

## Dynamics of Functional Difficulties and Wellbeing

**Abstract** This chapter uses the longitudinal data for Ethiopia, Malawi, Tanzania and Uganda to investigate some dynamic links between disability and wellbeing. The functional difficulty trajectories of individuals are significantly associated with different levels of wellbeing. Persons with persistent functional difficulties are worse off than persons with functional difficulties in one or no period. Women with persistent difficulties and older persons with persistent difficulties are the most deprived groups. New functional difficulties lower the odds to continue working and no longer reporting any difficulty increases the odds of returning to work. Functional difficulties are also associated with mortality in the short-term. More research is needed on the links between disability, on the one hand, and poverty dynamics and mortality, on the other.

**Keywords** Disability · Panel data · Mortality · Gender · Aging · Africa

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In this chapter, I exploit the longitudinal data available for Ethiopia, Malawi, Tanzania, and Uganda to study three questions related to the

dynamic links between functional difficulties and wellbeing. The first section asks whether individuals with different trajectories in terms of functional difficulties (e.g., new functional difficulty in wave 2, functional difficulty in both waves) tend to have different characteristics and wellbeing outcomes. The second section investigates if short-term changes in functional difficulties are associated with changes in asset ownership and work status. The last section considers if functional difficulties predict mortality in the short term.

Each of the three sections starts with a literature review, then moves onto methodology and ends with results and discussion. I conclude with a summary of the main results of this chapter. Because the first and second sections require information on functional difficulties in two waves, which was only available in Ethiopia and Uganda, results are limited to these two countries.

## 6.1 FUNCTIONAL TRAJECTORIES AND THEIR CORRELATES

### 6.1.1 *Literature*

Results in Chapter 4 earlier show that transitions in and out of functional difficulties are common. They affect about half of individuals with functional difficulties at a given point in time in Ethiopia and Uganda. This result is consistent with results from studies in HICs. The question then arises as to what such transitions may be correlated with.

There is a small body of literature on these correlates that tries to separate demographic from socioeconomic correlates. It also asks to what extent these transitions are due to factors amenable to policy change (e.g., poverty, employment, and education). The literature is mostly focused on transitions into disability, i.e., on the predictors of onsets. It has consistently shown that older persons are more likely to experience transitions into disability (e.g., Gannon and Nolan 2007). As age may be correlated with educational attainment, studies have to consider the extent to which, within age groups, education predicts onsets. Results are mixed with some studies finding that education predicts onsets (Jenkins and Rigg 2003; Jagger et al. 2007; Burchardt 2003) and other studies finding that it does not (Gannon and Nolan 2007). There is also evidence that poverty is a significant predictor of later disability onset while gender and family composition are not (Burchardt 2003; Gannon and Nolan 2007; Jenkins and Rigg 2003).

The literature on the determinants of persistent difficulties and of transitions out of disability is even smaller. Gannon and Nolan (2007) find that persons who are older, male and unemployed, and have no education are more likely to have a persistent illness or disability. They also find that people who work are more likely to no longer report an illness or disability in a subsequent wave compared to people who do not work. Jagger et al. (2007) show that persons with limited educational attainment are less likely to experience a transition out of a mobility or ADL limitation.

The literature above uses several disability measures: a broad activity limitation or work limitation measure (Burchardt 2003; Jenkins and Rigg 2003), a mobility or ADL limitation (e.g., Jagger et al. 2007) or broadly, a health problem, illness, or disability (Gannon and Nolan 2007). The question then arises as to whether similar correlates can also be found when one uses the Washington Group short set of questions on disability, which are now increasingly used in surveys and censuses internationally, but largely in cross-sectional datasets. The literature above is set in the context of a few HICs (Ireland, UK, and USA). Do similar results hold in very different contexts, in LICs in particular where health-care and rehabilitation services, and the socioeconomic environment are very different? This is what the rest of this section attempts to answer for Ethiopia and Uganda.

### 6.1.2 *Methodology*

The objective of this section is to determine the correlates of different trajectories in functional difficulty status in the short term. If persons with persistent functional difficulties are found to have a different profile compared to persons with transitory or no difficulty, it will be important to monitor this group for policy and to understand the determinants and consequences of persistent difficulties.

This section is focused on the cases of Ethiopia and Uganda, where comparable data on functional difficulties using the Washington Group questions was collected in two waves: the Ethiopia Rural Socioeconomic Survey (2011/2012, 2013/2014) and the Uganda National Panel Survey (2009/2010, 2010/2011). The sample includes individuals whose functional status is known in both waves.<sup>1</sup>

Individuals are categorized into one of four functional difficulty categories depending on their trajectory: (1) A functional difficulty in wave 1 only; (2) A functional difficulty in wave 2 only; (3) A functional difficulty

in both waves; and (4) No functional difficulty in any wave. The analysis not only considers any degree of functional difficulty (moderate or severe), but also later separates transitions by degree (severe, then moderate). Given that the longitudinal data is available for the short term only, the permanent or temporary nature of a functional difficulty cannot be determined. (1) and (2) may get at exits or entries into a functional difficulty status, but may also capture episodic functional difficulties. Group (1) captures persons with medium, long-term, or permanent functional difficulties. As noted in Chapter 4, there could be a variety of reasons for reporting a functional difficulty in one wave and not in the other, including changes in reporting behavior, measurement error, and actual changes in functional limitations.

After presenting descriptive statistics, this section will give results of a multinomial logit model of the probability of experiencing a particular functional trajectory as presented in Box 4.

