CSAE WPS/2008-01

Subjective well-being, disability and adaptation: A case study from rural Ethiopia

Marcel Fafchamps
Oxford University

Bereket Kebede
University of East Anglia

8.1. Introduction

In many developing countries poor infrastructure – including sanitation and health facilities – exposes the population to high risks of disability. Low standards of health and safety at work and at home, coupled with political, ethnic, and domestic violence, also contribute to raising the risk of becoming physically disabled. The effect of physical disability on people's lives is likely to be worse than in developed economies because of the reliance on physical labour for income generation – for example, in farming. Higher levels of national income and technological capability may also enable societies to make the investments required to enable disabled individuals to be productively employed. Finally, since formal social insurance is usually lacking in developing countries, the effect of disability on welfare is expected to be higher as disabled people must rely on social networks that have limited capacity to pool risks (Fafchamps and Lund, 2003).

However there are also factors that tend to lower the proportion of disabled individuals in poor societies. The first one is lower life expectancy. In developed economies, the incidence of disability typically increases with age (e.g., loss of eyesight and hearing, paralysis due to stroke). This means that, other things being equal, populations with a larger proportion of elderly people have a larger proportion of disabled individuals. Put differently, many people in poor rural economies do not live long enough to become disabled. The second reason is that disability may have such dire consequences in terms of lost income and lack of support that disabled individuals have a much shorter life expectancy than they would have in a developed economy. If this is the case, the proportion of disabled individuals in the population may be low even though the risk of disability is high.

In spite of the fact that disability is an important welfare concern, socio-economic studies on the effect of disability in developing countries are few in number. This chapter seeks to fill this gap by documenting the incidence of different forms of disabilities in rural Ethiopia. Using cross-sectional data from the Ethiopian Rural Household Survey collected in 2004, we examine the relationship between disability and welfare as captured by subjective well-being and self-reported wealth ranking questions. In particular, we test whether the negative effect of disability on welfare decreases over time. If it does, this would suggest that over time people adapt to disability. We also investigate whether the negative effect of disability on subjective well-being operates primarily through reduced material welfare.

Empirical results indicate that, as expected, disability has a significant negative impact on welfare. This is true whether the person who answered the subjective well-being question herself is disabled, or whether the disabled person is another member of

the household. Even though we find some weak indication of adaptation with respect to specific forms of disabilities, the overall weight of empirical results suggests little adaptation: disability is associated with a lower subjective well-being irrespective of the time elapsed since the onset of the disability. We also find that, in the studied population, disability is associated with significantly lower material welfare. This lower material welfare is the main channel through which disability reduces subjective well-being.

These findings stand in contrast with the psychology literature which has found that, in developed economies, the negative effect of well-being on subjective welfare becomes attenuated over time. But they are consistent with the local context: in an economy where there is no social protection against disability and where production depends on physical labour, disabled individuals are less able to contribute to household income, and this permanently reduces the household's material welfare. This explains why the negative effect of disability on well-being is shared by all household members, whether or not they are themselves disabled.

We should stress that, since we only have cross-section data, we cannot control for unobserved heterogeneity. In particular we cannot entirely eliminate the possibility that the relationship between material poverty and disability results from poor households having a higher risk of disability. We also cannot control for selectivity, that is, the possibility that a number disabled individuals are not observed in our data either because they left the household – e.g., to become beggars – or because they died prematurely as a result of abandonment or neglect (e.g., Miguel (2005). If this were the case, our results would underestimate the incidence of disability. To the extent that poor households are less able to care for disabled individuals, selectivity bias would affect poor households more, which means that the relationship between disability and material poverty may even be stronger than suggested by our results. To disentangle these issues longitudinal data on well-being and disability is necessary. The evidence presented here is nevertheless sufficiently strong to suggest that such longitudinal data should be collected.

This chapter is structured in the following way. The next section briefly discusses the link between welfare, disability, and adaptation in general, and posits the adaptation hypothesis that is pursued in the empirical part of the chapter. Section 8.3 presents the survey from which the data are sourced and reports a number of descriptive results on the distribution of subjective well-being and disability as captured by the data. Section 8.4 presents the different tests for the existence of adaptation among households with disabled people in rural areas of Ethiopia. In Section 8.5 we investigate the relationship between disability and material welfare. Section 8.6 provides the conclusions.

8.2. Welfare, disability and adaptation

Generally we expect a positive relationship between material conditions of life and subjective well-being; but this doesn't imply a one-to-one mapping between the two. Some individuals with positive material conditions may have negative subjective well-being (dissonance or dissatisfaction-dilemma) and others with negative material conditions may have positive subjective well-being (adaptation or satisfaction-paradox)(see Olson and Schober, 1993). Dominant models of subjective well-being argue that people can adapt to almost any life event including disability; this is termed hedonic adaptation in the literature (Lucas, 2007; Diener et al., 2006). With complete

adaptation people will go back to pre-disability levels of welfare after an adaptation period. Many defend this adaptation hypothesis arguing that subjective well-being (happiness) levels essentially fluctuate around a biologically determined set point that doesn't change much (Oswald and Powdthavee, 2006; Lucas, 2007). This argument is supported by many studies that show personality traits of individuals accounting for a significant proportion of the variance in happiness measures (see Ed Diener et al., 1999). People in poor living conditions may not have low subjective well-being if other social relationships compensate for their material deprivation (Biswas-Diener and Diener, 2001; Biswas-Diener and Diener, 2006). But there are also other studies that contradict the adaptation hypothesis. For example, using lifetime data for the US Easterlin (2006) found evidence contradicting both the mainstream economics view that happiness depends on objective conditions and the adaptation hypothesis.

