

Using the Umbrella Model to measure Household Vulnerability: application in Myanmar to assess disability related vulnerability

*Dr. Michael P Griffiths MBChB MSc (PHC) MRCP DFFP DTM&H
Director of Research, Social Policy and Poverty Research Group, Yangon, Myanmar*

ABSTRACT

Purpose: This paper describes the application of the Umbrella model in measuring household vulnerability to natural disaster and other economic shocks, and outlines how the model can be used to measure relative vulnerability at household level, identify significant contributory factors to household vulnerability, compare vulnerability profiles amongst different socio-demographic groups and use of the model in programming for poverty and vulnerability reduction.

Method: The Umbrella model comprises ten factors which contribute to household vulnerability, measured with one or more indicators for each factor. The model was applied to a baseline survey of 1,194 households in the central Dry Zone of Myanmar, and results analyzed according to household composition, including the presence of persons(s) with disabilities, presence of an older person and the gender of the household head.

Results: Analysis demonstrated significant differences in vulnerability profile, with households with one or more persons with disabilities more likely to be vulnerable than those with no person with disabilities (OR 1.7). Significant contributory factors to excess vulnerability were lack of livelihood diversity, poor asset profile and high rates of non-productive expenditure.

Conclusions: The Umbrella model represents a useful tool in mapping relative household vulnerability, enabling more precise planning of interventions to reduce vulnerability for persons with disabilities.

INTRODUCTION

Poverty is acknowledged to be multi-faceted, often defying simple analysis and interventions. Whilst measurements exist to quantify poverty in absolute economic terms (for example, \$1 per day purchasing power parity), a more useful poverty measurement needs to reflect the dynamic aspect of poverty. One approach is to measure both chronic and transitory poverty¹, and to quantify the extent to which poverty is caused by fluctuations in welfare (transitory poverty) as well as low levels of welfare in the long-term (chronic poverty)². Studies of transitory and chronic poverty assert that 'potentially much larger reductions in aggregate income poverty might be achieved by enhancing households' ability to smooth incomes across time'.³ A significant underlying contributors to and causes of transitory and chronic poverty is exposure to, and consequences of, natural disasters and other crises and hazards⁴. This in turn also includes analysis of factors which can affect resilience at community and household level. Hence, poverty reduction strategies have included aspects of vulnerability reduction as essential elements. Tools such as the Livelihood Vulnerability Index have been used to measure projected impact (i.e. vulnerability) at community level of the effects of climate change⁵. In general, poverty is linked to vulnerability to natural disaster, economic shock and other hazards in a cyclical fashion: poorer households are typically more vulnerable to both exposure to and negative impact from shocks, and the increased exposure and impact contributes to chronic poverty. Hence, any understanding of poverty

must also include an understanding of vulnerability. Research from developing countries demonstrates that households with a household member who is disabled are more likely to be poor than households with no disabled members, although findings are not unequivocal and there are very limited data.⁶ Persons with disabilities are known to be more vulnerable to the risk and impact of disasters and shocks,⁷ and anecdotal evidence suggests that households with persons with disabilities are also more vulnerable to the immediate and short/medium term impact of disasters and shocks⁸. However, there is little research to identify the extent and nature of excess vulnerability, and a need for simple, flexible tools which can be applied at community level to assess relative vulnerability. These tools need also to enable field workers to better understand and quantify the underlying causes of vulnerability, to design and implement suitable interventions and to predict likely outcomes of interventions and measure medium term impact of efforts to reduce household vulnerability. Current development practice of assigning people to 'vulnerable groups'-typically determined by demographics such as gender, age and disability, by assuming that members of these groups are homogenous and thus equally vulnerable, fails to adequately differentiate between persons with disabilities, or older people, or female headed households, who are vulnerable and those who are not, and moreover, by failing to make detailed analysis of the causes and contributors to vulnerability at household level are not able to design the most effective interventions. The model studied in this paper, the 'Umbrella' model, can enable a 'rights based' approach, facilitating inclusion of persons with disabilities (and other 'vulnerable' group members) as active participants in process, but without guaranteeing their status as an automatic beneficiary. This research examines the applicability and usefulness of the Umbrella model to analyze household vulnerability of rural households in the Union of Myanmar, with particular reference to vulnerability of households with person(s) with disabilities. Myanmar is one of the poorest countries in Southeast Asia, with 26% of households classified as living in poverty. With an overall disability rate of 2.32%, households with disability account for 10% of all households in Myanmar, but comprise 16% of all poor households.

