ASARC Working Paper 2013/14

Vulnerability to expected poverty in Afghanistan[1]

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November 2013

Abstract

This paper measures vulnerability to expected poverty (VEP) an ex-anti measure of well-being for Afghanistan using a single cross-section data. We measure VEP using household consumption expenditure during 2007/08 to predict probability of future consumption being lower than a specific probability threshold. Our results show that 66 per cent of Afghan population is vulnerable to poverty in near future compared to 42 per cent of the population who currently live under the poverty line. Our results show that poverty and vulnerability vary across geography and seasons and interestingly, areas most exposed to war have the lowest levels of poverty. The results further indicate that household head education, household head being male, housing condition, and ownership of irrigated agriculture land have a positive effect on consumption. In contrast, the fact that the household is rural or nomadic and proportion of family members under 15 and over 50 years of age have a negative effect on household consumption.

Keywords: Vulnerability, Poverty, Afghanistan

JEL Classification Code: C23, C25, C31, I32

[1] I am grateful to the Islamic Republic of Afghanistan (IROA)'s Central Statistics Office (CSO) for giving me access to the NRVA 2007/08 data for this analysis and to Professor Raghbendra Jha and Dinuk Jayasuria for supervision.
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I. Introduction

Poverty affects the lives of millions of people globally. The World Bank president McNamara defined absolute poverty in 1973 in a speech in Nairobi as "a condition of life so degrading as to insult human dignity". However, the depth and spread of poverty in different communities varies due to numerous factors. Poverty measures based on consumption or income data are available for most countries. These poverty measures are widely used to develop poverty alleviation strategies by governments and international donor agencies. Yet, while most poverty alleviation policies are future focused, poverty measures do not provide forward looking information.

An important, and often unanswered question, is who are likely to suffer the most poverty in the future. One way of estimating this is to consider the vulnerability of a population. To illustrate, a household with rain-feed land, which depends on climatic conditions, would be more at risk to poverty than a poor household with fertile irrigated agriculture land all else equal. Vulnerability analysis, together with current poverty analysis, would present more powerful information for development practitioners to base their programmatic decisions than any one type of analysis alone. Pritchett et al. (2000) defines vulnerability to poverty as the risk that a household will experience an episode of poverty in future, measured in terms of probability (p.1).

Importantly, those most prone to future poverty are not necessarily those that currently experience the most poverty (Jha et al. 2010, p.96). Consider Afghanistan, where the World Bank estimates poverty to be 36 per cent in 2007/2008 (WB 2010) and the country is ranked 175th on the human development index (UNDP 2011). Over the last decade it received a shock given the military intervention by the international community, resulting in an average GDP growth of 8.9 per cent during the period of 2003-2011 (WB 2013), the country is likely to experience another shock when International forces withdraw at the end of 2014. One consequence of this shock was that it created high paid employment opportunities in rural communities. Additionally, military personnel implemented a number of projects at district level which has an impact on local economy and thus households. Hence, the impacts of their withdrawal and the absence of an alternative income source will surely influence household consumption.

Vulnerability and poverty are two inter-related concepts in terms of explaining welfare. Holzmann and Jørgensen (2001) give two reasons for such relevance i) the poor are the most vulnerable to adverse shocks, and ii) the poor have fewer instruments to deal with such shocks (pp.530-531). However, poverty is a static concept of welfare while vulnerability takes an inter-temporal dimension of welfare into account. Vulnerability as opposed to poverty is an ex-ante measure of household well-being, which is not observed from data but predicted; conversely, poverty is an ex-post measure of well-being and always observed from data as either household income or expenditure (Chaudhuri et al. 2002, p.2). Therefore, formulating policies based only on current levels of poverty implicitly assumes that similar poverty levels will be observed in the future.

In the case of Afghanistan, many households that are not currently poor are not far away from the poverty line. Therefore, a small event such as a bad harvest, unemployment, illness, a natural disaster, or an economic recession can easily push them into poverty. Alternatively, some households currently below the poverty line may have a more stable source of income and hence consumption, they could therefore be less vulnerable to expected consumption risks. Ligon and Schechter (2003) argue that vulnerability estimates takes into account welfare losses due to poverty as well as those due to uncertainty and risk (p. C95). Hence, vulnerability estimates are forward looking, and takes the presence of uncertainty and risk into account.