Recent work on the link between welfare and disabilities using large-scale panel data indicate some results at least partly contradicting the hedonic adaptation hypothesis. For example, the studies show that long-term levels of subjective well-being change and that adaptation is not inevitable. Whether or not people adapt and revert back to their initial welfare levels and how fast they adapt differs for different types of events. In addition, there is a lot of heterogeneity in adaptation among individuals some adapting quickly and others slowly (Lucas, 2007).

Following Oswald and Powdthavee (2006) the adaptation idea can be presented in the following way. Suppose utility is represented by a simple separable function

$$V = v(y) + h$$

where $v(.)$ is increasing and concave in household income, y, and h is a measure of health. After a disability at time T, welfare decreases to

$$V = v(z) + h - D$$

where D is the disutility from disability and z represents post-disability income (may include transfers). To capture the idea of adaptation define a habituation function

$$D = D(t - T)$$

with t representing the current time period. If there is adaptation the first derivative of the function $D(.)$ becomes negative. This implies that with a longer duration of disability its effect on welfare decreases. This idea is the basis for the empirical tests conducted in section 8.4. Before that the data and descriptive results are presented.

8.3. The data

This chapter uses data from the sixth round of the Ethiopia Rural Household Survey (ERHS) conducted by the Department of Economics of Addis Ababa University, the International Food Policy Research Institute (IFPRI) and the Centre for the Study of African Economies (CSAE) of Oxford University in 2004. The sixth round is a

continuation of previous rounds that covered around 1,500 households in fifteen villages (peasant associations) dispersed over the main settled agricultural areas of Ethiopia.

In addition to comprehensive data on the socio-economic status of households, the sixth round of the ERHS gathered information on disabilities and subjective well-being. The disability module collected fairly detailed information on various forms of physical disability for all household members. The subjective well-being questions were typically asked to the head of household and his or her spouse. For some households, only one spouse was interviewed – because the other spouse was absent or the respondent was not married – in which case we have a single response for the household. Neither module was included in earlier survey rounds. This forces us to use cross sectional analysis with the usual limitations.

The disability module asked specific questions capturing problems in hearing, speaking, sight, loss of limbs and paralysis. Information was collected on all household members, together with data on the relative severity of the disability. **Table 8.1** summarises the types and degrees of disabilities in our sample. In all cases, less than 7% of individuals are reported to have any of the disabilities covered by the survey. Since the data cover all age groups, we see that disability rates are relatively low, given the level of poverty characteristic of rural Ethiopia and the endemic character of many debilitating diseases. We also have to keep in mind that disability rates are influenced by the proportion of elderly individuals in the sample since the prevalence of disability is higher among older people. For example, in our sample the percentage of individuals with no eye sight problems drops from 93.66% to 86.94% among people over 50 years of age.

To compare the figures with disability rates in rich countries, the incidence of disability in the US for 2005 is given in Appendix 8.1. The table reports rates of sensory and physical disability for different age groups disaggregated by sex. As can be observed from the table, the incidence of disability in the US significantly increases with age from below 2% for children to more than 16% and 30% for those older than 65 for sensory and physical disabilities respectively. To get comparable figures for Ethiopia, we summed the percentages of individuals in our sample with difficulties in hearing, speaking and sight for the incidence of sensory disability (10.80%) and that of loss of limbs and paralysis for physical disability (3.86%). The surveys in Ethiopia may not have covered all sensory and physical disabilities as the US census did, and hence the figures for Ethiopia probably underestimate the incidence of disability. For the US the corresponding weighted rates – population shares used as weights – for the population older than 5 years are 4.30% and 9.27% respectively. These average figures imply very high rates of sensory disability in Ethiopia as compared to the US. Due to longer life expectancy a significant proportion of the population in the US is older than 65 years and hence the higher rate of physical disability is not surprising.

Table 8.2 disaggregates disability rates across survey villages. As the chi-square statistics in the last row of the table indicate, disability rates differ significantly across villages. A closer examination of the figures further reveals a highly heterogeneous distribution of disability rates. The relative prosperity of a village is not a good predictor of the incidence of disability. For example, relatively prosperous villages like Yetmen, Debre Berhan and Sirbana Godeti have high disability rates in many cases. In contrast, a

poor village like Domaa has one of the lowest incidences of disability, being less than the average for all disability types.

We also find significant differences between villages located near to each other. For example, the four villages around Debre Berhan (abbreviated to DB in the table) are located in near proximity to each other but have disability rates that are significantly different. Similarly, Haresaw and Geblen have very different rates in spite of the fact that they are quite near to each other compared to other sites. These results suggest a significant amount of unexplained heterogeneity in disability across villages.