#### Box 4: Multinomial logit model of functional trajectories

$$\text{Functional Trajectory}_{i,t+1} = \alpha + \beta \text{Deprivation}_{i,t} + \sum_k \gamma_k x_{i,k,t} + \varepsilon_{i,t}$$

where:

(6.1)

- *Functional Trajectory*<sub>*i,t+1*</sub> of individual *i* at time *t + 1* refers to the four categories of functional trajectory above (1) through (4) with (4) No functional difficulty in any wave as the reference category.
- $\alpha$  is the intercept;
- *Deprivation*<sub>*i,t*</sub> is a dummy variable equal to 1 if the individual experiences a deprivation in the previous wave (in turn with respect to education, morbidity, work, material wellbeing, economic insecurity, and multidimensional poverty), 0 otherwise;
- $\beta$  is the coefficient of the deprivation status to be estimated. Results are reported in Table 6.2.
- $x_{i,k,t}$  is a set of *k* control variables at the individual, household or community level in time *t* (age categories, male, married, household head, household size, rural residence, distance to healthcare services);
- $\gamma_k$  is the set of estimated coefficients of the *k* control variables;
- $\varepsilon_{i,t}$  is the error term for person *i* at time *t*.

Model (6.1) of Box 4 does not identify the causal link from recent characteristics or deprivations to recent changes in functional difficulty. Instead, it estimates an association. For instance, finding a positive and significant coefficient for material wellbeing deprivation in wave 1 for a new functional status in wave 2 does not indicate that the material deprivation in wave 1 caused the functional difficulty in wave 2. It might reflect reverse causality from functional difficulty to a deprivation: the functional difficulty may have been a long term but transitory functional difficulty that was not measured in wave 1 and yet had already affected the employment, earnings, and material wellbeing of the individual prior to wave 1. The material wellbeing deprivation and the functional difficulty may also both be caused by factors not measured in the model, such as violence, natural disasters or an absence of public goods in the community (e.g., infrastructure, health services).

#### 6.1.2.1 Results and Discussion

Table 6.1 gives descriptive statistics for four groups of individuals based on their functional difficulty trajectory. Consistent with the descriptive statistics with cross-sectional data earlier in Chapter 4 (Table 4.4), persons with no functional difficulty tend to be younger and belong to larger households. In Ethiopia, males and females are evenly spread across the four groups, while in Uganda, 61% of persons with persistent functional limitations are women. There is no significant difference in the distance to healthcare services across groups, except in Uganda where persons with persistent difficulties are further away on average.

Table 6.1 also shows that the functional trajectory is associated with patterns with respect to deprivations in five dimensions (education, morbidity, work, material wellbeing, and insecurity) and in the multidimensional poverty indicators of Chapter 5 ( $H$ ,  $A$ ,  $M_0$ ). Persons with persistent functional difficulties are worse off than persons with functional difficulties in wave 1 or 2 and persons with no functional limitation in any wave. This is shown by significantly higher rates of deprivation in each dimension and of multidimensional poverty. For instance, in Ethiopia, 87% of those with persistent difficulties are multidimensionally poor compared to 69% of those who do not experience any difficulty in waves 1 and 2, and, respectively, 85 and 74% of those with a difficulty in wave 1 or 2 only.

Results from the model in Box 4 are shown in Table 6.2 for transitions in severe functional difficulty in the top panel, moderate difficulties in the middle panel, and then for all difficulties (any degree) in the bottom

**Table 6.1** Descriptive statistics by functional difficulty trajectory

	Ethiopia				Uganda			
	Difficulty in wave 1 only	Difficulty in wave 2 only	Persistent diff. in both waves	No difficulty	Difficulty in wave 1 only	Difficulty in wave 2 only	Persistent diff. in both waves	No difficulty
<b>Personal factors</b>								
Age 15-39	0.39***	0.35***	0.18***	0.72	0.43**	0.35***	0.22***	0.76
Age 40-49	0.18***	0.19***	0.19***	0.15	0.19***	0.23***	0.12***	0.13
Age 50-64	0.29***	0.28***	0.24***	0.09	0.27***	0.27***	0.27***	0.08
Age 65+	0.15***	0.18***	0.39***	0.03	0.14***	0.15***	0.39***	0.02
Male	0.47	0.49	0.5*	0.5	0.47**	0.48	0.39***	0.5
<b>Structural factors</b>								
<i>Household</i>								
Married	0.74**	0.69	0.63***	0.69	0.55**	0.54***	0.49	0.52
Household head	0.57***	0.6***	0.65	0.38	0.57***	0.58	0.62	0.33
Household size	5.44***	5.35***	4.5***	5.8	6.95***	7.31***	6.47***	7.5
	(0.12)	(0.14)	(0.15)	(0.04)	(0.23)	(0.52)	(0.27)	(0.07)
<i>Community</i>								
Distance to healthcare services	15.41	16.5	14.41	15.4	28.38	26.45	28.06**	26.37
	(0.77)	(0.96)	(0.83)	(0.26)	(1.91)	(2.23)	(1.94)	(0.72)
Rural	NA	NA	NA	NA	0.85***	0.89**	0.88***	0.84
<b>Deprivations</b>								
Education	0.93***	0.93***	0.97***	0.81	0.64***	0.55***	0.73***	0.4
Morbidity	0.4***	0.24***	0.48***	0.18	0.46***	0.55***	0.62***	0.29
Employment	0.25	0.23	0.33***	0.24	0.21*	0.24	0.36***	0.25
Material	0.99**	0.99	0.99**	0.98	0.71***	0.7***	0.71***	0.66
Insecurity	0.39***	0.3	0.37***	0.34	0.59***	0.6***	0.62***	0.48
H	0.85***	0.74	0.87***	0.69	0.71***	0.72***	0.79***	0.49
A	0.6***	0.57***	0.63***	0.56	0.54***	0.55***	0.61***	0.5
	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)
M <sub>0</sub>	0.52***	0.42**	0.55**	0.38	0.38***	0.4***	0.48***	0.24
	(0.01)	(0.02)	(0.02)	(0.00)	(0.01)	(0.03)	(0.02)**	(0.00)
N	611	485	457	6360	504	401	558	4527

