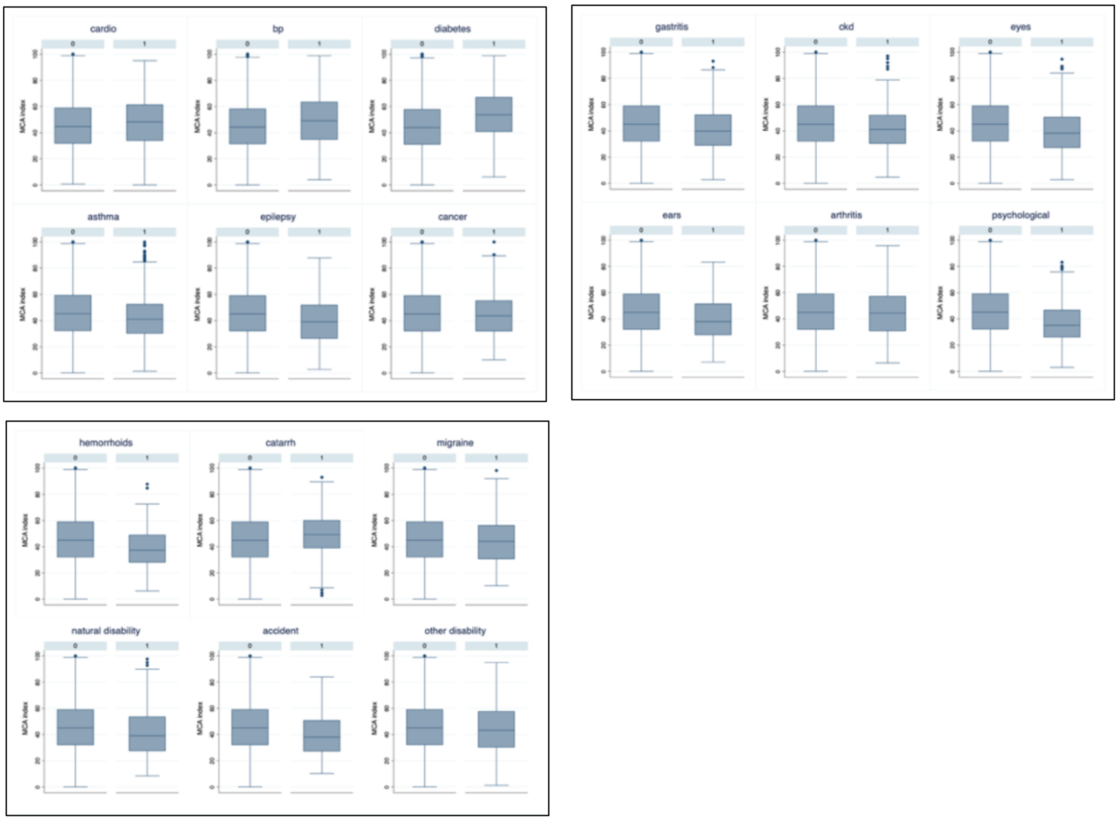
	SOL index / Disability definition	TPCA	MCA	Inverse prop	Equal prop
1	Total members in the HH with a self-reported disability/ chronic illness	0.5230	0.0509	0.0501	$0.0532^{\pm}$
2	At least one person in the HH with a self-reported disability/ chronic illness	0.0584	0.0571	0.0577	$0.0500^{\S}$
3	Total members in HH who has a self-reported disability/chronic illness other than cardiovascular issues, high blood pressure, diabetes and asthma	-0.0519	-0.0535	-0.0431	-0.0471

4	At least one person in HH who has a self-reported disability/chronic illness other than cardiovascular issues, high blood pressure, diabetes and asthma	-0.0643	-0.0629	-0.0504	-0.0472§
5	Total members in the HH who have stopped usual activities due to any of the enumerated disabilities/chronic conditions	-0.0726	-0.0739	-0.0652	-0.0687
6	At least one person in HH who have stopped usual activities due to any of the enumerated disabilities/chronic conditions	-0.0897	-0.0909	-0.0797	-0.0689§

Source: Author estimates on HIES (2016) data using STATA/SE14
Note: ± Spearman rank correlation is 0.682; § Estimated using Kendall's coefficient of rank correlation tau-sub-b, τ_b

Definitions 1 and 2 do not work well at all. Their statistically significant positive correlation with all the SOL indices is counterintuitive. Definitions 3 and 4 work in line with expectations, but the removal of chronic illnesses from the definition without further information on how such conditions affects a person's participation in daily activities is rather haphazard. Definitions 5 and 6 are more in line in the ICF definition. But only a negligible number of households are with more than one person whose usual activity has affected by a disability/chronic illness. Accordingly, the dichotomous variable that takes a value of 1 if a household has at least one person whose usual activity has been affected by a disability/illness or 0 otherwise is used as the disability covariate.