Table 8.1: Types and degrees of disability of individuals in surveyed households

	Frequency	% of pop.	% of disabled
Difficulty with hearing			
No problems	6,086	96.33%	
Sometimes has difficulty	151	2.39%	65%
Generally poor hearing	59	0.93%	25%
Deaf in one ear	13	0.21%	6%
Deaf in both ears	9	0.14%	4%
Difficulty with speaking			
No problems	6,267	99.15%	
Sometimes has difficulty	33	0.52%	61%
Generally has difficulty	7	0.11%	13%
Hardly speaks	5	0.08%	9%
Cannot speak at all	9	0.14%	17%
Difficulty with eyesight			
No problems	5,899	93.66%	
Seeing things close	137	2.18%	34%
Seeing things far away	93	1.48%	23%
Generally poor eyesight	103	1.64%	26%
Cannot see at night	18	0.29%	5%
Blind in one eye	27	0.43%	7%
Blind in both eyes	15	0.24%	4%
Others	1	0.02%	0%

	Freq.	% of pop.	% of disabled
Loss of limb			
None	6,133	97.97%	
Finger	42	0.67%	33%
Hand	48	0.77%	38%
Arm	2	0.03%	2%
Toes	1	0.02%	1%
Foot	17	0.27%	13%
Leg	11	0.18%	9%
Jaw	3	0.05%	2%
Part/whole face	1	0.02%	1%
Others	2	0.04%	2%
Paralysis			
None	6,068	98.19%	
Finger	34	0.55%	30%
Hand	29	0.47%	26%
Arm	2	0.03%	2%
Foot	4	0.06%	4%
Leg	22	0.36%	20%
Back	1	0.02%	1%
From hips down	2	0.03%	2%
From neck down	2	0.03%	2%
Left side body	1	0.02%	1%
Right side body	3	0.05%	3%
Whole body	7	0.11%	6%
Others	5	0.08%	4%

Table 8.2: Number and percentage of people with at least minor disabilities by survey villages

Village	Hearing		Speaking		Eyesight		Loss of limb		Paralysis	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Haresaw	10	2.46	3	0.74	16	3.93	9	2.21	3	0.74
Geblen	14	4.86	7	2.43	23	7.99	2	0.69	1	0.35
Dinki	17	5.56	1	0.33	19	6.21	6	1.96	3	0.98
Yetmen	11	3.90	7	2.48	21	7.45	13	4.61	11	3.90
Shumsha	29	5.39	13	2.42	47	8.74	11	2.04	3	0.56
S. Godeti	11	2.93	2	0.53	30	8.00	22	5.87	23	6.13
Adele Keke	10	2.13	0	0.00	12	2.55	2	0.43	4	0.85
Korodegaga	14	2.80	2	0.40	25	5.00	2	0.40	1	0.20
T. Ketchem	18	3.37	4	0.75	38	7.12	19	3.56	19	3.56
Imdibir	11	3.43	1	0.31	23	7.17	0	0.00	0	0.00
Aze Deboa	19	3.51	0	0.00	50	9.23	10	1.85	3	0.55
Adado	26	3.87	2	0.30	23	3.43	11	1.64	16	2.38
Gara Godo	21	4.26	5	1.01	27	5.48	11	2.23	7	1.42
Domaa	4	1.31	2	0.66	1	0.33	2	0.66	1	0.33
DB-Milki	5	1.83	1	0.37	10	3.66	4	1.47	1	0.37
DB-Kormar	3	1.06	3	1.06	11	3.89	2	0.71	1	0.35
DB-Karafin	7	3.95	1	0.56	8	4.52	1	0.56	0	0.00
DB-Bokafia	2	1.64	0	0.00	15	12.30	0	0.00	6	4.92
Total	232	3.37	54	0.78	399	5.79	127	1.84	103	1.50
	stat	prob	stat	prob	stat	prob	stat	prob	stat	prob
Chi2	31.10	0.02	54.33	0.00	80.44	0.00	82.75	0.00	128.03	0.00

Note: Percentages refer to the proportion of disabled individuals among surveyed individuals in each village.

The survey respondent and his or her spouse (if present) were asked two questions that we use as indicators of subjective well-being. The first question is: "Taken all together, how would you say things are for you these days: would you say you are:

0. Not too happy."
1. Pretty happy
2. Very happy

The second question is worded as follows: "Suppose we say that the top of a ladder represents the best possible life for you and the bottom represents the worst possible life for you. Where on the ladder do you feel you personally stand at the present time?" Respondents were asked to give a number between 0 and 10, with 0 the worst and 10 the best possible life. **Most** of the responses concentrate around mid-values. Close to 80% of respondents put their life on or below 5 on the 'ladder' question. This reflects the low standard of living as perceived by surveyed individuals. Two thirds of the respondents, however, are either pretty happy or very happy. This is not an uncommon finding and has often been interpreted as a sign of adaptation to low levels of income.

Table 8.3 presents the frequency distribution of responses from both spouses to both subjective well-being questions.

Most of the responses concentrate around mid-values. Close to 80% of respondents put their life on or below 5 on the 'ladder' question. This reflects the low standard of living as perceived by surveyed individuals. Two thirds of the respondents, however, are either pretty happy or very happy. This is not an uncommon finding and has often been interpreted as a sign of adaptation to low levels of income.