*Notes* The characteristics and deprivations are for wave 1. \*\*\* significant at the 1% level, \*\* significant at the 5% level, \* significant at the 10% level.

**Table 6.2** Odds ratio of deprivation by functional trajectory

	<i>Ethiopia</i>			<i>Uganda</i>		
	<i>Difficulty in wave 1 only</i>	<i>Difficulty in wave 2 only</i>	<i>Persistent difficulty in both waves</i>	<i>Difficulty in wave 1 only</i>	<i>Difficulty in wave 2 only</i>	<i>Persistent difficulty in both waves</i>
<b>Severe difficulty transitions</b>						
Education	1.21	3.94**	3.98***	2.57***	1.79	3.56***
Morbidity	4.02***	1.2	5.47***	1.23	7.1***	3.76***
Employment	2.18***	1.65*	3.76***	1.03	2.54**	5.61***
Material wellbeing	3.25*	1.7	4.32**	1.19	0.81	1.45
Insecurity	1.87**	0.45**	2.47***	2.15***	3.1***	1.38
Multidimensional poverty	2.27***	0.99	5.1***	2.31***	4.98***	4.75***
<b>Moderate difficulty transitions</b>						
Education	1.44**	1.01	1.93**	1.34**	1.17	1.19
Morbidity	2.5***	1.17	2.24***	1.53***	2.41***	2.51***
Employment	1	1.03	1.02	1.07	1.06	1.07
Material wellbeing	1.72*	0.8	0.87	1.29*	1.08	0.92
Insecurity	1.55	0.85	0.99	1.39***	1.68***	1.86***
Multidimensional poverty	1.95***	0.91	1.82***	1.63***	2.01***	1.96***
<b>All transitions</b>						
Education	1.41**	1.16	2.62***	1.48***	1.24	1.75***
Morbidity	2.7***	1.17	2.94***	1.45***	2.56***	3.01***
Employment	1.14	1.08	1.54***	1.05	1.15	2.02***
Material wellbeing	1.97***	0.61*	1.24	1.3**	1.06	1.11
Insecurity	1.79***	0.72**	1.51***	1.42***	1.73***	1.97***
Multidimensional poverty	1.99***	0.92 NS	2.49***	1.7***	2.16***	2.92***

Notes For each deprivation in a given row, a multinomial logit regression as in Box 4 is run and the odds ratio of difficulty in wave 1 only, difficulty in wave 2 only and difficulty in both waves are reported on the same row. No functional difficulty in any wave is the reference category. The upper (middle) panel covers severe (moderate) difficulty transitions and excludes persons with a moderate (severe) difficulty in any wave. \*\*\*significant at the 1% level, \*\*significant at the 5% level, \*significant at the 10% level. More information on the dependent variables is in Table 5.2. Descriptive statistics are in Table 6.1

panel. Persons with persistent functional difficulties are significantly more likely to have experienced multidimensional poverty and a deprivation in any dimension in Ethiopia and most dimensions in Uganda compared to persons with no functional difficulty in any wave. A similar association is found for persons with a severe limitation in wave 1 or wave 2, albeit less strong. Comparing the results of severe and moderate functional difficulty transitions, overall similar results are found for moderate difficulties but with smaller odds ratios.

Next, the mean adjusted multidimensional poverty headcount ( $M_0$ )<sup>2</sup> is calculated for different groups of persons with functional difficulties based on age, sex, and the severity and trajectory of the functional difficulty.<sup>3</sup> The trajectory covers a functional difficulty in one wave vs. both waves. Results are presented in Fig. 6.1. Groups are ranked from the least (bottom) to the most (top) multidimensionally poor as measured by  $M_0$ . There is a considerable variation in  $M_0$  across the subgroups ranging 0.45–0.7 in Ethiopia and 0.3–0.6 in Uganda.

There are some patterns in both countries. Older persons, older women, and persons experiencing severe difficulties in both waves tend to be the groups the most multidimensionally poor. These are groups for whom personal factors, structural factors, resources, and functional difficulties may interact to create situations of extreme deprivations. Further research is needed that explores the heterogeneity in wellbeing of persons with functional difficulties and how they are shaped by personal, structural, and resource factors.