Following from the standard definition of poverty as consumption being below a pre-defined level (Ravallion 2012, p.1), consumption dynamics and variability will explain vulnerability. Dercon (2002) argues that vulnerability analysis show that some poor household are unlikely to be vulnerable, while some non-poor household will be vulnerable to poverty in the future (p.158). Consequently, vulnerability estimates are similar to the family of Foster-Greer-Thorbecke (Foster et al., 1984) measures of poverty. Nevertheless, vulnerability explains the dynamics of poverty over time. As a result, estimating vulnerability is a more complex process. Therefore, a number of different empirical methodologies are used to measure vulnerability. The most common vulnerability estimates are vulnerability to expected poverty (VEP) and vulnerability to expected utility (VEU). VEP is the probability of falling under the poverty line or falling deeper into poverty in the near future (Chaudhuri et al. 2002; Chaudhuri 2003; Jha and Dang 2009; Christeanson and Subbaro 2001). Using household consumption expenditure these studies calculate the probability of consumption shortfall

based on a given set of household characteristics. Households are considered vulnerable if the probability of consumption shortfall is more than a defined probability threshold.

Another measure of vulnerability is estimated using a utilitarian approach. Ligon and Schechter (2003) and Holzmann et al. (2003) measure vulnerability as expected utility (VEU) as shortfall of consumption utility from a pre-defined utility level. This approach assumes a utility function and breakdowns the consumption shortfall caused by poverty and risks (aggregate, idiosyncratic). Additionally, Jha and Dang (2008) present two more measures of vulnerability namely vulnerability to variability and vulnerability as inability to insure consumption (p.239). Vulnerability as variability analysis considers a household vulnerable if the standard deviation of its consumption is high. Similarly, vulnerability to insure consumption also called vulnerability as uninsured exposure to risk (Gaiha and Imai 2008,) considers vulnerability as lose of welfare due to a negative shock (p.19).

In an ideal world, vulnerability assessments would be conducted with a longitudinal data of sufficient length. However, such data is scarcely available in developing countries. Instead, multiple authors have used cross-sectional data for such analysis (Chaudhuri et al. 2002, Chaudhuri 2003, Jha and Dang 2009, Christaensen and Subbarao 2005). These studies show that a detailed analysis of such data and the development of vulnerability assessment could provide useful information about future prospect of household welfare. Nevertheless, not all the vulnerability measures are possible with a single cross-section. To estimate vulnerability to expected utility (VEU) Kamanou and Morduch (2004) argues that the data requirements are too high to measure accurate variability in household consumption (p. 162).

Vulnerability to expected poverty (VEP) is estimated by estimating log mean consumption and variance of log consumption. This estimate requires assuming that log consumption is normally distributed and its conditional distribution is the same for all households. A salient feature of this vulnerability indicator is that it could be measured with a cross-section data. However, this also requires a large sample size which can provide sufficient information about future consumption behaviour. Gaiha and Imai (2008) argues that VEP requires a large sample cross-section data to represent household time-series variation in consumption given its characteristics and include information on households experiencing good and bad economic situations (p.13). The data we use for this vulnerability assessment has a large sample size and include detailed information on household consumption.

Poverty alleviation is the main focus of the Afghanistan National Development Strategy (ANDS) and will remain one of the country's important policy issues. However, during the development of ANDS very little information was available on poverty and vulnerability. For instance, a headcount poverty estimate does not exist, which was developed latter in 2010 (WB 2010). Vulnerability estimates and determinants of vulnerability in Afghanistan are important for targeting and allocating resources from the government and international donors. Understanding which household characteristics make a household more likely to be poor in the future can guide useful policy development. Also, understanding the geographic and seasonal variation in poverty and vulnerability can provide useful insights to policy dialogue. Currently, these policies are guided by very limited evidence provided by the World Bank research (2010). While very little quantitative evidence exists on the nature of poverty in Afghanistan, lack of appropriate data and expertise to carry such analysis are main constraints in the development of such evidence. The 2007/08 round of national risk and vulnerability assessment (NRVA) a representative household survey provided a useful cross-section data to conduct such analyses.