Table 8.3: Distribution of responses to two subjective well-being questions

First subjective well-being question ('happiness')			
	Frequency	%	Cum. %
Not too happy	773	33.7%	33.7%
Pretty happy	1,239	54.0%	87.8%
Very happy	281	12.3%	100.0%

Second subjective well-being question ('ladder')			
	Frequency	%	Cum. %
Worst life	24	1.1%	1.1%
1	82	3.6%	4.6%
2	209	9.1%	13.7%
3	358	15.6%	29.4%
4	424	18.5%	47.8%
5	694	30.3%	78.1%
6	246	10.7%	88.8%
7	129	5.6%	94.5%
8	86	3.8%	98.2%
9	31	1.4%	99.6%
Best life	10	0.4%	100.0%

In addition to the above subjective well-being questions, the survey also collected information on related perception of individuals about their relative and absolute wealth ranking in the village. This additional information provides a useful comparison to ascertain whether the subjective well-being measures are related to material welfare. We expect subjective well-being to be positively correlated to perceptions of relative and absolute wealth.

Two questions were asked. The first asks where individuals perceive their household stands vis-à-vis the community. It is worded as: "Compared to other households in this village, how would you describe your household:"

1. The richest in the village
2. Amongst the richest in the village
3. Richer than most households
4. About average
5. A little poorer than most households
6. Amongst the poorest in the village
7. The poorest in the village"

The second question asks the household about its absolute economic position: "Just thinking about your own household circumstances, would you describe your household

1. Very rich
2. Rich
3. Comfortable
4. Can manage to get by
5. Never have quite enough
6. Poor
7. Destitute"

To see the correlation between subjective well-being and the above two, Spearman correlation coefficients are calculated. The coefficients for the 'happiness' question are -0.4302 (p=0.00) for relative wealth ranking and -0.4706 (p=0.00) for absolute wealth ranking; the corresponding coefficients for the 'ladder' question are -0.6071 (p=0.00) and -0.6008 (p=0.00) respectively. Note that in the subjective well-being questions higher numbers represent higher levels of happiness but in the welfare perceptions higher numbers represent lower levels of wealth. Hence, these results indicate a strong and significant positive correlation between subjective well-being and self-reported wealth ranking in the villages.

6.4. Econometric analysis

We now turn to the link between subjective well-being and disability and investigate the data for any evidence of adaptation. As described in the previous section, two subjective well-being questions were asked to respondents. The two measures capture similar concepts of general satisfaction with life. In particular, they have a Spearman correlation coefficient of 0.3811, which is highly significant. To increase estimation efficiency, we combine the two separate measures into a single index. Because the 'happiness' question only takes three values, we first multiply it by 5 to obtain a variance similar to that of the 'ladder' question. The combined index therefore ranges between 0 and 20.

Two indicator variables are used in relation to disability. The first one indicates if there is at least one disabled individual in the household. For our first pass at the data, we include all cases of disability – minor as well as major – when creating this indicator variable. Individuals with no disability count as zero and all those with a slight or serious disability count as one.

The second indicator variable captures whether the disabled individuals are the respondent or his spouse – in which case the disabled individuals are also those who responded to the subjective well-being questions. One would indeed expect the subjective well-being of individuals to be affected more by their own disability than by that of other household members. In addition to the above two indicator variables, years of disability are included as well. As discussed in section 8.2, the adaptation hypothesis predicts that the disutility from disability should fall with duration of disability.

To avoid drawing spurious inference, we need to control for individual characteristics – such as age and gender – that are likely to affect subjective well-being

and may be correlated with disability. To control for social integration in the local community, we include an indicator variable that identifies whether the respondent was born in the village.

The combined subjective well-being indicator is censored from both below and above – at 0 and 20 respectively. To account for this censoring, we use a two-sided tobit estimator. Since we have two observations for some of the households, we control for household level random effects. We cannot control for household fixed effects because our main variables of interest, the disability variables, are fixed for the household – and thus would be wiped out by fixed effects estimation. In addition, dummy variables for survey sites are included to account for village level fixed characteristics.

We begin by regressing the combined subjective well-being indicator on the incidence of disability in the household and on the respondent's individual characteristics. We do so for each form of disability separately. An alternative would have been to include all disabilities in the same regression. Unfortunately, multicollinearity creates a problem because some of the disabilities are correlated with each other. For the sake of comparison, we have included the results from the pooled estimation in Appendix 8.2. The results presented there do not contradict the main conclusions from the separate regressions presented in **Table 8.4** below, but more difficult to interpret.

Table 8.4: Household random effects regressions of subjective well-being on disability

	Hearing	Speaking	Eyesight	Loss of limb	Paralysis
Male	-5.054	-5.165	-4.902	-5.198	-5.167
	(19.58)***	(19.75)***	(19.20)***	(19.86)***	(19.80)***
Age	2.724	2.322	2.928	2.283	2.381
	(6.25)***	(5.38)***	(6.71)***	(5.30)***	(5.50)***
Born in village	-0.579	-0.588	-0.566	-0.560	-0.562
	(2.04)**	(2.05)**	(2.02)**	(1.96)*	(1.96)**
Disabled	-3.946	-2.395	-4.794	-3.681	-2.987
	(7.42)***	(2.30)**	(9.51)***	(3.85)***	(2.94)***
Self disabled	0.272	-0.557	0.147	2.371	0.033
	(0.39)	(0.28)	(0.26)	(2.00)**	(0.02)
Yrs of disability	0.429	-0.001	0.761	0.286	0.142
	(2.40)**	(0.01)	(4.55)***	(1.04)	(0.56)
Dummy variables for villages entered but not reported here					
Constant	5.078	6.433	4.276	6.542	6.148
	(2.92)***	(3.72)***	(2.46)**	(3.79)***	(3.55)***
No. of obs	2330	2330	2330	2330	2330
No. of hhs.	1175	1175	1175	1175	1175
Wald chi2	685.08***	609.47***	755.47***	618.13***	617.81***
Rho	0.15	0.14	0.16	0.14	0.14
sigma_u=0	133.61***	146.83***	122.00***	145.72***	144.69***

Note: Absolute value of z statistics in parentheses; all continuous variables in natural logs; * significant at 10%; ** significant at 5%; *** significant at 1%

From Table 8.4 we see that males and people that are born in the village report lower levels of subjective well-being compared to females and those born outside the

village. Older people are happier compared to younger ones. These three findings are highly significant across all the five regressions.