## 6.2 CHANGES IN FUNCTIONAL DIFFICULTIES AND ECONOMIC WELLBEING

### 6.2.1 *Literature Review*

As noted in Chapter 2, it is often stated that ‘disability and poverty are a cause and a consequence of each other’ (DFID 2000; Yeo and Moore 2003). Yet, the poverty dynamics literature has been largely silent on disability. From the poverty dynamics literature, we know that households in LMICs have a limited set of coping mechanisms to deal with the economic consequences of illness, hospitalization or broad activity limitations (Santos et al. 2011; Mitra et al. 2016). In fact, they sometimes adopt coping mechanisms that are detrimental in the medium and long



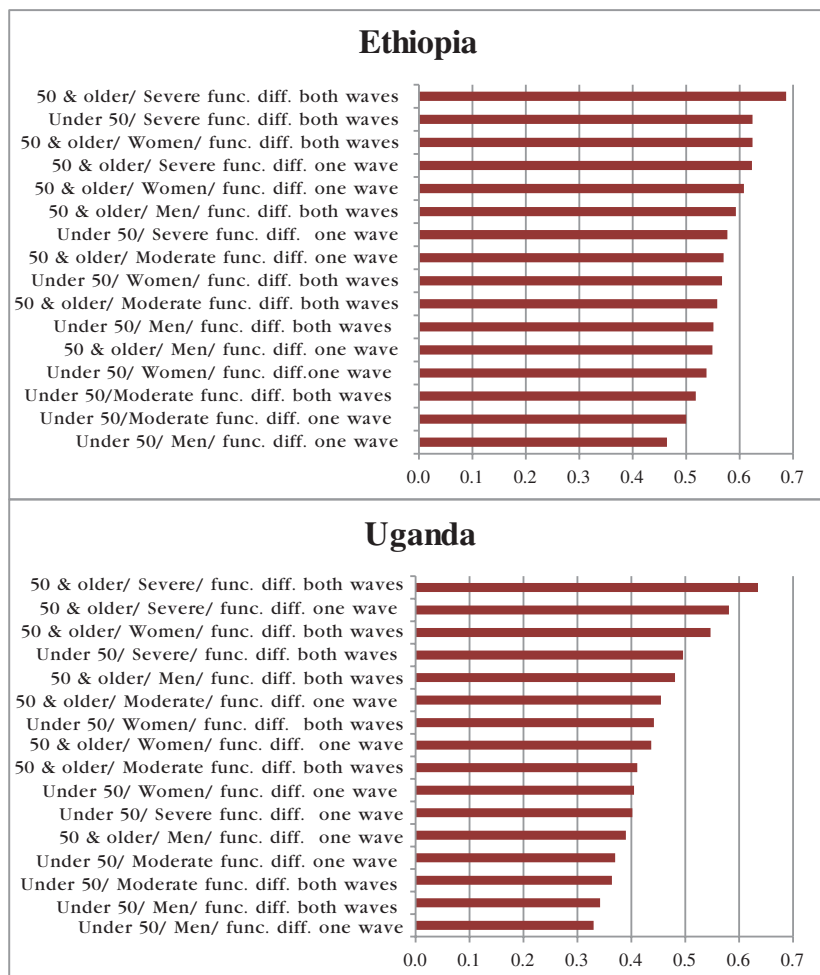


Fig. 6.1 Multidimensional poverty adjusted headcount ( $M_0$ ) by subgroup

run, such as selling productive assets. WHO–World Bank (2011) notes that the onset of disability is linked with a decline in social and economic wellbeing and an increase in poverty through a number of channels including stigma, education, employment, inaccessible basic services, and increased disability-related expenditures. However, the evidence for these

complex relationships between disability and deprivations is very limited. The evidence is scarce (Grech 2015) and is mainly correlational and does not separate the many causal pathways between disability and wellbeing (Groce et al. 2011; Mitra et al. 2013; Minuzoya and Mitra 2013).

The causal literature is mainly on the pathways from poverty to disability through channels such as malnutrition and working conditions. This suggests that policies aiming at poverty reduction in general will reduce disability prevalence. Poverty, and more broadly, inequalities, may increase the risk of disability through several pathways, many of which are related to poor health and its determinants. Poverty may lead to the onset of a health condition that results in disability. In LMICs, there is evidence that malnutrition leads to disability (Maulik and Damstadt 2007). Other possible pathways include diseases whose incidence and prevalence are strongly associated with poverty, lack of inadequate public health interventions (e.g., immunization), poor living conditions (e.g., lack of safe water), environmental exposures (e.g., unsafe work environments), and injuries. Poverty, as a contextual factor, may also increase the likelihood that a health condition/impairment/functional difficulty may result in a disability, for instance, if there is a lack of healthcare and rehabilitation services or if there are barriers to access the services that are available. In addition, stigma associated with a health condition or impairment may lead to deprivations. It might also be worsened by the stigma associated with poverty. Limited resources in the community, for instance to build accessible roads or buildings, may also make it difficult for an individual with mobility impairment to participate in the community life.

In reverse, the onset of a disability may lead to lower living standards and poverty through adverse impacts on education, employment, earnings, and increased expenditures related to disability. Disability may prevent school attendance for children and youth with disabilities (Filmer 2008; Mizunoya et al. 2016) and restrict their human capital accumulation, thus leading to limited employment opportunities and reduced productivity (earnings) in adulthood. For onsets during adulthood, disability may prevent work, or constrain the kind and amount of work a person can do (Gertler and Gruber 2002), lowering income for the individual and the household and potentially resulting in poverty. In addition, disability may lead to additional expenditures for the individual and the household, in particular in relation to specific services such as healthcare, transportation, assistive devices, personal care (Mont and Cuong 2011; Mitra et al. 2017).