This paper has examined vulnerability to expected poverty in Afghanistan using NRVA 2007/08. Using one dollar a day poverty line 42 per cent of people in Afghanistan live under the poverty line. Additionally, 66 per cent of Afghans are vulnerable to expected to poverty in one year period. Furthermore, eastern region and winter are the poorest and the most vulnerable region and season respectively. Urban households are the least poor and least vulnerable, but being rural or Kuchi (nomadic) increases poverty and the probability of being poor in next period. A further breakdown shows that 35 per cent population are poor and vulnerable to poverty, while 31 per cent are currently not poor but vulnerable to poverty in next period. Finally that 34 per cent of population are neither poor nor vulnerable.

The paper is the first in its nature to address vulnerability in the context of Afghanistan. The evidence provided will broaden the knowledge of policy makers on the topic of poverty and vulnerability. Section II explains the data used in this study and the poverty estimates. Section III will outline theory and econometrics of methodology to estimate vulnerability. Section IV will discuss the results in detail. Finally, section V will conclude the paper.

II. Data and Poverty Estimates

i.Data

The data used for the paper is a representative household survey called National Risk and Vulnerability Assessment (NRVA) conducted every two years. Data from 2003, 2005, and 2007 is available, while we only had access to the most comprehensive set of 2007/2008 data. The data provide very detailed information on: food consumption, non-food expenditure, housing infrastructure, assets and credit, demographic, income, agriculture and livestock, health, education, remittance, migration and shocks.

An additional interesting aspect of the survey is that it is conducted throughout the year and the data could be clustered over four quarters to explain seasonal variation of different variables. Moreover, price data is collected separately at the district level and for the whole year to capture difference in prices by location and seasons of year. The sample size is 20,576 households in 34 provinces and 2,572 communities. The data include 11 urban domains as the centre of 11 provinces, while it also has one domain of Kuchi (nomadic) population. The survey is conducted using three main questionnaires, a male questionnaire, a female questionnaire and a community questionnaire. Additionally, it used a separate questionnaire to collect prices from markets at district level. The survey had a very high response rate of over 99 per cent.

ii.Poverty estimation

Vulnerability assessments use poverty estimates based on household consumption. Therefore, to conduct the analysis, it will be necessary as to first estimate household consumption expenditure. Literature on poverty in the case of Afghanistan is almost non-existent. The only comprehensive analysis of poverty is conducted by World Bank and reported in 2010 using the same data set. To construct aggregate household consumption estimates we used Deaton and Zaidi (2002) and Lanjouw (2005) as guide.

To construct aggregate consumption we used 91 food items and prices collected at district level. Additionally, non-food consumption includes two types of items; first items for which expenditure is reported for 30 days, and other items for which it is reported as annual expenditure. Moreover, monthly energy consumption and monthly rent paid by household were included. Conversely, large asset purchases, donation, celebrations and some religious

expenditure were reported but we did not consider these in our household consumption expenditure. Deaton and Zaidi (2002) and Lanjouw (2005) recommend not including information on large expenditure such as marriage, funeral, religious expenses, gifts and donation either because they are reported for few household and are very large or there are double counting issues involved.

The price data as expected suffered from a large missing data problem. To correct for this, following Deaton and Zaidi (2002), we collapsed the prices by median, district and month of interview, while imputed the missing values by median prices. This strategy is important to avoid biased estimates. For instance, collapsing by district captures regional difference in prices while collapsing by month of interview captures the seasonality of prices. This process is important in the case of Afghanistan due to price variation over the year and geography. This process has a very profound impact on the poverty analysis in Afghanistan. For instance, Afghanistan could be divided into urban areas which are connected to neighbouring countries and Kabul the capital of the country, where food is comparatively cheaper and easily available. Conversely, there are central regions and other mountainous areas which suffer from lack of transportation infrastructure and food shortages and higher prices. Similarly, harsh winters in central, western and north eastern provinces cause higher prices and food shortages. While comparatively during summer local produce availability will lead to abundance availability and lower prices.