As expected, individuals living in households with at least one disabled person – whatever the disability – have lower levels of subjective well-being compared to those households without disabled people. Surprisingly, whether the disability is suffered by oneself or another member of the household doesn't seem to affect subjective well-being: four out of the five coefficients on the variable 'self disabled' are not significant. In fact, in the case of loss of limb, those respondents with the disability seem to have *higher* levels of subjective well-being. This is contrary to expectations.

The results are mixed for the main variable of interest, years of disability. If there is adaptation, those households who have experienced disability for a longer period should have higher levels of subjective well-being than those who experienced disability recently. This is supported by the years of disability coefficients in the hearing and eyesight regressions. But in the case of the other three disabilities, the coefficients are not significant.[1]

In the regressions so far, we have not taken into account whether the disability is slight or severe. This could influence our results. For example, if people adapt to more serious disabilities over time but not to minor disabilities, the latter may dominate the former and the regressions will not be able to identify the effect of adaptation.

To examine this further, we re-estimate the regressions with the same controls as above but the disability variables now represent only households with more severe disabilities. For example, in the case of hearing impairment, 'sometimes has hearing difficulty' is left out while 'generally poor hearing', 'deaf in one ears', and 'deaf in both ears' are taken as more serious forms of hearing disability.

The results from the regressions on severe disability are given in **Table 8.5**. None of the coefficients on years of disability is significant. Coupled with the mixed results from Table 8.4, these findings cast doubt on the adaptation hypothesis in the case of physical disability in rural Ethiopia.

We also find that the effects of self-disability on subjective well-being are now significant and negative in three of the five regressions. This suggests that, in the case of severe disability, respondents care whether they or others are disabled. The sign and significance of other regressors remain the same as in the previous regressions.

An alternative empirical strategy for examining the effect of years of disability and testing whether there is adaptation is to run the same regressions only on households with disabled people. Estimated coefficients capture the effects of years of disability conditional on being disabled. This helps to ascertain whether the results from the original regressions are contaminated by the inclusion of households without disabled persons: the number of years of disability for households without disabled people is zero, but it is also zero for those households that suffered disability in the year of the survey.

Table 8.6 presents the coefficients on (log) years of disability with number of observations and households for regressions of subjective well-being on all the variables included previously. Except for speaking disability, none of the coefficients on years of

[1] The coefficients in the pooled regression reported in Appendix 8.1 are also in line with these results except one. The coefficient on years of speaking disability becomes *negative* in contrast to a non-significant coefficient in the separate regression. The correlation between hearing and speaking disabilities is high – due to individuals who are deaf and mute – and this is probably the main reason for this result.

disability is significant. The coefficient for 'speaking disability' becomes significant only at 10% and has a sign contrary to that predicted by the adaptation hypothesis. These additional results thus also fail to support the adaptation hypothesis.

Table 8.5: Household random effects regressions of subjective well-being on severe disability

	Hearing	Speaking	Eyesight	Loss of limb	Paralysis
Male	-5.097	-5.170	-4.985	-5.172	-5.174
	(19.55)***	(19.76)***	(19.21)***	(19.71)***	(19.80)***
Age	2.574	2.313	2.865	2.276	2.383
	(5.91)***	(5.36)***	(6.54)***	(5.27)***	(5.51)***
Born in village	-0.579	-0.576	-0.590	-0.572	-0.560
	(2.02)**	(2.01)**	(2.08)**	(1.99)**	(1.95)*
Disabled	-2.214	-1.659	-2.375	3.576	-2.490
	(2.21)**	(1.10)	(3.26)***	(0.55)	(1.15)
Self disabled	-1.979	-1.870	-2.062	-0.578	-2.328
	(3.28)***	(1.04)	(4.42)***	(0.64)	(2.30)**
Years of disability	0.368	-0.799	0.288	-1.199	0.267
	(0.69)	(0.99)	(0.84)	(0.37)	(0.27)
Constant	5.473	6.456	4.426	6.534	6.151
	(3.14)***	(3.74)***	(2.53)**	(3.77)***	(3.55)***
No. of obs	2330	2330	2330	2330	2330
No. of hhs.	1175	1175	1175	1175	1175
Wald chi2	628.17***	609.90***	667.59***	601.03***	610.78***
Rho	0.14	0.14	0.15	0.14	0.14
sigma_u=0	140.58***	147.12***	134.43***	147.27***	144.07***

Note: Absolute value of z statistics in parentheses; all continuous variables in natural logs; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 8.6: Household random effects regression coefficients on (log) of years of disability from only households with disability

