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Research Paper

Disability and poverty: A survey of World Bank Poverty Assessments and implications

*Handicap et pauvreté : enquête de la Banque mondiale sur les
estimations de la pauvreté et leurs répercussions*

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Abstract

Disability has often been associated with poverty, but few studies examine the relationship empirically in developing countries. For example, a review of World Bank Poverty Assessments finds that while most countries acknowledge the issue, few have the data to investigate it. This paper sets forth a preferred methodology for examining disability and poverty that is in line both with a more functional approach to disability incorporated in the WHO's International Classification of Functioning and Sen's Capabilities Model. Applying that methodology to two developing countries reveals the strong connection between poverty and disability and the need for a separate poverty line for families with disabled members.

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Keywords: Poverty; Disability; Poverty line; Equivalence scale

Résumé

On a souvent associé le handicap à la pauvreté, mais rares sont les études qui analysent empiriquement ce lien dans les pays en développement. Ainsi, un rapport de la Banque mondiale sur les estimations de la pauvreté montre qu'en dépit de la reconnaissance du problème par la plupart des pays, peu d'entre eux disposent des données nécessaires à son étude. Cet article présente une méthodologie pour analyser le handicap et la pauvreté concordante tant avec l'approche fonctionnelle contenue dans la Classification internationale du fonctionnement, du handicap et de la santé de l'OMS qu'avec le modèle des « capacités » de Sen. L'application de cette méthodologie à deux pays en voie de développement montre la relation forte

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entre pauvreté et handicap et la nécessité de disposer d'un seuil de pauvreté différent pour les familles dont certains membres sont handicapés.

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Mots clés : Pauvreté ; Handicap ; Seuil de pauvreté ; Échelle d'équivalence

Introduction

Disability has often been associated with poverty (Yeo & Moore, 2003; Hoogeveen, 2005; Elwan, 1999) but comparatively little rigorous quantitative research has been undertaken. This paper lays out the methodological complexities of estimating the share of the world's poor which consists of disabled people, and puts forth an approach for rigorous quantitative research.

In this paper, we briefly survey 154 poverty assessments (PAs) done at the World Bank over the past 20 years. After developing a four-way typology of PAs in terms of their treatment of the issue of disability, we find that only 11 PAs quantified the poverty rate of households with disabled members. Moreover, all of these were in the Europe and Central Asia (ECA) region.

The degree to which disability and poverty have been examined empirically has been limited to some degree by the unavailability of data and a relatively nascent methodology. Therefore, we next review approaches to measuring poverty and how to incorporate disability into that measurement, including a discussion of the application of the Zaidi and Burchardt (2005) methodology for assessing the additional economic costs of living with a disability, Kuklys's methodology for operationalizing Sen's capabilities model, and the more standard approach of constructing equivalence scales.

Finally, we apply the Zaidi and Burchardt methodology to two countries – Bosnia and Herzegovina (hereafter Bosnia) and Vietnam – where quality data on both consumption and disability were both collected as part of the same household survey.

Disability measurement at the World Bank and UN

Before examining the relation between disability and poverty, it is important to be clear about what is meant by disability. According to the social model, disability is the outcome of the interaction of a person's functional status and his/her environment. People are not identified as having a disability based upon a medical condition. Instead, they are disabled by an environment that erects barriers to their participation in the social and economic life of their communities.

Moreover, disability is not an "all or nothing" concept. Disability can range from mild to severe, can be constant or episodic, and whether a person is considered to have a disability is highly dependent on their environment – not just the physical environment, but the cultural and legal environment, as well.

How then can we measure disability in a quantitative fashion that allows us to compare poverty rates across disability statuses? How researchers construct a variable for disability will influence the correlations they find between disability and various socioeconomic characteristics, such as poverty.