Figure II-1: MCA index by type of disability/chronic condition



Source: Author estimates based on HIES (2016) data, using STATA 14/SE

Table II-8: Summary statistics of the independent variables submitted to the econometric analysis (HIES)

	Mean or proportion	**Robust SE**	**95% Conf interval**	
TPCA	48.3226	0.3476	47.6385	49.0067
MCA	46.4807	0.3224	45.8461	47.1153
Inverse Prop Index	36.3920	0.3047	35.7922	36.9917
Equal weight index	49.8008	0.2766	49.2564	50.3452
At least one member in the HH stopped activity due to disability	0.0759	0.0024	0.0712	0.0806
Household receives disability pay	0.0079	0.0006	0.0067	0.0091
Log of household income	10.2379	0.0128	10.2126	10.2632
Share of children in the HH	0.1063	0.0013	0.1038	0.1088
HH gets Samurdhi	0.1933	0.0044	0.1846	0.2020
HH gets income from many sources	0.1461	0.0031	0.14001	0.1521
HOH's age	52.7402	0.1206	52.5028	52.9775
HOH's education	2.9334	0.0096	2.9146	2.9522
HOH has a white collar job	0.1595	0.0039	0.1519	0.1671
HOH has stopped activity	0.0429	0.0017	0.0396	0.0462
HOH married	0.7781	0.0029	0.7724	0.7838
HOH single	0.0217	0.0012	0.0194	0.0241
HOH ever married	0.2002	0.0028	0.1946	0.2057
Sinhala	0.7712	0.0083	0.7549	0.7875
SL Tamil	0.1095	0.0056	0.0985	0.1206
Indian Tamil	0.0358	0.0028	0.0303	0.0414
Moor	0.0792	0.0045	0.0703	0.0882
Other ethnicity	0.0042	0.0007	0.0029	0.0056
Urban	0.1686	0.0079	0.1531	0.1841
Rural	0.1686	0.0079	0.1531	0.1841
Estate	0.7885	0.0083	0.7723	0.8048
N	20,896			

Source: Author estimates based on HIES 2016 data using STATA 14/SE

Table II-9: Regression analysis output for the log of OECD modified equivalent food and non-food expenditure

	Food exp		**Non-food exp**	
	β/se	β/se	β/se	β/se
At least one member in the household stopped activity due to disability	-0.0669***	-0.0683***	-0.01900	-0.03080
	(0.0100)	(0.0100)	(0.0250)	(0.0240)
Log of household income	0.0801***	0.0724***	0.3841***	0.3699***
	(0.0030)	(0.0030)	(0.0080)	(0.0080)
Household characteristics	YES	YES	YES	YES
Characteristics of the HOH	YES	YES	YES	YES
Sector	YES	YES	YES	YES
District fixed effects	NO	YES	NO	YES
R-squared	0.1775	0.2062	0.4027	0.4213
F	161.8008	133.4068	471.8852	458.9027
p	0.0000	0.0000	0.0000	0.0000
AIC	16035	15292	53339	52676
BIC	16202	15459	53506	52843

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: N=20,896; Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. * p<0.10, ** p<0.05, *** p<0.01

Table II-10: Summary statistics of the independent variables submitted to the econometric analysis (MDS)

	Mean or proportion	**Robust SE**	**95% Conf interval**	
Severity score	14.6122	0.5638	13.4884	15.7359
Severity dummy	0.5371	0.0227	0.4919	0.5822
Severity quantile	2.4475	0.0551	2.3377	2.5573
Prop in each severity quantile				
1	0.2503	0.0182	0.2157	0.2883
2	0.2498	0.0114	0.2277	0.2733
3	0.2500	0.0125	0.2260	0.2757
4	0.2499	0.0181	0.2157	0.2876
BDAL category	0.4172	0.0247	0.3680	0.4664
Prop. in each BDAL category				
0	0.7072	0.0151	0.6763	0.7363
1	0.1722	0.0101	0.1530	0.1932
2	0.0905	0.0067	0.0780	0.1047
3	0.0301	0.0034	0.0240	0.0378
Log of household income	10.2745	0.0307	10.2133	10.3358
Respondent's gender	0.4920	0.0098	0.4724	0.5116
Respondent's age	3.4977	0.0278	3.4423	3.5531
Respondent has AL or higher education	0.1851	0.0165	0.1523	0.2179
HOH's age	47.5712	0.4153	46.7435	48.3988
HOH has AL or higher education	0.1726	0.0165	0.1398	0.2055
HOH in wage work	0.5282	0.0189	0.4905	0.5659
HOH in self-employment	0.3512	0.0199	0.3114	0.3909
FHH	0.1156	0.0082	0.0993	0.1319
HH receives *Samurdhi*	0.1992	0.0180	0.1632	0.2351
HH has taken disability pay	0.0075	0.0016	0.0044	0.0106
HH has taken loans	0.3573	0.0163	0.3249	0.3898
HH finds honouring debt difficult	0.1932	0.0136	0.1660	0.2204
HH size	4.1146	0.0443	4.0264	4.2028
Urban	0.2510	0.0542	0.1588	0.3731
Rural/Estate	0.7490	0.0542	0.6269	0.8412
N	3,158			

Source: Author estimates based on MDS (2014/15) data using STATA 14/SE

Appendix III

Table III-1: Proportions of poor household based on different definitions of poverty