METHOD

The study population was comprised of two samples selected for a large-scale livelihoods intervention projects funded by the Livelihood and Food Security Trust Fund (LIFT). The project areas were selected in the central Dry Zone, in areas known to have higher than average poverty levels. Eighty participating villages in three Regions (Magwe, Mandalay and Sagaing) were selected based on initial poverty surveys. In two regions (Mandalay and Sagaing) and 1:4 household sample was used (1 in every 4 households was selected), whereas in Magwe, all households in selected villages were surveyed. Household samples were collected between 2011 and 2012. Data collected was planned and undertaken by Myanmar Market Research Department (MMRD), Social Policy & Poverty Research Group (SPPRG) in conjunction with ActionAid Myanmar.

Data collection tools were based on the Umbrella model,⁹ is so called because of its application to plot household vulnerability in a user-friendly umbrella style radar plot to illustrate the relative degree of 'protection' which a household has against shocks and hazards. The tool draws on Moser's 'Asset vulnerability framework' to measure household economic vulnerability according to ten factors (indebtedness, productive income, livelihood diversity, dependency ratio, asset profile, water & sanitation, food security, health, social capital and decision making power), and was developed according to a livelihood and vulnerability framework developed by the Livelihood and Food Security Trust Fund (Myanmar)¹⁰. The full list of factors and linked indicators is included as Table 1.

Table 1: Vulnerability factors, contributions to vulnerability, indicators and sources

Factor	Contribution to vulnerability	Indicator	Source & validation
Indebtedness	High levels of non-productive debt put livelihood assets at risk (collateral); repayments may reduce essential expenditure; high levels of existing debt can reduce ability to access additional credit	Debt repayment as proportion of income Repayment: income ratio >30% is usually risky	World Bank 1997, adapted
Income	Low or negative income: expenditure ratio can lead to reduction in essential spending, increase risk of debt or negative coping responses. High proportion of income spent on non-productive items can lead to under-investment in livelihood, leading to higher risk	Proportion of income expended on non-productive items (food, health, rent, fines)	World Bank 1997, adapted
Assets	Ownership of livelihood assets, convertible assets or crucially, land (in the form of usage right) can provide short term protection against shocks.	Moser's asset vulnerability Framework, adapted for survey by Myanmar Market Research Department	Moser (1998)
Food Security	Current and prior experience of food insecurity is strongly linked with increased vulnerability to future food insecurity. Likewise, food insecurity leading to malnutrition can affect human capital, and put livelihoods at risk.	Food Security Index	UNDP, modified
Livelihood diversification capacity	Income derived from a single source is more vulnerable to shocks. Multiple sources, or the potential to diversify, can increase protection against shocks affected main/key livelihoods	Livelihood diversity index (= number of income generating activities at HH)	DHS (2006) modified
Health	Chronic or frequent illness in primary earner OR one requiring care threatens livelihood security and reduces income, as well as increasing health expenditure; unplanned health expenditure is a common cause of negative coping (e.g. conversion of livelihood assets to cash)	Income generating household member days per year lost work through illness	UNDP modified
Water & Sanitation	Water is an essential for health and many livelihoods; more time taken to draw water reduces time for other activities; unsafe water sources increase risk of ill health which reduce livelihood effectiveness; unreliable water supplies increase resource expenditure	Average time to collect water	DHS (2006)
Dependents	Household members requiring high levels of social or medical care divert human, physical and financial resources away from potentially productive livelihood activities	Household Dependency scale	TLMI adapted
Social Participation	Persons with higher levels of social participation build up social capital, which can increase the likelihood of relief and assistance in times of difficulty	Participation index	TLMI, adapted from p-scale (KIT)
Decision making	Persons with more influence in decision making can have stronger negotiating position for livelihood related factors such as fair pricing, land and asset use	Proximity to power scale	Adapted UNDP