In recent years, a functional approach to measuring disability has become more standard, and has recently been adopted by the World Health Organization's International Classification of

Functioning, Disability and Health and the UN's Washington Group (WG) on Disability Statistics (Mont, 2007a; Mont, 2007b). The WG, established by the UN Statistical Commission and with the involvement of at least 50 nations, has recommended using the presence of difficulties in at least one of a core set of basic activities – seeing, hearing, walking, cognition, communication, and self-care – as an operational proxy for a person with a functional limitation that puts them at risk of being disabled in the social model sense (Mont, 2007a). By comparing outcomes of people with and without these impairments, it is possible to get a handle on how the environment may be disabling people. For example, if people in a particular country who have difficulty walking without assistive devices have equivalent levels of consumption, employment, education, and other social indicators then that would provide evidence that physical disability in that country's environment is not an economic problem.

The WG also recommends examining the data on disability using multiple thresholds for the level of difficulty in carrying out basic activities to obtain a sense of the impact of mild, moderate and severe limitations in functioning. The importance of looking at activities of daily living or functional ranges is also recommended in Gertler and Gruber (2002).

This paper follows this approach to measuring disability, while at the same time acknowledging that surveys with more extensive sets of questions are capable of generating a more detailed, nuanced, and extensive analysis of disability.

Poverty measurement

Standard welfare economics began by measuring poverty as a lack of income. A person was considered poor if their family's income fell below a predetermined poverty line. Indeed, in more developed countries, income is a reasonable proxy for the level of well-being that can be achieved via present and future consumption. In lower income countries, however, this is not the case. Much consumption is obtained through informal markets, in-kind transfers, bartering, and home production. Overall, a comprehensive measure of current consumption is generally preferred for three reasons (Deaton, 1999; Deaton & Zaidi, 2002).

- First, current consumption is often taken to be a better indicator of the current standard of living, since the utility level depends primarily on actual consumption of goods and services. For that reason the consumption measure should be as comprehensive as possible.
- Second, current consumption may also be a best possible approximation to long-term average well-being, because consumption tends to fluctuate much less than income does.
- Third, international experience shows that data on consumption are more accurately collected. Respondents in agricultural and informal sectors may have difficulties in recalling correctly all kinds of income they receive. Others may also seek to conceal their income because of taxation and other concerns. Reported income is typically understated (lower) than measured consumption, particularly in the higher deciles.

For these reasons, the core welfare metric for PAs at the World Bank has been and remains household consumption. However, even measuring poverty by consumption goods is problematic. Different people in different situations may require a different set of consumption goods to have a quality of life we consider to be free of poverty. This cuts to the very core of what we mean by poverty. Is it just lack of income or consumption, or is it something more? And if so, how does disability fit into this?

Some of these issues have been given a great amount of attention. Unfortunately, though, the role of disability in determining poverty rates has been under-researched. A convenient and significant benchmark of how to approach poverty measurement was the publication of the World Development Report 1990 Poverty (World Bank, 1990) and the subsequent Poverty Reduction Handbook (World Bank, 1993). Moving beyond the quantitative aspects of measuring welfare solely through the monetary metrics of income or consumption, the World Development Report 2000/2001 Attacking Poverty stressed dimensions of opportunity, empowerment, and security to assess poverty and the Bank, as did the Voices of the Poor initiative (Narayan, Patel, Schafft, Rademacher, & Koch-Schulte, 2000a; Narayan, Chambers, Shah, & Petesch, 2000b). We will address some of the non monetary dimensions of poverty below. Here we present a general overview of three main issues in poverty measurement: the welfare metric, the poverty line, and equivalence.¹ Those with more interest in exploring in depth are referred to the myriad research available at www.worldbank.org/poverty, <http://go.worldbank.org/2AQMBVLYK0> and www.worldbank.org/lsm.

If a household's consumption falls below the poverty line, all its members are counted as poor. The implicit assumption here is that all individual members of a household benefit equally (or in a constant proportion, called an equivalence scale), from the household's expenditure or income.