	Mean	Robust Std Err	[95% Conf. Interval]	
Income poverty				
Income < mean log of household income	0.4091	0.0056	0.3981	0.4202
Income in bottom 2 quantiles of log of income	0.4837	0.0057	0.4724	0.4950
Income < 25th percentile of log income distribution	0.2419	0.0045	0.2331	0.2507
Food exp. < 25th quantile of the log food exp	0.2500	0.0048	0.2406	0.2594
Non-income poverty (Falling into the bottom 2 quantiles of the SOL index)				
MCA	0.5000	0.0077	0.4849	0.5152
PCA	0.5000	0.0078	0.4848	0.5153
Inv. Prop	0.5000	0.0070	0.4862	0.5138
Equal	0.5670	0.0071	0.5531	0.5809
N	21,622			

Source: Author estimates based on HIES (2016) data using STATA SE/14

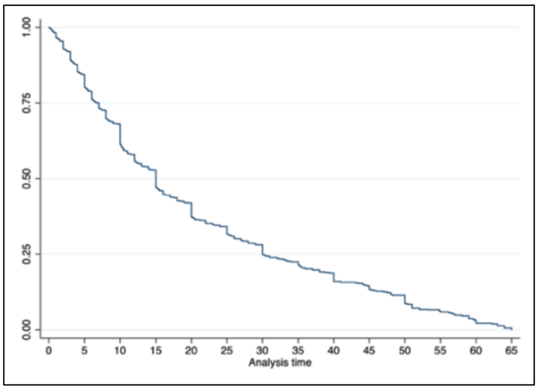
Table III-2: Proportions of covariates used in final models

	Proportion	Robust SE	95% confidence interval	
Male	0.6887	0.0062	0.6765	0.7010
No schooling	0.0434	0.0029	0.0377	0.0491
Primary	0.2671	0.0065	0.2543	0.2799
Up to O/L	0.5359	0.0063	0.5234	0.5483
Up to A/L	0.1223	0.0046	0.1132	0.1314
More than A/L	0.0313	0.0025	0.0264	0.0362
Stopped activity	0.1685	0.0057	0.1572	0.1798
HOH white collar worker	0.1304	0.0048	0.1210	0.1398
Share of children in HH	0.0536	0.0017	0.0502	0.0570
HH gets transfers	0.6368	0.0075	0.6220	0.6517
HH has borrowed from banks	0.3161	0.0063	0.3037	0.3284
HH has pawned jewellery	0.1889	0.0057	0.1777	0.2002
HH owes to retain shops	0.1046	0.0049	0.0951	0.1142
HH owns land	0.8902	0.0051	0.8802	0.9002
Total adult men employed	0.8625	0.0096	0.8435	0.8814
Total adult women employed	0.4979	0.0081	0.4819	0.5139
N	7,051			

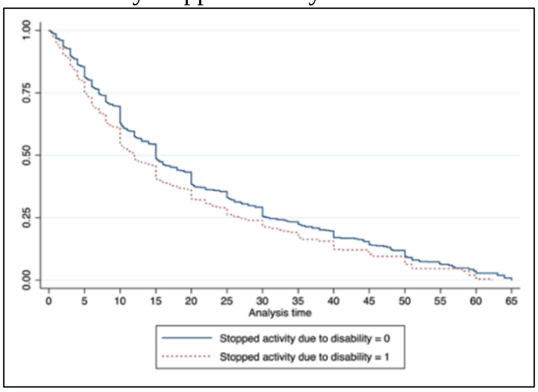
Source: Author estimates based on HIES (2016) data using STATA SE/14