## 6.2.2 Methodology

### 6.2.2.1 Household Material Wellbeing

I exploit the longitudinal data available for Ethiopia and Uganda to investigate if changes in functional difficulties are associated with changes in economic wellbeing between two waves two years apart for Ethiopia and one year apart for Uganda. For the asset index, a first-difference model is estimated where changes in asset score between two waves are associated with changes in control variables at the household level (Table 4.7). Based on the human development model (Chapter 2) and the associations between economic deprivations and functional difficulties found in Chapter 5, a functional difficulty decrease/increase is expected to be associated with an increase/decrease in economic wellbeing, respectively.

For work status, the model is described in Box 5. I split the analysis between individuals who are working at baseline and those who are not and differentiate between increasing and decreasing functional difficulties. The objective is to investigate separately determinants of work exits, on the one hand, and return to work, on the other (Mitra and Jones 2017). Among persons working at wave 1, I also restrict the sample to persons without a functional difficulty at baseline. I then investigate if an increase in functional difficulty is associated with an increase in the probability of transitioning into not working. Likewise, among persons not working at wave 1, I investigate the decrease in functional difficulty and its association with returning to work for the sample of the initially not working with a functional difficulty in wave 1.

#### Box 5: First-difference model of work status

$$\Delta y_i = \beta \Delta F_i + \sum_{k=1}^5 \gamma_k \Delta x_{k,i} + \Delta \varepsilon_i \quad (6.2)$$

where:

- The symbol  $\Delta$  refers to the difference of a given variable between wave  $t+1$  and  $t$ ;
- $\Delta y_i$  denotes changes in work status for individual  $i$ : work exit and return to work transitions are considered in turn as dependent variable.
- $\Delta F_i$  is the change in functional difficulties: for work exit, the sample includes persons with no difficulty and working in wave 1 and a value of ‘1’ refers to a new difficulty in wave 2, a value of

‘0’ refers to no change; for return to work, the sample includes persons with a difficulty and not working in wave 1, a value of ‘1’ refers to no longer having a difficulty in wave 2, and ‘0’ refers to still having a difficulty in wave 2.

- $\beta$  is the estimated coefficient for  $\Delta F_i$  and is reported in Table 6.3.
- The set of control variables includes  $k$  potentially time-varying characteristics  $\Delta x_{k,i}$  (marital status, household head, household size, distance to healthcare services, rural) while time-invariant characteristics (e.g., sex, birth year) are differenced out.
- $\gamma_k$  is the set of estimated coefficients of the  $k$  control variables.
- $\Delta \varepsilon_i$  captures changes in time-varying unobserved factors.

### 6.2.3 *Results and Discussion*

#### 6.2.3.1 *Household Material Wellbeing*

Are changes in functional status associated with changes in household material wellbeing in the short-term? It might be that following an onset of a functional difficulty, households sell assets to pay for healthcare or compensate for lower earnings.

In the interest of space, results of the asset index are discussed here but are not shown in a table. Changes in functional difficulties are not significantly associated with changes in asset ownership for Ethiopia and Uganda.

The differences in asset ownership shown earlier in Chapter 5 (Table 5.7) for Ethiopia may reflect cumulative effects that take place over the medium and long term and could not be identified here with data following households over the short term. They may also reflect other links between functional difficulties and assets/living conditions, including of course reverse causality from poor assets/living conditions to the onset of functional difficulties or other factors that affect both assets/living conditions and functional difficulties.

#### 6.2.3.2 *Work Status*

Results are presented in Table 6.3 for changes in work status and functional difficulties. Column (i) considers if new functional difficulties in wave 2 are associated with work exits among workers in wave 1. The model gives a significant association between increased functional

**Table 6.3** Odds ratio of work exit or return to work and change in functional difficulties

<i>Dependent variable</i> <i>Functional difficulty transi-</i> <i>tion</i>	<i>Work exit</i> <i>Difficulty in wave 2 only vs.</i> <i>No difficulty in any wave</i> <i>(i)</i>	<i>Return to work</i> <i>Difficulty in wave 1 only vs.</i> <i>Difficulty in both waves</i> <i>(ii)</i>
<b>Severe difficulty</b>		
<i>Ethiopia</i>		
All	1.72**	4.61***
Females	1.37	3.60*
Males	2.19***	7.92**
Age 15–49	1.11	4.90*
Age 50 and older	2.14***	4.69**
<i>Uganda</i>		
All	2.04**	3.47***
Females	2.11**	2.32
Males	1.63	6.10**
Age 15–49	0.86	3.31
Age 50 and older	3.08***	4.08**
<b>Any difficulty (moderate and severe)</b>		
<i>Ethiopia</i>		
All	1.13	2.99***
Females	1.14	2.39***
Males	1.11	5.40***
Age 15–49	0.86	1.78
Age 50 and older	1.44**	3.66***
<i>Uganda</i>		
All	0.77	2.67***
Females	0.63	2.38**
Males	0.94	3.32**
Age 15–49	0.56*	2.16*
Age 50 and older	1.25	2.37*

*Notes* Diff. stands for difficulty. Each estimated coefficient is from a separate logistic regression as explained in Box 5. In column (i), the sample includes all individuals working in wave 1 and not reporting a functional difficulty in wave 1. In column (i), a difficulty in wave 2 only refers to: in the upper panel, among persons with no severe difficulty in wave 1, a new severe difficulty in wave 2; and in the lower panel, among persons with no difficulty in wave 1, a new moderate or severe difficulty in wave 2. In column (ii), the sample includes all individuals not working in wave 1 and reporting a functional difficulty in wave 1: no longer experiencing a severe difficulty in the upper panel and no longer experiencing any difficulty at all in the lower panel. \*\*\*significant at the 1% level, \*\*significant at the 5% level, \*significant at the 10% level

difficulty and rising odds of a work exit when individuals experience new severe difficulties in wave 2 (top panel). This result holds for the entire sample of workers and for older workers in both countries. For instance, for Ethiopia, having a new severe functional difficulty is associated with having 1.7 times higher odds of leaving work.