Factors were measured using standardized indicators, which were then converted by mathematical formulas to a scale from 0-1 to allow input into the vulnerability model. The indicators can be collected at household level, or at community level. Provided that there is a consistent method to convert to a 0-1 scale, different and even multiple indicators can be used to measure the different factors. This is essential as different indicators, or different calibrations, may be required for different populations or geographical areas. Scores are plotted on a 10-point radar plot, either as a single household plot, a village aggregate, a township or even State level aggregate.

This model looks primarily at **relative** resilience, as the capacity to cope with shocks and hazards, rather than relative exposure. Hence, it is best applied to determine which households are more vulnerable within a given population, rather than for absolute comparison between regions or countries.

The model was converted to a questionnaire, which was translated into local language (Burmese) and training was given to staff of the Myanmar Market Research Company (MMRD) for the Sagaing/Mandalay sample, and to village volunteers from ActionAid Myanmar for the Magwe sample, who then conducted data collection according to the criteria outlined. Initially, the questionnaire was piloted on a sample of 100 households, and amendments were made to the question phrasing. After selection of the target area, households were randomly selected to generate a 1:4 sample for Sagaing and Mandalay, yielding a total of 1,194 households, and the all-inclusive approach in Magwe yielded 3,914 households from 50 villages in Magwe Region. Consent was obtained and recorded in local language, and households were given the option to decline participation. Verification and monitoring for quality control was conducted by MMRD for Sagaing/Mandalay and ActionAid Myanmar for Magwe. Data collection, tabulation and basic analysis were conducted by MMRD and SPPRG. Disability was determined by applying the modified ICF criteria used in the 2008-2009 Myanmar National Disability Survey¹¹. Using this approach, individuals were first screened for functional impairment, and then categorized as a person with disabilities based on Myanmar definition of disability. This definition was developed prior to the 2008-9 survey, based on opinion surveys of the public, Disabled People's Organizations and government and NGOs. Older persons were those aged 60 or over. Analysis was conducted by the author, using Microsoft Excel software. Vulnerability was defined in relative terms, by measuring the relative deviation of a particular household score from the overall population mean.

A household was classified as 'Vulnerable' if they had three or more of the ten factors which scored over 1 standard deviation lower than the population mean for that factor. Given a reasonably normal distribution of household values it would be expected that having at least one factor which scores more than one standard deviation below the mean would occur frequently. Hence, only those households with three or more vulnerable factors were included. Determining vulnerability based on the average of all 10 factors would require that each factor have a similar mathematical range, and that variances in each factor were distributed in a similar way, which is difficult to achieve.

RESULTS

The distribution of scores for different factors demonstrated in most cases a normal distribution (where most households had a score either slightly above or below the average) but some factors such as food security, WATSAN (water & sanitation) health and social participation, a clear bimodal distribution indicated clustering around either high or low scores, with less in the middle. In some cases, there were clustering of scores in the 0.9-1 range, due to the fact that the formulas adjusted all high scores to have a maximum of 1, in order to allow comparison. The overall scores were normally distributed, indicating reasonable reliability for the sample data.