Figure III-1: Kaplan-Meier survival estimate

Panel A: Overall

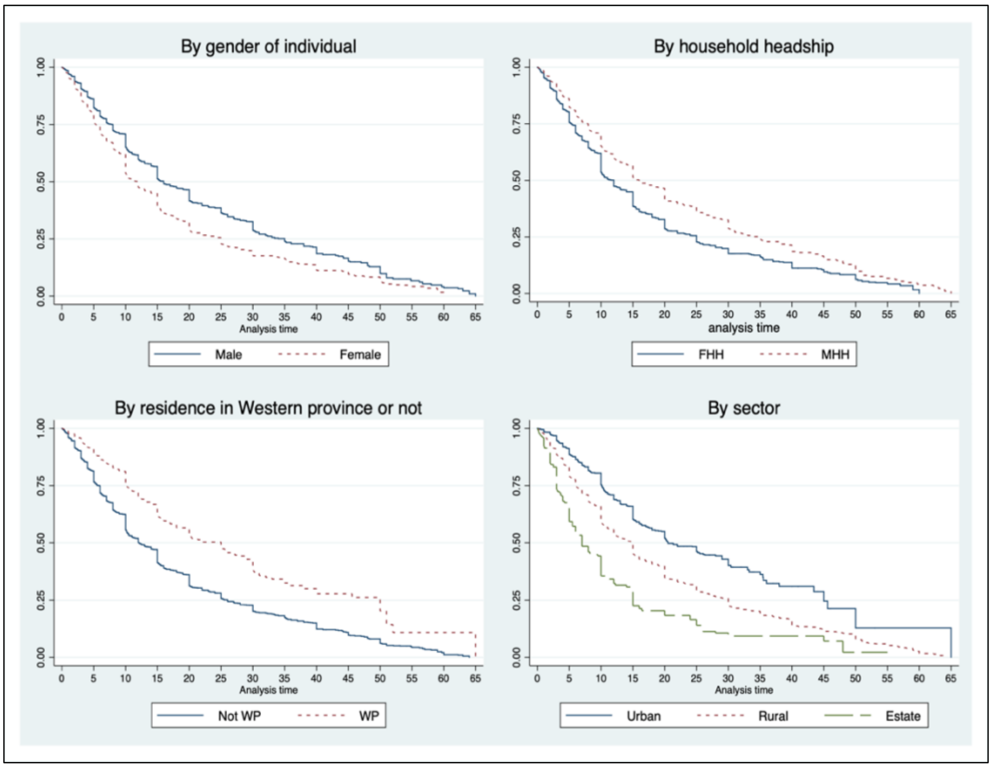


Panel B: By stopped activity



Source: Author estimates based on HIES (2016) data using STATA SE/14

Figure III-2: KM survival estimate by gender, household headship and spatial variables



Source: Author estimates based on HIES (2016) data using STATA SE/14

Table III-3: Output of the proportionality assumption test (Model 6)

	rho	chi2	df	Prob>chi2
Individual variables				
Sex	-0.01160	0.54	1	0.4621
Education	-0.00408	0.05	1	0.8185
Stopped activity due to disability	-0.03036	3.24	1	0.0717
Household variables				
HOH has a white-collar job	0.01177	0.41	1	0.5209
Share of children in the HH	0.00266	0.02	1	0.8752
Earns transfer income	-0.01330	0.59	1	0.4431
Has loans with banks	0.02838	2.38	1	0.1232
Has pawned jewellery	-0.02115	1.61	1	0.2049
Owes to retail shops	-0.01862	1.24	1	0.2654
Owns land	0.00508	0.1	1	0.7495
Spatial variables				
Urban sector	0.02189	2.44	1	0.1181
Rural sector	0.01074	0.63	1	0.4283
Lives in the Western Province	0.03032	3.2	1	0.0736
Global test		21.24	13	0.0683

Source: Author estimates based on HIES (2016) data using STATA SE/14

Table III-4: Cox PH regression models – Alternative regression specification outputs

		Model 6A (Falling below median LN HH income		**Model 6B (Using the non-truncated sample)**	
		$\beta(se)$	HR	$\beta(se)$	HR
Individual variables	Sex	0.137***	1.147***	0.125***	1.133**
		(0.0400)	(0.0454)	(0.0410)	(0.0462)
	Education	-0.184***	0.832***	-0.197***	0.821***
		(0.0240)	(0.0201)	(0.0260)	(0.0214)
	Stopped Activity	0.069*	1.072	0.085*	1.089
		(0.0400)	(0.0428)	(0.0450)	(0.0488)
HH variables	HOH in white-collar job	-0.583***	0.558***	-0.630***	0.533***
		(0.0730)	(0.0410)	(0.0780)	(0.0416)
	Child share in HH	1.109***	3.031***	0.980***	2.665***
		(0.1250)	(0.3780)	(0.1470)	(0.3930)
	Gets transfer income	0.085**	1.089*	0.176***	1.193***
		(0.0420)	(0.0452)	(0.0440)	(0.0522)
	Has loans with banks	-0.379***	0.685***	-0.441***	0.643***
		(0.0410)	(0.0277)	(0.0420)	(0.0269)
	Has pawned jewellery	-0.096*	0.908	-0.152***	0.859**
		(0.0500)	(0.0457)	(0.0540)	(0.0460)
	Owes to retail shops	0.082	1.085	0.085	1.089
		(0.0540)	(0.0589)	(0.0540)	(0.0584)
	Owns land	-0.162***	0.851**	-0.132**	0.876*
		(0.0590)	(0.0500)	(0.0640)	(0.0560)
Spatial variables	Urban‡	-0.456***	0.634***	-0.607***	0.545***
		(0.1190)	(0.0751)	(0.1290)	(0.0700)
	Rural‡	-0.198*	0.821	-0.276**	0.759*
		(0.1120)	(0.0922)	(0.1180)	(0.0896)
	Lives in WP	-0.335***	0.715***	-0.390***	0.677***
		(0.0480)	(0.0341)	(0.0530)	(0.0360)
	chi2	586.8936		633.7475	
	p	0.0000		0.0000	
	N	7051	7051	7063	7063
	AIC	53093.2	53093.2	46065.4	46065.4
	BIC	53182.3	53182.3	46154.7	46154.7

Source: Author estimates based on HIES (2016) data using STATA SE/14
Note: Reference – estate sector; clustered at the PSU; exponential coefficients for HR models; robust SE in parenthesis; * p<0.05, ** p<0.01, *** p<0.001

Appendix IV

Table IV-1: Two-sample Kolmogorov-Smirnov test for equality of distribution functions of income and SOL

	Income		**SOL**	
Smaller group	D	p-value	D	p-value
0	0.0011	0.996	0.0001	1.000
1	-0.1388	0.000	-0.1457	0.000
Combined K-S:	0.1388	0.000	0.1457	0.000

Source: Author estimates on HIES (2016) data using STATA 14/SE

The approximate asymptotic p-value for the combined K-S test is insignificant and rejects the null hypothesis that the two samples are drawn from the same distribution.