In contrast, for both countries, when all new functional difficulties, whether moderate or severe, are considered (bottom panel), no significant association is found for the entire sample and all subsamples except persons 50 and older in Ethiopia and persons 15–49 in Uganda.

Column (ii) assesses if changes in functional difficulties are associated with return to work among persons who did not work and had functional difficulties in wave 1. In both countries, no longer experiencing a functional difficulty in wave 2, whether of any degree or severe only, is significantly associated with higher odds of working in wave 2. For Uganda, persons who no longer experience a functional difficulty have odds of working in wave 2 that are 2.7 times higher than persons who still have a functional difficulty.

Does this model identify the causal impact of functional difficulties on work? Compared to the regression models used in Chapter 5 (Table 5.4), the model of Box 5 removes the potential bias of omitted variables associated with time-invariant characteristics (e.g., personality traits such as low self-esteem) that may be correlated with both economic outcomes on the one hand, and reports of functional difficulties, on the other. However, there is still the possibility that these estimates are biased by other factors that change over time, affect both functional difficulties and work status and are not measured here (e.g., exposure to violence). In addition, in each wave, the data on functional difficulties and work were collected at the same time. In other words, in column (i), the new functional difficulty and work exits are observed at the same time in wave 2, and there is no indication of which one preceded the other. Hence, although it is plausible that this temporal association reflects a mechanism whereby functional difficulties impact work status, these results cannot for certain establish a causal link from functional difficulties to work status. More econometric research and qualitative research are needed to isolate and demonstrate the causal links between functional difficulties and work in the context of LICs. Longitudinal datasets that follow individuals over longer periods of time and for more than two waves would help further research in this field.

Nonetheless, these results offer suggestive evidence that functional difficulties may have a negative economic impact through work. New functional difficulties are associated with lower odds of work and no longer reporting difficulties comes with higher odds of return to work in the short term. These findings have implications for public policy. There may be a need for rehabilitation services in an LMIC context to assist people continue working or return to work following the onset of a health deprivation. The availability of vocational rehabilitation services in an LMIC context is limited (WHO–World Bank 2011). In some LMICs, there are programs focused on those injured in the workplace (e.g., Malaysia). In more and more LMICs, there are community-based rehabilitation programs, the efficacy of which is often not evaluated (WHO–World Bank 2011; Mitra et al. 2014). Exceptions are some studies reviewed by Sharma (2007) and recently Mauro et al. (2014, 2015).

### 6.3 FUNCTIONAL DIFFICULTIES AND MORTALITY WITHIN 2 YEARS

LICs have the highest adult mortality rates in the world (Rajaratnam et al. 2010), and reducing premature adult mortality rates is fundamental to improve wellbeing and to promote sustainable development. Yet data on adult mortality is severely lacking in LICs, as they often do not have vital registry systems. Population-based surveys can offer a way of assessing the overall health of a population (e.g., Rathod et al. 2016).

The objective of this section is to use longitudinal population-level data on mortality collected as part of the LSMS in Ethiopia, Malawi, Tanzania, and Uganda to investigate the association between functional difficulty, on the one hand, and short term mortality, on the other. If important associations are found, then functional difficulty indicators may be considered as potential indicators of vulnerability to mortality for policy purposes.

#### 6.3.1 *Methodology*

Mortality data was collected as part of the four longitudinal LSMS surveys described in Chapter 3. During a household revisit, the household respondent was asked about each member of the household who was listed as member of the household during the prior wave. In case a member is no longer a part of the household, the household respondent

was asked why the person is no longer a member and death is one of the possible reasons listed in the questionnaire. While this survey-based data may provide useful insights, it is limited in that the death cannot be verified and the cause and timing of death are also not known. Certain stigmatized causes of death such as HIV/AIDS may lead to death under-reporting. In the four countries under study, and especially in Malawi, it is likely that HIV/AIDS is a significant cause of death. This section uses a lagged model that exploits the longitudinal data as shown in Box 6.

**Box 6: Lagged logistic model of mortality**

A logistic regression is run as follows:

$$Mortality_{i,t+1} = \alpha + \beta_1 Severe_{i,t} + \beta_2 Moderate_{i,t} + \sum_k \gamma_k x_{i,t,k} + \delta z_{i,j,t} + \varepsilon_{i,t} \quad (6.3)$$

where

- $Mortality_{i,t+1}$  is a variable indicating if individual  $i$  interviewed in initial wave  $t$  died by wave  $t+1$  two years later (1 if dead, 0 otherwise).
- $\alpha$  is the intercept;
- $Severe_{i,t}$  is a variable equal to 1 if the individual  $i$  had a severe functional difficulty in the initial wave  $t$ , 0 otherwise;
- $Moderate_{i,t}$  is a dummy variable equal to 1 if the individual  $i$  had a moderate functional difficulty in initial wave  $t$ , 0 otherwise;
- $\beta_1$  and  $\beta_2$  are the coefficient of the functional difficulty variables, to be estimated;  
They are the coefficients of interest, and their values are reported for each country in Table 6.5.
- $x_{i,t,k}$  is a set of  $k$  control variables for personal factors (age categories, male) and structural factors (being married, being the household head, having a mother with no prior schooling, household size, distance to healthcare services.<sup>4</sup>)
- $\gamma_k$  are the estimated coefficients for the set of  $k$  control variables.
- $z_{i,j,t}$  is a binary variable indicating if the person's household is in the bottom quintile based on the asset index described in Chapter 5.
- $\delta$  is the estimated coefficient for  $z_{i,j,t}$ .
- $\varepsilon_{i,t}$  is the error term for person  $i$ .