	Coefficient (z-statistics)	No. of observations	No. of households
Hearing disabilities	0.023		
	(0.09)	275	167
Speaking disabilities	-0.867		
	(1.68)*	51	30
Eyesight problems	0.127		
	(0.65)	428	263
Loss of limb	-0.501		
	(1.37)	96	55
Paralysis	-0.494		
	(1.37)	80	47

Note: Indicator variables for male, born in village, self-disabled and villages and age are included in estimation but not reported here; * significant at 10%

In Table 8.6 we conditioned the regressions on households having a disabled person. This means that we tested if years of disability affect subjective well-being conditional on being disabled. The reverse can also be used to test for adaptation: we can take disabled households with similar years of disability and compare them with households without disability. For instance, if we compare households who became disabled in the survey year (with zero year of disability) with households without disability, the decline associated with disability should reflect the immediate effect of disability on subjective well-being. By contrast, comparing households without disability to those with, say, five years of disability yields the effect of disability on subjective well-being after five years of adaptation. Comparing the two disability coefficients enables to ascertain whether the negative effect of disability falls over time. If the adaptation hypothesis holds, the fall in subjective well-being associated with disability should be less for those households with longer years of disability. **Table 8.7** presents the coefficients on the indicator variable 'disabled' for different groups of households categorised by years of disability. Since the number of observations varies for different forms of disability, we also vary the interval of years to get sufficient number of observations. Most of the disability coefficients are negative and significant. If the adaptation hypothesis holds, the disability coefficients should become smaller for longer years of disability. Except for loss of limb, we do not observe this pattern. For hearing, eyesight, and paralysis, no consistent pattern emerges. In the case of speaking disability, just the opposite happens: the decrease in subjective well-being is *higher* for households that have stayed longer with the disability.

Table 8.7: Coefficients on indicators of disabilities from household random effect tobit for different years of disabilities

		Hearing	Speaking	Eyesight	Loss of limb	Paralysis
Zero year	Coe	-3.3528	-1.9526	-4.5515	-3.3230	-2.4902
	St. err	0.8097***	1.4102	0.8450***	1.2650***	1.3147*
0<years≤5	Coe	-4.4670		-4.6948		
	St. err	0.8481***		0.9394***		
0<years≤10	Coe		-2.1007		-1.3857	
	St. err		2.0116		1.8884	
0<years≤20	Coe					-2.4606
	St. err					1.7331
5<years≤10	Coe	-5.5343		-4.3634		
	St. err	1.3894***		0.9772***		
10<years	Coe	-3.7625	-3.8270	-3.8071	-4.8034	
	St. err	1.1329***	2.1089*	1.0045***	1.7087	
20<years	Coe					-5.0708
	St. err					2.5168**

Note: * significant at 10%; ** significant at 5%; *** significant at 1%

Taken together, our results provide little evidence of adaptation to disability among rural Ethiopian households. Even though some of the results in relation to specific forms of disability from the different empirical specifications go with the predictions of

the adaptation hypothesis, they are not robust and the overall impression one gets is that there is little evidence to support it.

8.5. Disability and material welfare

The analysis we have conducted so far does not control for material welfare. Yet in the context of rural Ethiopia disability is likely to reduce the household's effective workforce and hence its income and wealth. To investigate this possibility, we regress the absolute and relative self-perceived wealth rankings reported by survey respondents on the same set of regressors as Table 8.4.

Results are presented in Tables 8.8 and 8.9. They confirm that, indeed, disability is associated with lower wealth, in the absolute as well as relative sense. The regression results also show that the wealth effect does not operate through disability of the respondent himself or herself – the self-disabled dummy is never significant. We do, however, find some evidence of adaptation for loss of hearing and eyesight: in both these cases, the negative association between disability and material welfare – as measured by self perceived wealth rankings – gets attenuated over time. We find a similar result for loss of limb, but only in the relative ranking regression (Table 8.9).

Table 8.8: Household random effects regressions of absolute wealth ranking

	Hearing	Speaking	Eyesight	Loss of limb	Paralysis
Male	-1.410	-1.432	-1.369	-1.432	-1.433
	(18.40)***	(18.61)***	(18.05)***	(18.58)***	(18.64)***
Age	0.751	0.680	0.835	0.670	0.694
	(6.33)***	(5.80)***	(7.04)***	(5.72)***	(5.90)***
Born in village	-0.226	-0.226	-0.227	-0.220	-0.221
	(2.81)***	(2.79)***	(2.86)***	(2.73)***	(2.73)***
Disabled	-0.848	-0.579	-1.188	-0.679	-0.612
	(5.80)***	(2.04)**	(8.58)***	(2.57)**	(2.20)**
Self disabled	0.149	0.160	0.080	0.185	0.098
	(0.74)	(0.28)	(0.50)	(0.55)	(0.26)
Yrs of disability	0.103	-0.000	0.163	0.105	0.004
	(2.13)**	(0.01)	(3.61)***	(1.41)	(0.06)
	Dummy variables for villages entered but not reported here				
Constant	-5.218	-4.984	-5.530	-4.960	-5.053
	(11.03)***	(10.61)***	(11.72)***	(10.57)***	(10.74)***
No. of obs	2330	2330	2330	2330	2330
No. of hhs.	1175	1175	1175	1175	1175
Wald chi2	608.45***	568.90***	684.00***	572.78***	572.14***
Rho	0.02	0.02	0.03	0.02	0.02
sigma_u=0	4.36***	6.09***	2.38***	5.68***	5.51***

Note: Absolute value of z statistics in parentheses; all continuous variables in natural logs; * significant at 10%; ** significant at 5%; *** significant at 1%

To investigate whether the negative association between disability and subjective well-being is due to lower material welfare, we re-estimate the model presented in Table 8.4 with the addition of the two wealth ranking variables. We include both variables because the literature has shown that subjective well-being depends on both absolute and

relative consumption (Blanchflower and Oswald, 2004; Fafchamps and Shilpi, 2007). If the negative effect of disability on well-being is entirely due to lower consumption, inclusion of the wealth ranking variables should result in a non-significant coefficient for the disability variables.