Table IV-2: Comparing distribution of the household income and SOL (MCA index) between households with and without PWDs

Global test of equality of two CDFs of:

	Income	**SOL**
Simulated p-value	< .0001	< .0001
At a 10% level: reject	Reject	Reject
At a 5% level: reject	Reject	Reject
At a 1% level: reject	Reject	Reject

Source: Author estimations on HIES (2016) data using STATA 14/SE

With strong control of FWER at a 10% level:
CDF equality is rejected at all points in the following ranges of household income and SOL (MCA index):

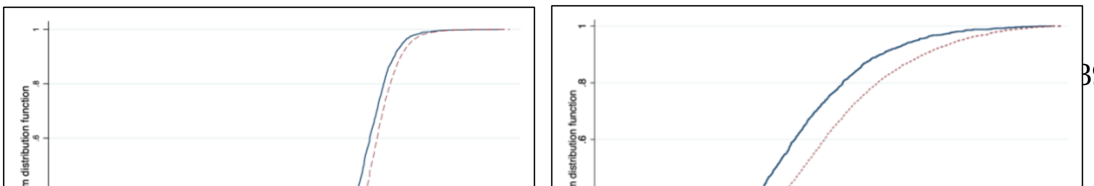
Income		**SOL**	
From	To	From	To
6.6699	6.6970	11.3360	11.3799
6.7254	6.8207	11.8648	11.9667
6.9486	6.9878	11.9925	12.3834
7.0068	7.5841	12.5285	12.5736
7.6417	8.0008	12.6749	89.4034
8.0119	11.8671	89.8872	90.1993
11.8903	11.8951	90.2297	90.2860
		92.5352	93.8749

Source: Author estimations on STATA 14/SE using HIES 2016 data

Figure IV-1: Empirical CDFs of income and SOL of households with and without PWDs

Panel A: Log of HH income

Panel B: SOL index



Source: Author estimations on STATA 14/SE using HIES 2016 data

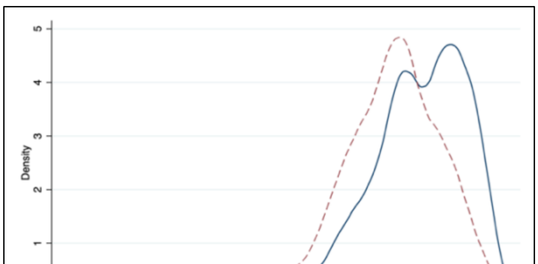
Table IV-3: Treatment model

	$\beta(se)$
Dep var: Has PWD stopped activity	
Length of disability	0.0056
	(0.004)
PWD's sex	0.4646***
	(0.074)
PWD's age	0.0092***
	(0.003)
PWD's education	-0.3800***
	(0.050)
Head of household has a white collar job	-0.6430***
	(0.144)
Household size	0.0381**
	(0.019)
Household receives *Samurdhi*	0.2512***
	(0.079)
Household receives disability pay	1.2645***
	(0.228)
Urban†	0.0875
	(0.234)
Rural†	0.3792*
	(0.202)
Lives in the Western Province	-0.6321***
	(0.105)
Constant	-1.8385***
	(0.343)
chi2	342.0378
p	0.0000
AIC	1510331
BIC	1510413
N	7,063

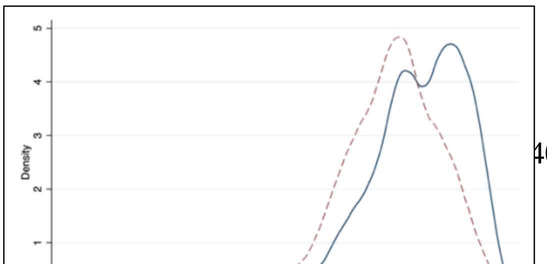
Source: Author estimations on STATA 14/SE using HIES 2016 data
Notes: Standard errors in parenthesis; † Reference: estate sector; Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Figure IV-2: Density plots of household income for IPW and IPWRA

Panel A: IPW



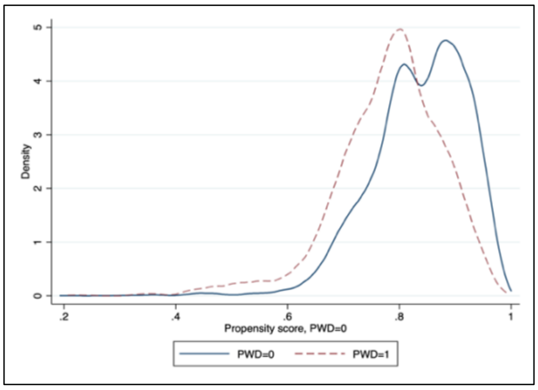
Panel B: IPWRA



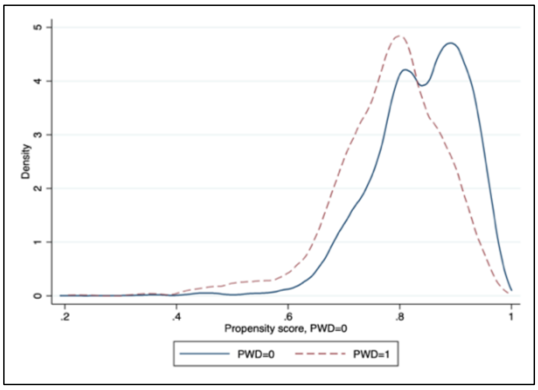
Source: Author estimations on STATA 14/SE using HIES 2016 data