In a variant of (6.3), the functional difficulty variables are replaced by the functional score defined earlier in Chapter 3. Results are also reported in Table 6.5.

### 6.3.2 Results and Discussion

Adult mortality rates are presented in Table 6.4. They range from a low of 12.4/1000 persons in Uganda to a high of 29/1000 persons in Malawi. In all four countries, men have higher mortality rates than women. Mortality rates are consistent with rates found from other population-based surveys in LICs in Africa.<sup>5</sup> Malawi's mortality rates stand at more than twice those of Ethiopia, Tanzania, and Uganda, which may be due in part of the higher prevalence of HIV/AIDS in Malawi.

Descriptive statistics for the entire sample and the subsamples of persons who died are in Appendix A8. Entire samples have a mean age of about 34 years and mostly include rural residents. As expected, compared with the entire sample, persons who have died were older, more likely to report a functional difficulty and to have fewer assets in the prior wave.

Table 6.5 reports results of the model of Box 6. It gives the odds of dying in the short run, given a functional difficulty (or a functional score value) in the prior wave. Results are given separately by sex and age group. Severe functional difficulties and the functional score are significantly and positively associated with short-term mortality in all four countries for men and women, for people younger or older than 50. For example, in Tanzania,

**Table 6.4** Rates of mortality within two years among adults (deaths/1000)

	<i>Ethiopia</i>	<i>Malawi</i>	<i>Tanzania</i>	<i>Uganda</i>
All adults	13.4	29	12.7	12.4
Men	16.2	31.3	15.5	14.7
Women	10.6	26.7	10.2	10.2
Adults younger than 50	7.4	17.1	8	6
Adults 50 and older	40.3	85.4	32.7	43.1

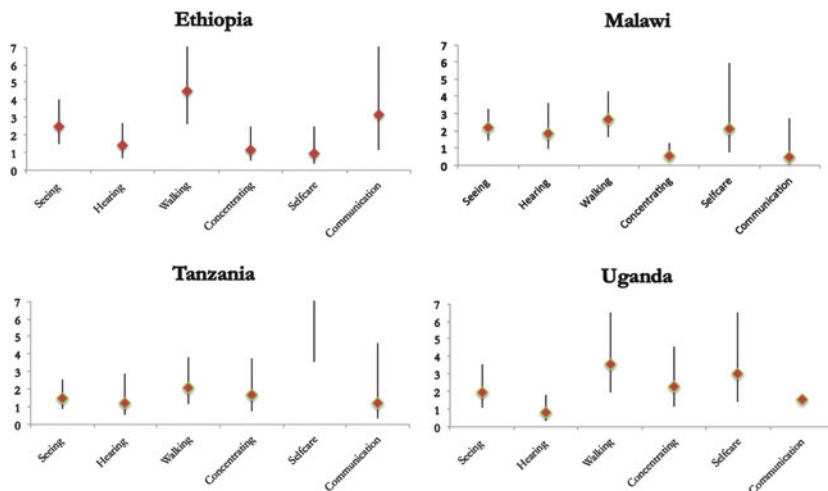
*Sources* Author's calculations using Ethiopia Rural Socioeconomic Survey (2011/2012, 2013/2014), Malawi Integrated Household Survey (2010/2011, 2012/2013), Tanzania National Panel Survey (2010/2011, 2012/2013) and Uganda National Panel Survey (2009/2010, 2011). *Note* Estimates are weighted

**Table 6.5** Odds ratio of short term death by functional difficulty status

	<i>Ethiopia</i>	<i>Malawi</i>	<i>Tanzania</i>	<i>Uganda</i>
<b>Men</b>				
Moderate functional difficulty	2.53***	2.13***	1.82*	1.71
Severe functional difficulty	13.86***	8.98***	6.18***	9.23***
Functional difficulty score	8.07***	10.37***	6.81***	7.69***
<b>Women</b>				
Moderate functional difficulty	2.84**	2.55***	2.52**	7.62***
Severe functional difficulty	10.79***	2.99**	9.99***	26.44***
Functional difficulty score	7.97***	5.37***	7.89***	8.70***
<b>Younger than 50</b>				
Moderate functional difficulty	2.49**	1.21	3.13***	2.55**
Severe functional difficulty	9.90***	6.79***	7.26***	8.75***
Functional difficulty score	9.59***	7.67***	10.12***	6.65***
<b>50 and older</b>				
Moderate functional difficulty	1.39	1.45	1.01	1.39
Severe functional difficulty	7.05**	2.28**	4.28***	5.64***
Functional difficulty score	5.99**	3.46***	5.36***	5.75***