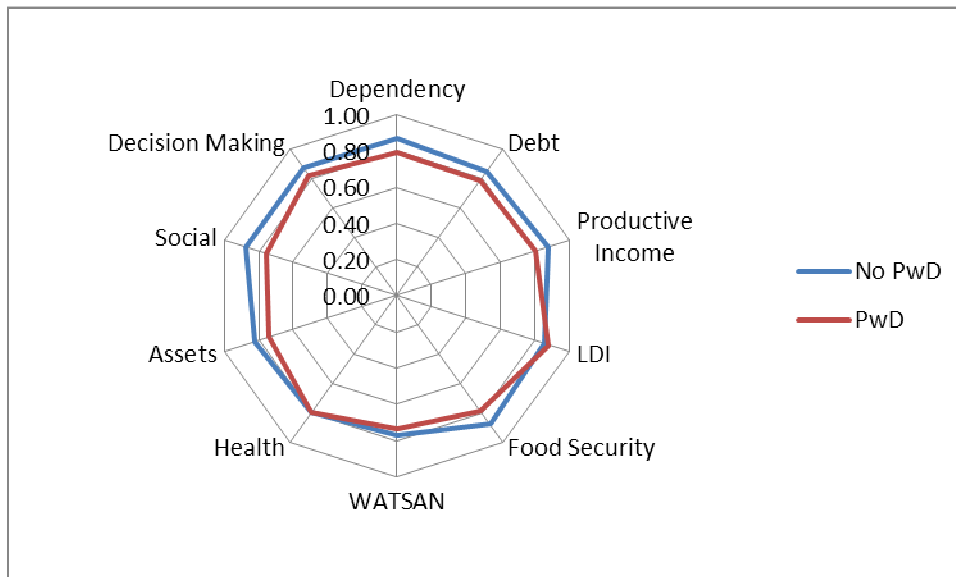
The overall prevalence of disability in the sample was 4%, higher than the national average (2.32%) but within the margin of error for the townships sampled. Overall, 13% of all households had one or more members who were persons with disabilities. There were significant differences in the demographic profiles of households with and without persons with disabilities, as demonstrated in figure 2, whereby households with a person with disabilities had more household members, a higher average age of household head, higher proportion of female-headed households, higher proportion of older persons, higher number of dependents, higher number of income sources, and higher number of days lost to illness. This suggests a strong interdependency between aging, disability and vulnerability which will be explored in this study.

Table 2: socio-economic characteristics of households with and without PwD member

	PwD	Not	Significance
Household members (average)	5.3	5.0	<0.001
Age of Household head	57.60	49.58	<0.001
% female headed	33.9%	21.1%	<0.001
% with older person	58.4%	32.4%	<0.001
Number of dependents	2.12	1.88	<0.001
Average number of income sources	2.81	2.64	<0.001
% expenditure on food	31.5%	32.4%	ns
% expenditure on debt	14.0%	12.3%	ns
% of debt owned by money lenders	25.5%	23.3%	ns
average # land acres owned	1.97	1.81	ns
Average days lost per income generating member to ill health	6.33	4.60	<0.001

Significant differences emerged when comparing vulnerability profiles of households with, and households without a member who has disabilities, households with and without an older person, and female headed households. In terms of mean scores for the ten factors, the profiles demonstrate relatively small variations. However, the mean scores mask significant variation amongst households with persons with disabilities.

Figure 1: Household vulnerability profiles for households with and without persons with disabilities, plotted as 'Umbrella'



Analysis by individual factors demonstrates a significant sub-set of vulnerable households with persons with disabilities, whose main vulnerability is related to low levels of livelihood diversity, higher levels of

economic dependents, higher levels of food insecurity and low levels of productive income (indicating a higher proportion of income spent on essentials such as food, health and debt servicing).

Table 3: Percentage of households classified as vulnerable, by demographic characteristics

	Person with disabilities	Odds Ratio + 95% CI
None	22.7%	
PwD	28.0%	1.33 (1.16-1.5)
Female	29.4%	1.17 (0.88-1.5) (comparing male vs. female PwD)
Aged over 60	32.0%	1.57 (1.22-1.9) (Comparing PwD aged over 60 and PwD aged under 60)
Female >60	37.4%	3.43 (2.7-4.4) Comparing female PwD aged over 60 with male PwD aged over 60)

, 28% of all households with a person with disabilities were classified as vulnerable, compared to 22.7% of households with no persons with disabilities. The likelihood of being classified as vulnerable increased if the person with disabilities was female, or was aged over 60, and was highest of the person with disabilities was female and aged over 60. Whilst female headed households had moderately higher rates of vulnerability than male headed households, and the presence of an older person increased overall rates of vulnerability, these factors were exacerbated by disability. The data indicates that households with a woman with disabilities are more likely to be vulnerable than a woman headed households without a person with disabilities, and that a household with a women with disabilities is more likely to be vulnerable than a household with a man with disabilities. The main underlying factors are related to economic factors such as lower rates of livelihood diversity, poorer asset profiles and high rates of non-productive expenditure.