But it is possible that there exist economies of scale in consumption, such that the per capita cost of reaching a certain welfare level is lower in large households than in small ones. For example, the cost of heating might depend on dwelling characteristics, irrespective of whether the residing family is large or small, making the per capita cost of heating lower for the large family. The effective number of household members that share a certain welfare level should thus be adjusted for economies of scale.

Intuitively, it seems obvious that the consumption needs of children differ from adults, and by extension, the elderly from children, and further, of disabled people from non disabled individuals. However, it has proven to be exceptionally difficult to theoretically disentangle these "within the household" dynamics. Since one of the main developers of this approach (Deaton & Muellbauer, 1986) has subsequently repudiated it on theoretical grounds (Deaton & Paxton, 1998), there has been a gap in the theoretical literature.

But strong reasons exist for believing that a given level of consumption is not equivalent for a disabled person as compared to a non disabled person, and so poverty measures for disabled people are misleading. According to Amartya Sen's capabilities approach (Sen, 1984, 1985, 1993, 1999), poverty is not solely a function of material goods, but is rather based on a standard of living described by the capability to conduct various "functionings." These functionings are defined as the attainment of states of being that are fundamental to living an acceptable quality of life. They include things such as being well-sheltered, being well-nourished, being able to move about freely, or being able to form and maintain a family. As such, they are not input based, like income and consumption measures. They are output based. Does a person have the capability to combine the resources at their disposal to live a complete and dignified life?

Functionings result from a production process. Consumption goods are combined with technical constraints, called "conversion factors", to produce states of being. These conversion factors can be at the individual, social or environmental level. For example, to achieve the functioning of being able to move about freely, the required consumption goods will depend in part on the ability to move one's legs, the type of terrain, and the presence of public transportation. What's

¹ See also <http://go.worldbank.org/2AQMBVLYK0>, click on poverty analysis.

important in Sen's model is not whether a person owns a car or a mule or a bicycle, but whether they are capable of getting to where they need to go.

Critics sometimes cite Sen's unwillingness to present a detailed list of functionings as a weakness in his approach, but Sen maintains that there is no universal list of functionings. Rather, he says that in each situation democratic processes and social choice procedures should dictate the functionings used to build and evaluate policies (Clark, 2005; Robeyns, 2005).

Other authors have attempted to come up with a set of core functionings that they maintain can be adapted to take into account different cultures and stages of economic development (Alkire, 2002). Some have built these on what they consider basic values. Others rely on categories that specify institutional or legal means to achieve capabilities, while others have generated their lists from extensive community exercises in a wide range of localities, or by reviewing the development literature to see what core activities are most referenced. But in every case, the core concept remains: quality of life (or poverty) should not be measured by material goods absent of the considerations of what those goods are used for and the other resources people have at their command.

This approach is fundamentally multidimensional and requires analysts to make more explicit value choices over what constitutes poverty. Sen also points out that being multidimensional – and inclusive of the broader social and physical environments – his capabilities approach helps identify unintended consequences (Sen, 1999). This approach also is more indicative of how poor people view poverty, as the recent *Voices of the Poor* project at the World Bank emphasized (Narayan, Patel, Schafft, Rademacher, & Koch-Schulte, 2000a; Narayan, Chambers, Shah, & Petesch, 2000b). When interviewed, poor people around the world listed not only material well-being as important, but a range factors that can all be seen as relating back to Sen's capabilities approach (Table 1).

Reviewing Sen's capabilities approach and Table 2, it is not difficult to see where disability fits into all of this. Disability operates via all the conversion factors previously mentioned to alter the production function people use to turn material goods into functionings.

In fact, Sen's model dovetails extremely well with the social model of disability. That model conceptualizes disability as arising from the interaction of a person's functional status with the physical, cultural, and policy environments (Shakespeare & Watson, 1997; Hughes & Paterson, 1997). If the environment is designed for the full range of human functioning and incorporates appropriate accommodations and supports, then people with functional limitations would not be "disabled" in the sense that they would be able to fully participate in society.