Figure IV-3: Density plots of household SOL for IPW and IPWRA

Panel A: IPW



Panel B: IPWRA



Source: Author estimations on STATA 14/SE using HIES 2016 data

Table IV-4: Overidentification test

Dep var	Estimator	Probability		Conclusion
Overall: Income	IPW and IPWRA	chi2(12) Prob > chi2	= 15.3002 = 0.2254	Cannot reject H_0
Overall: SOL	IPW	chi2(12) Prob > chi2	= 15.3955 = 0.2205	Cannot reject H_0
	IPWRA	chi2(12) Prob > chi2	= 15.3002 = 0.2254	Cannot reject H_0
FHH vs MHH: Income	IPW IPWRA	chi2(12) Prob > chi2	= 10.6167 = 0.4759	Cannot reject H_0
FHH vs MH:H SOL	IPW	chi2(12) Prob > chi2	= 12.1229 = 0.3471	Cannot reject H_0
	IPWRA	chi2(12) Prob > chi2	= 10.6167 = 0.4759	Cannot reject H_0

Source: Author estimations on STATA 14/SE using HIES 2016 data
Notes: H_o - Covariates are balanced; H_1 - Covariates are not balanced

Appendix V

Table V-1: Two-fold (explained) and three-fold (endowment effect) OB decomposition output

	Two-fold decomposition: Explained portion		**Three-fold decomposition: Endowment effect**	
	Income	SOL	Income	SOL
	β/se	β/se	β/se	β/se
Share of children	0.0020	-0.0732*	0.0022	-0.0985**
	(0.002)	(0.039)	(0.003)	(0.041)
Gets *Samurdhi*	-0.0284***	-0.7339***	-0.0288***	-0.7471***
	(0.004)	(0.088)	(0.004)	(0.090)
Gets Disability pay	-0.0058*	-0.0950**	-0.0057	-0.1026**
	(0.003)	(0.041)	(0.005)	(0.052)
Earns many	-0.0133**	0.0051	-0.0130**	0.0044
	(0.006)	(0.005)	(0.006)	(0.006)
Log of household income		-1.8886***		-1.8887***
		(0.191)		(0.192)
HOH age	-0.0142***	1.1425***	-0.0138***	1.2034***
	(0.005)	(0.096)	(0.005)	(0.101)
HOH white collar	-0.0293***	-0.4488***	-0.0295***	-0.4443***
	(0.003)	(0.046)	(0.003)	(0.045)
HOH no edu	-0.0076***	-0.2205***	-0.0076***	-0.2238***
	(0.002)	(0.050)	(0.002)	(0.051)
HOH primary edu	-0.0283***	-0.6447***	-0.0281***	-0.6598***
	(0.004)	(0.063)	(0.004)	(0.064)
HOH secondary edu	-0.0018*	-0.1458***	-0.0020*	-0.1506***
	(0.001)	(0.031)	(0.001)	(0.033)
HOH tertiary or more	-0.0470***	-1.0946***	-0.0466***	-1.1111***
	(0.004)	(0.090)	(0.004)	(0.092)
FHH	0.0028	-0.0133	0.0029	-0.0145
	(0.003)	(0.015)	(0.003)	(0.016)
Urban	-0.0055***	-0.3634***	-0.0050***	-0.3667***
	(0.002)	(0.077)	(0.002)	(0.077)
Rural	-0.0014	0.0467**	-0.0011	0.0529***
	(0.001)	(0.019)	(0.001)	(0.020)
Estate	-0.0002	-0.0238	-0.0002	-0.0243
	(0.001)	(0.058)	(0.001)	(0.059)
Colombo	-0.0209***	-0.3684***	-0.0210***	-0.3750***
	(0.004)	(0.063)	(0.004)	(0.064)
Gampaha	-0.0145***	-0.4118***	-0.0143***	-0.4165***
	(0.002)	(0.058)	(0.002)	(0.059)
Kalutara	0.0007	0.0122	0.0008	0.0127
	(0.002)	(0.028)	(0.002)	(0.029)
Kandy	0.0001	-0.0189	0.0000	-0.0193
	0.000	(0.023)	0.00	(0.023)
Matale	-0.0003	-0.005	-0.0006	-0.007
	0.000	(0.007)	(0.001)	(0.008)
Nuwara Eliya	0.0000	0.0031	0.0000	0.0035
	0.000	(0.007)	0.000	(0.008)
Galle	0.0008	0.0125	0.0008	0.0123
	(0.001)	(0.013)	(0.001)	(0.013)
Matara	0.0004	0.0299	0.0005	0.0315
	0.000	(0.018)	(0.001)	(0.019)
Hambantota	0.0008	0.0222	0.0009	0.0173
	(0.001)	(0.014)	(0.001)	(0.013)