Given the non-linear nature of the vulnerability classification, multivariate analysis did not demonstrate useful findings to explore the relationship between ageing, disability and vulnerability. However, analysis of vulnerability rates for all households with an older person (24.6%), households with an older person who was disabled (32%) and households with a person with disability aged below 60 (21.9%) and households with no older person and non PwD (21.9%) strongly suggest that within this model, disability renders disadvantage amongst older persons with disabilities, either as newly disabled or as persons with disabilities who have reached old age.

DISCUSSION

The application of the Umbrella model to a large sample of rural households in central Myanmar demonstrated that households with persons with disabilities experience significantly higher rates of vulnerability. The presence of an older person with disabilities, or a woman with disabilities, was associated with even higher rates of vulnerability. Analysis of household vulnerability profile demonstrated that key contributory factors to excess rates of vulnerability are lack of livelihood diversity, poor asset profiles and high rates of non-productive expenditure.

These findings confirm existing research findings of higher rates of poverty amongst households with persons with disabilities. By analyzing a key contributory factor to poverty (vulnerability to natural disaster and economic shocks), this research demonstrates a method to allow more detailed analysis of the 'pathways to poverty'. These data demonstrate the usefulness of applying the Umbrella model to measuring household vulnerability. Applying the model to a general rural population enabled accurate mapping of vulnerability profiles, and differentiation according to demographic characteristics. By doing so, the relative increase in vulnerability rates experienced by households with persons with disabilities

can be demonstrated, as well as differentiation between households with persons with disabilities which need not be classified as vulnerable. Furthermore, application of this model enables more detailed analysis of the underlying contributory factors to household vulnerability, enabling more accurate planning and monitoring of interventions designed to reduce vulnerability and associated poverty. In this population, a sub-set of vulnerable households with persons with disabilities was identified, and analysis demonstrated that the key contributory factors are associated. Interventions designed to strengthen livelihood opportunities, enhance asset profiles and reduce non-productive expenditure can then be targeted at these households, and their impact monitored by follow up data collection.

A major benefit of the Umbrella Model is the ability to differentiate between households with persons with disabilities which can be reasonably classified as 'vulnerable' and those which are not. Current practice within the humanitarian sector has tended to classify beneficiary households according to demographic characteristics, often resulting in automatic classification into a 'vulnerable group' of any and all households which have a person with disabilities as a household member. This model allows more accurate differentiation, and in doing so can be used to support a rights-based approach to inclusion of persons with disabilities which does not assume automatic vulnerability, but instead can identify persons with disabilities for whom inclusion as a recipient of assistance is warranted.

The Umbrella model has potential value for application in poverty reduction projects, by enabling detailed analysis of categories and causes of vulnerability at household level, and enabling more targeted interventions based on a more robust understanding of underlying contributory factors to vulnerability. Given the flexibility of the model, allowing for the use of different indicators to better reflect local conditions, the model can be applied in a variety of settings. However, this limits the extent to which data from one area or country is comparable with data from another, and the model remains at best a predictor of relative vulnerability of a given household or group of households as compared to others within that same area. Our sample highlighted the need to experiment further with indicators which better capture differences between households. This is particularly true of the indicators used for debt and food security, which showed heavy clustering at one end of the scale. The model requires more robust field testing in a variety of settings, and further research to identify a wider pool of suitable indicators. Finally, the model would benefit from longitudinal analysis of accuracy in predicting vulnerability, and in particular, to explore and identify more substantive connections between vulnerability measurements and poverty.

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ACKNOWLEDGEMENTS

This study was undertaken as part of the REVEAL project, a livelihoods intervention programme aimed at poverty reduction in central Myanmar. Data presented here was used with permission of the REVEAL project management, with consent and knowledge of participants.

DECLARATION OF INTEREST

No conflict of interest