"Participation" in the social model of disability can be seen as nothing other than having the full range of Sen's capabilities. In Sen's model, people's well-being is a function not only of consumption goods, but also individual, social and environmental conversion factors. To improve well-being, therefore, it is not just material consumption that needs to be addressed. Similarly, with the social model of disability, policy interventions aimed at increasing disabled people's participation in social and economic life should not be made only at the individual level (e.g., medical rehabilitation) but also at the societal level, for example the introduction of universal design to make infrastructure more accessible, inclusive education systems, and community awareness programs to combat stigma.

Literature survey of PAs at the World Bank

Limitations in the availability of data on disability in developing countries pose restrictions on the extent of analysis that can be done to examine the relationship between disability and poverty.

Table 1
Well-being according to Voices of the Poor.

Material well-being: having enough
Food
Assets
Work
Bodily well-being: being and appearing well
Health
Appearances
Physical environment
Social well-being:
Being able to care for, bring up, marry and settle children
Self-respect and dignity
Peace, harmony, good relations in the family and community
Security
Civil peace
Physically safe and secure environment
Personal physical security
Lawfulness and access to justice
Security in old age
Confidence in the future
Freedom of choice and action
Psychological well-being
Peace of mind
Happiness
Harmony (including a spiritual life and religious observance)

However, some existing World Bank analysis offers insight into this relationship, although it must be said that the quality of data on disability can vary substantially (Mont, 2007a).

Overall, most PAs undertaken by the World Bank have not addressed the issue of disability in an extensive or systematic manner. Fig. 1 shows the breakdown of PAs by the degree to which

Table 2
Poverty rates by presence of disabled pensioner in household in ECA Pas.

Country	Year	Poverty		Extreme poverty	
		All	Disabled pensioner	All	Disabled pensioner
Armenia	1999	54.7	58.6	8.5	10.6
Georgia	1999	42.7	60.0	8.9	17.0
Kosovo	2002	50.3	n.a.	12.0	15.5
Kosovo	2005	n.a.	n.a.	15.2	17.9
Kyrgyz	1995	40.0	41.1	15.0	33.1
Kyrgyz	2003	56.4	56.0	24.7	38.2
Poland	2004	14.8	21.0	8.6	12.8
Russia	1995	26.8	35.4	10.4	14.0
Russia	1999	24.6	23.8	12.5	12.4
Ukraine	1996	30.0	32.4	6.7	n.a.
Uzbekistan	2003	27.5	23.7	9.7	n.a.

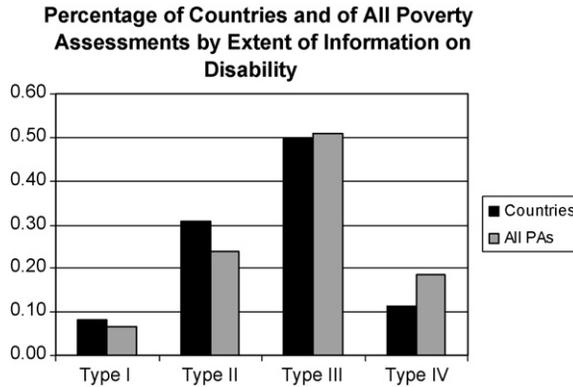


Fig. 1. Percentage of countries and of all poverty assessments by extent of information on disability.

they deal with disability. PAs are divided into four groups:

- type I – statistics reported on poverty rates of disabled people versus the general population;
- type II – some data are reported on disabled people, in regard to employment, health, social assistance, or some other subject pertaining to poverty, but not poverty rates per se;
- type III – mention is made of the importance of disability in relation to poverty or factors related to poverty, but no data are available;
- type IV – no mention is made of disability.

In Fig. 1, the black bars represent the distribution of countries' PA with the greatest attention to disability (some have more than one PA in the time period examined: 1995–2006). The grey bars show the distribution of all PAs. As can be seen in the chart, fewer than 10% of countries with a PA reported statistics on poverty broken down by the presence of a disability (type I), and all of these were in one region of the world, namely ECA.