Table 8.9: Household level random effects panel regressions of self-perceived relative wealth ranking

	Hearing	Speaking	Eyesight	Loss of limb	Paralysis
Male	-1.641	-1.674	-1.599	-1.675	-1.674
	(19.29)***	(19.50)***	(18.96)***	(19.50)***	(19.53)***
Age	1.034	0.951	1.128	0.937	0.960
	(7.61)***	(7.08)***	(8.28)***	(6.99)***	(7.13)***
Born in village	-0.194	-0.193	-0.194	-0.187	-0.187
	(2.14)**	(2.11)**	(2.17)**	(2.05)**	(2.05)**
Disabled	-1.063	-0.574	-1.269	-0.915	-0.646
	(6.39)***	(1.78)*	(8.02)***	(3.06)***	(2.05)**
Self disabled	0.173	0.308	0.026	0.425	0.231
	(0.77)	(0.49)	(0.14)	(1.12)	(0.54)
Yrs of disability	0.161	0.007	0.184	0.182	0.032
	(2.91)***	(0.10)	(3.54)***	(2.13)**	(0.40)
	Dummy variables for villages entered but not reported here				
Constant	-6.521	-6.252	-6.875	-6.208	-6.303
	(12.04)***	(11.63)***	(12.68)***	(11.56)***	(11.68)***
No. of obs	2330	2330	2330	2330	2330
No. of hhs.	1175	1175	1175	1175	1175
Wald chi2	612.88***	561.68***	667.61***	570.16***	563.85***
Rho	0.06	0.06	0.07	0.06	0.06
sigma_u=0	30.54***	34.35***	25.46***	33.62***	34.34***

Note: Absolute value of z statistics in parentheses; all continuous variables in natural logs; * significant at 10%; ** significant at 5%; *** significant at 1%

Estimation results presented in Table 8.10 suggest that this is indeed the case: after we include the wealth ranking variables, the disabled variable is no longer significant in any of the five regressions. In contrast with Table 8.4, the 'years of disability' variable is no longer significant for hearing and eyesight. This is consistent with the attenuation effect on wealth that we observed in Tables 8.8 and 8.9. Put differently, the adaptation effect we documented for hearing and eyesight is also driven by adaptation in material welfare. The 'self-disabled' variable is weakly significant in two of the five regressions, but with opposite signs; this may be a statistical artefact.

Table 8.10: Household level random effects panel regressions of subjective well-being on disability and relative and absolute wealth ranking

	Hearing	Speaking	Eyesight	Loss of limb	Paralysis
Male	-0.054	-0.033	-0.049	-0.068	-0.046
	(0.39)	(0.24)	(0.35)	(0.49)	(0.33)
Age	-0.725	-0.834	-0.789	-0.836	-0.820
	(2.71)***	(3.18)***	(2.91)***	(3.19)***	(3.11)***
Born in village	0.355	0.365	0.357	0.366	0.363
	(2.21)**	(2.27)**	(2.22)**	(2.28)**	(2.26)**
Disabled	-0.458	0.242	-0.348	-0.478	-0.444
	(1.45)	(0.41)	(1.14)	(0.87)	(0.77)
Self disabled	-0.154	-1.832	0.031	1.154	-0.153
	(0.41)	(1.76)*	(0.11)	(1.92)*	(0.22)
Yrs of disability	-0.020	-0.012	0.060	-0.182	0.007
	(0.18)	(0.09)	(0.55)	(1.02)	(0.04)
Relative wealth ranking	0.857	0.858	0.857	0.859	0.861
	(10.23)***	(10.25)***	(10.23)***	(10.26)***	(10.27)***
Absolute wealth ranking	1.220	1.219	1.216	1.221	1.219
	(14.26)***	(14.24)***	(14.19)***	(14.27)***	(14.24)***
Dummy variables for villages entered but not reported here					
Constant	20.753	21.088	20.950	21.124	21.063
	(18.80)***	(19.34)***	(18.73)***	(19.38)***	(19.25)***
No. of obs	1957	1957	1957	1957	1957
No. of hhs.	1173	1173	1173	1173	1173
Wald chi2	1149.50***	1143.33***	1142.01***	1145.56***	1141.54***
Rho	0.38	0.38	0.38	0.38	0.38
sigma_u=0	114.99***	116.24***	116.14***	116.44***	115.33***

Note: Absolute value of z statistics in parentheses; all continuous variables in natural logs; * significant at 10%; ** significant at 5%; *** significant at 1%

8.6. Conclusion

Using cross-section data from a household survey conducted in 2004, this chapter examined the relationship between subjective well-being and disability among rural Ethiopian households. We have looked for evidence that households with disabled members have a lower level of well-being. We also investigated whether, over time, households that suffer from disability adapt to their plight. If adaptation occurs, the negative effect of disability should fall over time. If adaptation is strong enough, it is even possible for affected households to return to their pre-disability well-being level.