*Sources* Author's calculations using Ethiopia Rural Socioeconomic Survey (2011/2012, 2013/2014), Malawi Integrated Household Survey (2010/2011, 2012/2013), Tanzania National Panel Survey (2010/2011, 2012/2013) and Uganda National Panel Survey (2009/2010, 2011). *Notes* For each country, two logistic regressions are run. For the first one, the coefficients of moderate difficulty and severe difficulty dummies are reported on separate rows (no functional difficulty is the reference category). For the second one, the coefficient of the functional difficulty score (marginal effect) is reported. Coefficients are odds ratios. \*\*\*significant at the 1% level, \*\*significant at the 5% level, \*significant at the 10% level. The regression controls are as follows: age, sex (for the sub sample by age), being married, having a mother with no prior schooling, household asset bottom quintile, being the household head, household size, distance to healthcare services and rural. For Tanzania, data was missing for distance to healthcare services for a sizeable share of the sample, community fixed effects were thus used instead

the odds ratios of dying within two years for a woman with a severe functional difficulty are 9.99 times those of a woman with no functional difficulty, everything else held constant. For moderate functional difficulties, an association is found for women in the four countries and for people younger than 50 in three out of four countries. Across all countries and subgroups, a 1% increase in the functional score increases the odds of dying by 5 to 10%.



**Fig. 6.2** Odds ratio of death within two years by functional difficulty type (any degree) in wave 1.

*Note:* The estimated odds ratio for selfcare in Tanzania stands at 7.74 and is not shown in the graph

This model is also used by replacing the severe and moderate functional difficulty variables with the type of functional difficulty the person experienced in the initial wave. Results are presented in Fig. 6.2. It plots the odds ratios of death within two years given functional difficulty types (e.g., seeing) in the initial wave and their confidence intervals. A lower bound of the confidence interval above one indicates significantly higher odds of experiencing death within two years compared to a person without this functional difficulty type, everything else held constant. Only one type of functional difficulty, walking, is consistently and significantly associated with higher odds of death in all countries. Having a seeing difficulty is associated with higher odds of death in three countries (Ethiopia, Malawi, and Uganda). There is an association for Selfcare in two countries (Tanzania and Uganda), for communication in Ethiopia and concentrating in Uganda, and none for hearing. Similar results were reached when the analysis was restricted to severe functional difficulties (Appendix A9).<sup>6</sup>

Of course, this model is unable to determine a causal relationship from functional difficulties to mortality. It only points at an association.

Despite this caveat, the results have noteworthy implications. The association between functional difficulties and mortality in the short term has implications for research on disability and poverty. The association between disability and economic inequalities measured at a given point in time as done earlier in Chapter 5 may be affected by a disproportionate risk of mortality associated with disability in the context of LICs. It is therefore possible that due to mortality, the association between disability and poverty using survey data at one point in time may underestimate the true extent of the association between disability and poverty given the disproportionate risk of mortality among the poor with disabilities. Further research is needed on the links between disability, poverty, and mortality.

More broadly, persons with functional difficulties experience higher odds of mortality in the short term. This should be taken into account in policies and programs aimed at reducing mortality among adults, including premature mortality. Functional difficulties may be part of, or linked to, determinants of premature mortality, and yet they are not part of initiatives such as the  $25 \times 25$  initiative signed by WHO members states in 2011 to cut mortality due to noncommunicable diseases by 25% by 2025 (WHO 2013).

## 6.4 CONCLUSION: SUMMARY AND IMPLICATIONS

This chapter uses longitudinal data for Ethiopia, Malawi, Tanzania, and Uganda to assess some potential dynamic links between functional difficulties and wellbeing.

1. The functional difficulty trajectories of individuals are significantly associated with different levels of wellbeing. Persons with persistent functional difficulties are worse off than persons with functional difficulties in only one wave, who are in turn worse off than persons with no functional limitation in any wave.
2. Among persons with functional difficulties, older persons, older women and persons experiencing persistent severe difficulties tend to be the groups the most multidimensionally poor. Longitudinal data collection and monitoring of functional difficulties and wellbeing outcomes are needed to identify the trajectory

of functional difficulties and vulnerable groups. This is required for policies and programs that aim to reduce extreme poverty in general and to target vulnerable groups in particular.

3. No significant association was found between changes in functional status and changes in assets/living conditions in the short term.
4. New functional difficulties lower the odds to continue working, and no longer reporting functional difficulties increases the odds of returning to work.

These findings suggest that there may be a causal link from functional difficulties to work status.

These findings, together with the consistent and strong association between functional difficulties and work outcomes found in Chapter 5, suggest that there may be a need for rehabilitation services in an LMIC context to assist people to continue working or return to work following the onset of a health deprivation.

5. Functional difficulties are consistently found to be associated with mortality in the short term.

More attention is needed to functional difficulties as potential determinants of mortality, including premature mortality. More research is also needed on the links between disability, poverty, and mortality as excess mortality may reduce the association between disability and poverty in LICs.

## NOTES

1. Attrition was very limited for both datasets.
2.  $M_0$  is explained earlier in Chapter 5.
3. Groups could not be further disaggregated due to small sample sizes: for instance, the sample could not be disaggregated by age, sex, trajectory *and* severity.
4. Descriptive statistics are in Table 4.4.
5. For instance, for Zambia, Rathod et al. (2016) find a mortality rate of 16.2/1000 for men and 12.3/1000 for women.
6. Given the association between functional difficulties and resources, especially asset ownership, the model is also run without economic quintile as a control. Results were overall similar for the functional difficulty/score variables.

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