This is not to say that disability is totally ignored. In roughly one-third of countries with a PA, some data on disability was available in regard to employment, health, social assistance, or some other subject pertaining to poverty, and nearly half of all countries that did not have any data made reference to the role disability most likely plays in generating, or at least sustaining, poverty. Only about 12% of PAs totally ignored the issue.

Europe and Central Asia (ECA) is the region which has paid most attention to disability and poverty from an analytical point of view. As can be seen on Fig. 2, eight out of 25 countries have at least one PA that reports data on disability and poverty. Only one country can be categorized as having only a type IV PA. In fact, all the type I countries in Fig. 1 are from ECA. This relates strongly to the historical context, and the availability of information in household surveys which enable a variable denoting disability to be constructed.

In ECA, social protection was the sector mostly closely associated with disability in terms of policy and fiscal impact, owing to the system of disability pensions and the pervasive free or low-cost provision of goods and services to certain categories of the population in Russia and some other former Soviet Union (FSU) countries.² After the transition, virtually every region

² For details on Kazakhstan, see [Seitenova and Becker \(2008\)](#). For details on Russia, see [Merkuryeva \(2007\)](#), and [Becker and Merkuryeva \(in press\)](#).

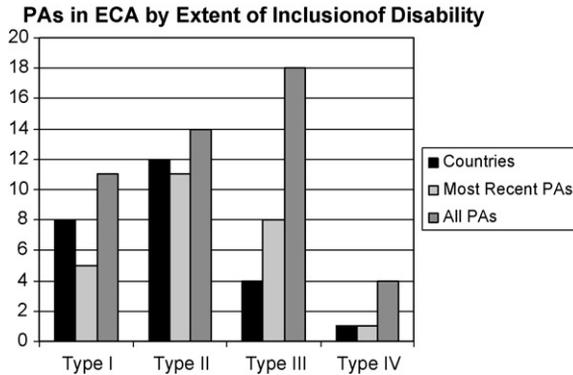


Fig. 2. PAs in ECA by extent of inclusion of disability.

in Russia and many FSU countries adopted additional privileges for veterans and persons with disabilities although the basic system had been set up during the Soviet period. Therefore, in these PAs the definition of disability is actually almost equivalent to “eligible for a disability pension” and is not the broader definition of disability as it relates to the social model.

A legacy of this system was the payment of a disability pension for acquired disability (either from work injury or general illness) and for congenital impairments for children. As a result, household survey questionnaires often included a question in the income section about disability pensions. Two specialized surveys financed with World Bank technical assistance, the NOBUS in Russia (Russian acronym for National Sample Survey of Household Welfare and Participation in Social Services),³ and the Bosnian Living Standards Measurement Survey (LSMS),⁴ and a survey in three areas of Uzbekistan (not nationally representative) provided significantly more detail (Mete, 2008). In particular, the Bosnia and Herzegovina LSMS included a detailed block on mental health and illness issues, while the NOBUS⁵ captured data about privileges. The Uzbek survey included a detailed block on functioning, discussed below.⁶

However, with these exceptions, general household budget or income and expenditures surveys did not typically include detailed information about disability or capability. Thus, the PAs constructed a variable of whether a household reported receipt of one or more disability pensions as the “disability” variable. We discussed above why this measure is not the best way to capture disability in survey analysis. However, this is the only information that was available for most ECA countries in order to quantitatively assess poverty rates among households with and without disabled members (as proxied by receipt of a disability pension).

³ Available at <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/RUSSIANFEDERATION-NEXT>.

⁴ Available at <http://www.worldbank.org/LSMS/>.

⁵ See: <http://go.worldbank.org/VWPUL3S9F01>.