The results show no strong evidence in support of the adaptation hypothesis. Using different specifications and controlling for household level random effects, we find that disability has a negative significant impact on welfare. But the effect of years of disability is in most cases not significant, contrary to the predictions of the adaptation hypothesis.

We also find that disability is associated with lower material welfare, as measured by absolute and relative wealth rankings in the village. We again find little evidence of adaptation, except for loss of hearing and eyesight. Once we control for wealth ranking, the effect of disability on well-being disappears. This indicates that the association

between the two variables is basically due to the effect of disability on material welfare. These findings make sense in the context of rural Ethiopia where people are very poor and income generation relies primarily on physical labour – e.g., farming.

These conclusions should nevertheless be taken as tentative: since we only have cross sectional data, we cannot control for unobserved heterogeneity. Longitudinal data on subjective well-being and disability over time would provide stronger evidence. This is left for future research.

References

Biswas-Diener, Robert and Diener, Ed (2001) "Making the Best of a Bad Situation: Satisfaction in the Slums of Calcutta." *Social Indicators Research*, 55, pp. 329-52

____(2006), "The Subjective Well-Being of the Homeless and Lessons for Happiness." *Social Indicators Research*, 76, pp. 185-205.

Blanchflower, David G. and Andrew J. Oswald (2004), "Well-Being over Time in Britain and the USA", *Journal of Public Economics*, 88(7-8), pp. 1359-1386

Diener, Ed; Lucas, Richard E. and Scollon, Christie Napa (2006) "Beyond the Hedonic Treadmill: Revising the Adaptation Theory of Well-Being." *American Psychologist*, 61(4), pp. 305-14.

Diener, Ed; Suh, Eunkook M.; Lucas, Richard E. and Smith, Heidi L (1999) "Subjective Well-Being: Three Decades of Progress." *Psychological Bulletin*, 125(2), pp. 276-302.

Easterlin, Richard A. (2006) "Life Cycle Happiness and Its Sources: Intersections of Psychology, Economics and Demography." *Journal of Economic Psychology*, 27, pp. 463-82.

Fafchamps, Marcel and Susan Lund (2003), "Risk Sharing Networks in Rural Philippines", *Journal of Development Economics*, 71(2), pp.261-87

Fafchamps, Marcel and Forhad Shilpi, (2008), "Subjective Welfare, Isolation, and Relative Consumption", Journal of Development Economics, forthcoming

Lucas, Richard E. (2007), "Adaptation and the Set-Point Model of Subjective Well-Being." *Current Directions in Psychological Science*, 16(2), pp. 75-79

Miguel, Edward, (2005), "Poverty and Witch Killing", *Review of Economics Studies*, 72, pp. 1153-72

Olson, Geraldine I. and Schober, Brigitte I. (1993) "The Satisfied Poor: Development of an Intervention-Oriented Theoretical Framework to Explain Satisfaction with Life in Poverty." *Social Indicators Research*, 28, pp. 173-93.

Oswald, Andrew J. and Powdthavee, Nattavudh (2006), "Does Happiness Adapt? A Longitudinal Study of Disability with Implications for Economists and Judges," Discussion Paper 2208, Institute for the Study of Labor, Bonn, Germany

Appendix

Appendix 8.1: Incidence of disability in the United States of America (2005)

Subject	Total	Male	Female
Population 5 to 15 years	**44,586,147**	**22,810,520**	**21,775,627**
With a sensory disability	1.2%	1.3%	1.1%
With a physical disability	1.2%	1.3%	1.1%
Population 16 to 64 years	**188,041,309**	**92,647,138**	**95,394,171**
With a sensory disability	2.8%	3.3%	2.4%
With a physical disability	7.2%	6.7%	7.7%
Population 65 years and over	**34,760,527**	**14,844,129**	**19,916,398**
With a sensory disability	16.4%	18.2%	15.1%
With a physical disability	30.8%	27.4%	33.3%

Source: U.S. Census Bureau, 2005 American Community Survey

Appendix 8.2: Household level random effects panel regressions of subjective well-being on disability (on all forms of disabilities)

	Without interaction	
	Coefficients	z statistics
Male	-4.843	19.14***
Age	3.066	6.99***
Born in village	-0.542	1.95*
Hearing problem	-2.723	4.65***
Self disabled	0.480	0.66
Years of hearing disability	0.493	2.06**
Speaking problem	1.268	1.17
Self disabled	-0.582	0.29
Years of speaking disability	-1.333	3.99***
Eye problem	-4.545	8.21***
Self disabled	0.036	0.06
Years of eyes disability	1.108	5.30***
Limb loss	-2.433	2.51**
Self disabled	2.553	2.16**
Years of limb loss	0.244	0.88
Paralysis	-0.275	0.26
Self disabled	-1.756	1.32
Years of paralysis	0.088	0.35
Dummy variables for villages entered but not reported here		
Constant	3.870	2.22**
No. of observations	2330	
No. of households	1175	
Wald chi2	816.33***	
Rho	0.17	
sigma_u=0	117.53***	

Note: All continuous variables in natural logs; * significant at 10%; ** significant at 5%; *** significant at 1%