Jaffna	0.0007	0.0218	0.0007	0.0212
	(0.001)	(0.017)	(0.001)	(0.017)
Mannar	0.0000	0.0022	0.0000	0.0021
	0.000	(0.003)	0.000	(0.003)
Vavuniya	0.001	-0.0043	0.0006	-0.0054
	(0.001)	(0.007)	(0.001)	(0.008)
Mullaitivu	0.0005*	0.0063	0.0005*	0.0062
	0.000	(0.004)	0.000	(0.004)
Kilinochchi	0.0005**	0.0229***	0.0005**	0.0227***
	0.000	(0.008)	0.000	(0.008)
Batticaloa	0.0001	-0.0143	0.0000	-0.0136
	(0.001)	(0.013)	(0.001)	(0.012)
Ampara	0.0002	0.0028	0.0001	0.0031
	0.000	(0.007)	0.000	(0.007)
Trincomalee	0.0003	0.0374***	0.0004	0.0382***
	(0.001)	(0.014)	(0.001)	(0.014)
Kurunegala	-0.0043**	0.0434*	-0.0036*	0.0383
	(0.002)	(0.024)	(0.002)	(0.024)
Puttlam	0.0007	0.0124	0.0005	0.0111
	(0.001)	(0.013)	(0.001)	(0.012)
Anuradhapura	-0.0012	-0.0344*	-0.0008	-0.0384*
	(0.001)	(0.018)	(0.001)	(0.020)
Polonnaruwa	0.0020**	-0.0221*	0.0023**	-0.0237*
	(0.001)	(0.013)	(0.001)	(0.014)
Badulla	-0.0017	-0.0406	-0.0019	-0.0412
	(0.001)	(0.031)	(0.002)	(0.031)
Moneragala	0.0017	0.0117	0.0016	0.0119
	(0.001)	(0.009)	(0.001)	(0.009)
Ratnapura	-0.0006	0.002	-0.0006	0.0023
	(0.001)	(0.004)	(0.001)	(0.005)
Kegalle	-0.0002	0.0004	-0.0004	-0.0005
	0.000	(0.006)	0.000	(0.006)

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: N = 1,612; Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Table V-2: Two-fold (Explained) OB decomposition output by household headship

	Two-fold: Explained portion	
	Income	SOL
	Model 1	Model 2
	β/se	β/se
Share of children in HH	0.0018	-0.0993
	(0.004)	(0.065)
Receives *Samurdhi*	0.0144*	0.3106*
	(0.009)	(0.180)
Receives Disability	0.0015	0.0173
	(0.002)	(0.028)
Many income sources	0.0593***	-0.067
	(0.015)	(0.077)
Log of HH income		1.9311***
		(0.476)
HOH age	0.0217*	-0.0911
	(0.012)	(0.133)
HOH white collar	0.0345***	0.6072***
	(0.008)	(0.130)

Urban	-0.0029	-0.0443
	(0.011)	(0.166)
Western Province	-0.0073	-0.0782
	(0.008)	(0.083)

Source: Author estimates based on HIES (2016) data using STATA SE/14
Notes: N = 1,612; Numbers in parentheses are robust standard errors clustered at the primary sampling unit level. Sampling weights applied. Significance level denoted by * p<0.10, ** p<0.05, *** p<0.01

Appendix VI

Table VI-1: Means and proportions of variables submitted to OLS regression model (Table 9.2)

	Mean	Robust Std. Err.	[95% Conf. Interval]	
Log of HH income	9.928	0.033	9.864	9.992
MCA index	39.976	0.475	39.040	40.913
PWD gender	0.540	0.012	0.516	0.564
PWD age	57.265	0.521	56.239	58.292
PWD no or primary educ only	0.471	0.013	0.446	0.495
PWD child	0.125	0.009	0.108	0.142
PWD spouse	0.167	0.009	0.149	0.186
PWD other relative	0.151	0.009	0.133	0.170
Share of children	0.057	0.003	0.050	0.063
Gets *Samurdhi*	0.285	0.012	0.261	0.309
Gets disability pay	0.043	0.005	0.034	0.052
Bank borrowings	0.326	0.012	0.302	0.350
Owns land	0.891	0.011	0.870	0.912
Many income sources	0.132	0.009	0.115	0.150
HOH age	59.231	0.401	58.441	60.022
HOH educ. Cat.	2.628	0.018	2.592	2.664
HOH white collar	0.078	0.007	0.065	0.092
HOH PWD	0.568	0.013	0.544	0.593
FHH	0.248	0.011	0.227	0.269
Sinhala	0.796	0.015	0.766	0.826
SL Tamil	0.089	0.010	0.070	0.108
Indian Tamil	0.036	0.007	0.023	0.049
Moor	0.075	0.009	0.058	0.093
Urban sector	0.120	0.012	0.098	0.143
Rural sector	0.834	0.013	0.808	0.861
Estate sector	0.045	0.008	0.029	0.061
N	1,612			

Source: Author estimates based on HIES (2016) on STATA SE/14.