⁶ Other sources of survey information on disability are another survey for Russia, the Russian Longitudinal Monitoring Survey (<http://www.cpc.unc.edu/rfms/>), the Ukrainian Longitudinal Monitoring Survey (not freely accessible, but described in point 37 in <http://www.eerc.kiev.ua/library/stat-databases.shtml>), South Africa’s Cape Area Panel Study <http://www.caps.uct.ac.za/>, and the Indian National Sample Survey study on disabled persons (http://mospi.nic.in/stat_act.t14.htm).

Statistics on poverty rates for all households and households with disability pensions can be found in [Table 2](#). The relationship reported in that table is not straightforward. In Ukraine, Armenia, and Kosovo, we find slightly higher rates of poverty and extreme poverty for households with disabled members. In the Kyrgyz Republic, there is only a slightly higher rate of poverty when disabled people are present, but the rate of extreme poverty is much higher. And in Georgia and Poland, poverty is much higher for households with disabled members. This relationship is documented in other countries as well. Controlling for a range of demographic factors, households in Uganda, for example, were found to be 38% more likely to be poor in a study unconnected with a PA (Hoogeveen, 2005). Disability in that study was a self-reported concept – that is, “do you have a disability?”.

Evidence from a study in India also unconnected to a PA highlights some of the reasons why poverty rates can be higher in households with disabled member (World Bank, 2007). The definition of disability in that study was broader than the receipt of a disability pension, however. Disabled people – that is, people having difficulty undertaking basic activity – received less education, having 52% illiteracy compared to 35% for the general population. The share of disabled children not enrolled in school was over five times the general rate, even in relatively well-off states. Disabled children very rarely progress beyond primary school.

Disabled people in India also have lower employment rates, and the gap between their employment and that of non disabled people is growing. According to the study:

“The large majority of persons with disability in India are capable of productive work. Despite this fact, the employment rate of disabled population is lower (about 60% on average) than the general population, with the gap widening in the 1990s. Having a disability reduces the probability of being employed by over 30% for males in rural Uttar Pradesh and Tamil Nadu, though the effect is lower for women [. . .]. Around 45% of households with a person with a disability report an adult missing work to care for [disabled] member, the bulk of these every day and on average for 2.5 h. However, other adult men are more likely to be working in households with disabled members, due to the need to compensate for lost income. (Executive Summary)”

Overall, poor prospects for education and employment among disabled people, and the intense stigma that they often face, are expected to drive them into poverty.

The situation looks very different in Russia and Uzbekistan, however. In Russia, poverty was associated with disability in the 1995 PA, but that relationship disappeared in the more recent PA conducted in 1999 ([Table 2](#)). And in Uzbekistan, the poverty rate for households with disabled members was actually lower than for households without such members.

Interpreting these statistics, however, should not be undertaken without a deeper understanding of how disability is defined in these studies. Remember, in most of them disability is basically equivalent to being eligible for a disability pension. In 2006, however, the Bank undertook a survey in Uzbekistan that allowed for comparison of findings across different disability definitions. In fact, the study found that the relationship between poverty and disability changed depending on the threshold for what constitutes a disability. When minor and moderate disabilities were included, there was no significant relationship between poverty and disability, and to the extent one existed the correlation was negative. However, when a higher threshold was used so that only very significant disabilities are counted, there was a strong positive correlation between poverty and disability (Scott & Mete, 2008).

These 11 PAs all looked at post-transfer poverty, in other words, no subtraction from income or consumption for the value of disability pensions received was made.⁷ An analysis of pre-transfer poverty would show higher poverty rates for households with disabled members.

Estimating the impact of disability on poverty

The next question is: what are we missing about the relationship between disability and poverty as defined by the capabilities approach if we use standard consumption measures of poverty? By using similar consumption poverty lines for disabled and non disabled people, are we seriously underestimating the impact of disability on the quality of people's lives?

In fact, in estimating a structural equations model of functionings achievement, Kuklys (2005) finds that the importance of income in assessing the quality of health and housing in the UK diminishes when incorporating the Sen approach. She undertakes a factor analysis of responses to a list of questions to create latent variable scores for health and housing. She then uses this to estimate structural equations, with income and a variety of demographic variables. Income is found not to be significantly related to health, but for housing, results were mixed. Income was significantly correlated with housing in 2000 but not in 1991.

Kuklys (2005) goes on to address the importance of disability in assessing poverty. Her method relies on combining aspects of the capabilities approach with the estimation of equivalence scales. Without using an equivalence scale, she finds in a sample from the UK that in 1999, 23% of households with disabled members had less than 60% of the median income, but when adjustments were made for the additional demands placed on disabled people that percentage rose to over 47%.

Rather than trying to estimate the extra costs of disability from an equivalence scale⁸ which approach has not been theoretically verified (Deaton & Paxton, 1998), a conceptual approach to estimating the additional costs of disability is provided by Zaidi and Burchardt (2003, 2005) called the "standard of living approach". The intuition is quite clear and appealing – disabled people may have a lower standard of living than non disabled people with the same income, owing to their differing needs – both for items specifically designed for disabled people (Braille, wheelchairs, etc.) and for greater quantities of general items, such as transportation, heating, or medical services. Households with disabled members have to spend more on these items, diverting consumption from other items that would raise the general standard of living of the household. The standard of living is expected to rise for with income for all households, but households with greater needs because of disability would have a lower standard of living.

Zaidi and Burchardt (2005) depict this graphically (Fig. 3) as follows, where the higher standard of living attainable at the same income for households without disabled members is shown as the top line (or vertical distance CB). This depiction assumes that the standard of living is linear with respect to income. AB is the extra cost of disability. Zaidi and Burchardt (2003) also draw logarithmic and decreasing return curves, but the idea is the same.

Specification of both the income and the disability variables are driven by empirically testing many various definitions, and of course reflect the information available in the surveys which are used for the empirics.

⁷ See World Bank (2001) for a discussion of why pre-transfer as well as post-transfer poverty should be assessed.

⁸ Lelli (2005) uses the functionings approach to estimate equivalence for Belgium and Italy for the functioning of "shelter" but did not analyze disability-related functional utilization limitations.

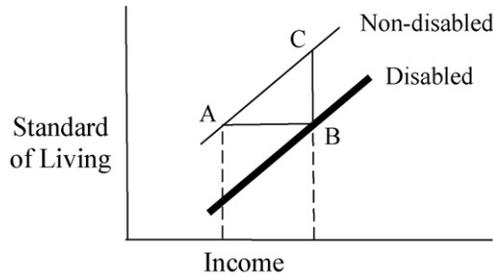


Fig. 3. Standard of living, income and disability (Zaidi & Burchardt, 2005).

Zaidi and Burchardt (2005) find that in the UK the sum of disability scores for an individual and partner performs best for the disability variable specification, while the natural log of income was the best specification for income. As noted in the preceding section on the definition of disability, it would be necessary to test whatever disability definitions would be supported by the data sets available in developing countries to assess whether the extra costs of disability in developing countries were similar to those found by Zaidi and Burchardt for the UK. Their specification of log income implies that an additional amount of income makes more difference to a poor household than a rich one. It will be very interesting to see if this generalizes across lesser-developed countries. To date, their implications for UK policy surveyed in Tibble (2005), but no studies have applied the standard of living approach to developing countries.

We apply the Zaidi and Burchardt approach to two developing countries, Bosnia and Herzegovina and Vietnam. These countries were selected because after an exhaustive search of household living standard surveys, they were the only ones found with both consumption and disability data that allowed for the application of this approach. This situation is expected to change, however, as more countries are beginning to improve their disability data collection.

We construct an asset index of the seven most commonly owned durables in the two countries, which composition differs slightly as per country circumstances (Table 3). Applying the Zaidi and Burchardt model to the regression results found in the Appendix A, and using a functional definition of disability as discussed earlier in this paper, leads us to the results that on average, the extra cost of disability in Vietnam is 9% and is 14% in Bosnia (Tables 4a and 4b). We therefore raise the poverty line by 9% for Vietnamese households with disabled member(s) and the poverty line by 14% for such households in Bosnia.