Table VI-2: Means and proportions of variables submitted to OLS regression model (Table 9.3)

	FHH	MHH
Log of HH income	9.697	10.005
MCA index	37.923	40.654
PWD age	0.221	0.645
PWD no or primary educ only	59.715	56.456
PWD child	0.562	0.440
Share of children	0.165	0.112
Gets *Samurdhi*	0.044	0.061
Gets disability pay	0.317	0.275
Bank borrowings	0.052	0.040
Owns land	0.248	0.352
Many income sources	0.864	0.900
HOH age	0.077	0.150
HOH educ. Cat.	62.513	58.148
HOH white collar	2.448	2.687
HOH PWD	0.019	0.098

Urban	0.601	0.558
Rural	0.124	0.119
Estate	0.819	0.840
N	395	1217

Source: Author estimates based on HIES (2016) on STATA SE/14.

Table VI-3: Qualitative interview guide

Interview guide – Time duration [60 minutes max]
The interview will be conducted with the primary female respondent (PFR) of the household. She could either be the head of the household, partner of the male head of household or the principal female relative of the head of household. Note: The interview will be conducted only if the PFR and the PWD have had the booster vaccination for COVID-19. If possible, the interview should be conducted in the garden, if not in a place with plenty of ventilation. This information will be confirmed beforehand with the PFR. *The time of meeting will also be agreed depending on what is convenient for her* based on her schedule. Three specific options will be explored to see what works best for her if she is also the primary caregiver to the PWD 1) Conduct the interview when the PWD is having a nap or is asleep. 2) Conduct the interview at a time there is someone else at home to care for the PWD 3) Break up the interview to two parts of 30 min each within a day based on what is convenient for the interviewee.
Serial No of Respondent
Age
Gender
Relationship to the PWD
Province
Interview duration
Audio recorded or not
Is PFR a PWD?
1. Can you tell me a little bit about yourself? E.g., your education level, some information about your family? Your usual activity? Some information about your employment if you are working or has ever worked? If not, why? 2. Do you have any health-related or other difficulties that make it challenging for you to perform your day-to-day activities? [By day-to-day activities, I mean getting out of bed on one's own, having a wash/bath, moving around the house, walking a small distance, going to the bathroom, sitting down and getting up, eating meals etc]. Please describe. [Note to researcher: Ask additional questions as required about the extent of difficulty in performing different day-to-day functions] 3. Do you have members in your household whose health-related or other difficulties make it challenging for them to perform their day-to-day activities? a. Can you describe to me in some detail the profile of such individual(s) in your household? By profile I mean, the age, gender, the main difficulties faced in performing day-to-day activities, their usual activity, if they are or were ever employed or not, any particular reason for either response] [Note to researcher: At this point, explain to the PFR that the term 'disability' will be used to refer to difficulties in performing day-to-day activities such as those described earlier. A person with difficulties in performing day-to-day activities will be referred to as a PWD] 4. Including yourself if you think you have difficulties that limit your ability to perform day-to-day activities, how many PWDs are there in your households in your opinion?

5. If there are other PWDs, can you explain who takes up the primary caregiver role to the other PWDs in the household?
a. If you yourself are a PWD who is your primary caregiver?
6. Can you describe to me the kind of support and care available to you (if relevant) and/or other PWDs in your household? [For example, from your extended family, neighbours, friends, religious institutions, political leaders, NGOs, the government]
7. Do you now or have you ever paid for help to care for you or other PWDs in your household?
    a. If so, can you explain why you and your family sought paid help?
    b. Is that an option you consider now or in the future?
    c. Why or why not?
8. Can you think of any specific additional expenses your household has to incur to make you (if relevant) and/or other PWDs in the household feel more comfortable and better able to go about day-to-day activities?
9. If money was not a problem, are there additional measures of support you can create for yourself (if relevant) and/or the other PWDs in the household?
a. Other than money, are there additional difficulties in creating the kind of supported you discussed?
10. Can you explain to me what a typical day is like for you, including any activities of caring for the PWDs in the household?
11. What are some of the activities you like to do (daily, monthly or even yearly – e.g., reading, gardening, going to a place of worship, going on a trip), that you cannot do at the moment because of your household experience of disability?
12. Can you explain to me how you feel about being the principal female in this household?
    a. Is there anything your family/relatives including PWDs in the household can do to make your role in this household more effective, including as a caregiver?
    b. How does the presence of and experience of disability in the household affect your other roles and work? [e.g., as a parent, spouse, income-earner, if that is the case, principal caregiver to family members]
13. Can you explain to me about your pandemic experience and lockdowns in relation to your role as the principal female in this household? What are your worries and concerns? What has been good about it?
14. Can you think of some ways in which the government or other agencies can help PWDs and their households?
15. Could you explain to me how you feel about yourself these days?
16. If there is anything you could change about your role in your household, what would that be?
17. Ask ONLY if the PFR herself is a PWD:
    a. Do you think having a disability has negatively or positively affected your status in the household? [By status I mean, the ability to make decisions for yourself, the respect of your household members, your self-worth as the principal female of this household]
    b. If so, how?

Source: Author

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