Before adjusting for the extra cost of disability, we found poverty to be 13.5% in Vietnam overall, and slightly higher for households with disabled member(s) at 16.4%. However, if the extra cost of disability is applied, we find that the poverty rate for households with disabled members jumps to 20.1%. Poverty rates in households with non disabled members are not affected, but

Table 3
Asset Index Components.

Bosnia and Herzegovina
1. Stove, 2. Washing machine, 3. Refrigerator, 4. Freezer, 5. vacuum cleaner, 6. Television, 7. Radio cassette

Vietnam
1. Motorbike, 2. Wardrobe, 3. Bed, 4. Tables, chairs, and sofas, 5. Television, 6. Electric fans, 7. Cookers

Table 4a
Extra cost of disability in Vietnam.

Vietnam				
Variable	Coefficient	Standard error	T-Statistics	$P > t $
Real total household expenditures	1.652	0.12	132.62	0.00
Disabled household member	-0.0156	0.022	-7.26	0.00
Number of children 16 and under	-0.0281	0.006	-45.7	0.00
Number of elderly 65 and older	0.003	0.013	0.21	0.83
Constant	-10.89	0.126	-86.68	0.00
Number of observations	39.71			
Adjusted R-squared	0.35			

Extra expense of disability is $0.156/1.652 = 9\%$.

Table 4b
Extra Cost of Disability in Bosnia.

Bosnia				
Variable	Coefficient	Standard error	T-Statistics	$P > t $
Ln of annual household total consumption	-0.333	0.014	-23.45	0.00
Disabled household member	0.046	0.019	2.40	0.016
Number of children 14 and under	-0.008	0.007	-1.15	0.249
Number of adults	0.012	0.005	2.26	0.024
Constant	4.25	0.127	33.33	0.00
Number of observations	16965			
Adjusted R-squared	0.39			

Extra expense of disability is $0.046/0.333 = 14\%$.

the higher incidence in poverty of households with disabled members brings up the total poverty rate in Vietnam to 15.7%. Results were even more pronounced in Bosnia, where the 14% extra cost of disability raised the poverty incidence of households with disabled members from 21.1% (unadjusted) to 30.8%, and moved overall poverty from 19.5% unadjusted to 22.4%.

These magnitudes are not trivial, and would have definite fiscal implications on country budgeting for disability allowances. We argue, however, that the adjusted poverty lines are more appropriate for policy that would truly enable disabled people to attain a decent standard of living.

Conclusion

Disability and poverty are intricately linked as both a cause and consequence of each other. Unfortunately, due to lack of data and the difficulty of addressing the additional costs of disability, few estimates exist of the impact of disability on poverty – especially taking into account Sen's capability approach would argue for a separate poverty line for households with disabled members. Applying the Zaidi and Burchardt approach to data from Bosnia and Vietnam that allows for a consumption-based measure of poverty and a functional measure of disability reveals that ignoring the issue of disability significantly understates both poverty and the impact of disability.

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Appendix A

The graphical representation of the Zaidi and Burchardt method can be formulated algebraically as:

$$S = \alpha Y + \beta D + \gamma X + k$$

where S is an indicator of the standard of living, Y is household income, D is disability status, X is a vector of other household characteristics, and k is an intercept term representing a constant absolute minimal level of standard of living under which the household could not survive. The extra cost of disability, E , is given by

$$E = \frac{dY}{dD} = -\frac{\beta}{\alpha}$$

which can be seen on Fig. 3. The parameter β is the distance CB between the lines and α is the slope, or CB over AB. Thus β/α is equal to AB, the extra cost of disability.

The regressions for Vietnam and Bosnia are below. The dependent variables are the asset indicators equaling the sum dummy variables representing ownership of the top seven assets in each country, listed in Table 3. The explanatory variables are similar but not exactly the same because of what was available in the respective data sets.

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