Also, Deaton and Zaidi (2002) argue that median prices are preferred to mean prices for imputation as the latter is sensitive to outliers (p.30). Imputing with median prices seems reasonable as this price is not from urban areas, where prices will be lower, and is also not from remote areas where prices are expected to be higher. Also, it the case of poor people most of their budget is spent on food expenditure. Therefore, using higher prices for food items will downward bias the poverty estimates. Therefore, the choice to impute the missing prices will need to be made very carefully. Imputing with higher prices implies using the prices from remote areas and high price season; therefore these prices might not be representative.

The choice of poverty line has serious implications for poverty estimates as well as policy formulation. While the choice of poverty line is embedded in the economic theory of consumer behaviour, it is necessary to ensure the comparability of poverty estimates

(Ravallion 2001, p.3). Therefore, this paper uses one-dollar-a-day poverty line converted at the average exchange rate for the duration of the survey period[2]. This poverty line was developed by Ravallion, et al. (1991) and revised by Chen and Ravallion (2001). This poverty line is also used as benchmark for millennium development goals. However, it is worth mentioning that the World Bank report uses national poverty line calculated as food-poverty line and non-food poverty line in consultation with local government authorities to ensure the ownership of poverty estimates.

Based on this poverty line our head count poverty estimate is 42 per cent. This is 6 percentage points higher than the World Bank estimates. Three main methodological differences explain such variability. First, the poverty line used in our paper is higher than the one used by the World Bank (2010). Secondly, our imputation strategy outlined above used median prices to impute for missing prices, while the World Bank uses a different imputation strategy (WB2010, p.9). Lastly, our estimates do not include some non-food items from consumption expenditure based on theoretical reasons outlined by Deaton and Zaidi (2002). For instance we do not include celebration and religious expenditure such as pilgrimage (Haj). The reason for this exclusion is that we assume an equal distribution of consumption expenditure among household members; while this large expenditure items does not contribute to the welfare of the household and do not benefit everyone in the household equally. However, it is worth mentioning that our poverty profile is consistent with the World Bank report in terms of the distribution of the poverty over geography and seasons. We will discuss the distribution of poverty with vulnerability results in Section 4.

III. Methodology

Vulnerability analysis is more challenging than that of poverty. To conduct vulnerability analysis, a theoretical framework on inter-temporal choices and determinates of consumption in a static setting is required. This section outlines the theoretical underpinnings of VEP and also explains our estimation strategy.

i. Vulnerability Measurement

Vulnerability is defined as the ex-anti risk that a household will fall into poverty if currently non-poor, or if currently poor will remain poor. Nevertheless, a number of definitions exist

[2] During this period annual average is $1US equals 50 AFS.

for vulnerability in the context of welfare assessments. The definitions we use imply a detailed estimation of household mean consumption as well as the variation in household consumption. Udry (1995), Townsend (1994) and Gunther and Harttgen (2009) argue that in the face of shocks, mean consumption and variance of consumption are two important estimates in explaining household vulnerability.

To construct such measurements in an ideal setting a panel data is required. However, Chaudauri et al. (2002) and Chaudhuri (2003) propose an estimation methodology for vulnerability to poverty based on cross-section data. Following this methodology, this paper estimates VEP for Afghanistan using household data from 2007/2008. Chaudhuri (2003) proposes that vulnerability depends on the stochastic properties of inter-temporal consumption, which itself depends on household characteristics (p. 12). The vulnerability of a household is defined as the probability of its consumption in period t+1 to be below a threshold probability

$$V_{ht} = Pr(c_{h,\ t+1} \leq z) \tag{1}$$

Where V is vulnerability of household h at time t, $c_{h,t+1}$ is the household's per-capita consumption level at time t+1 and z is the poverty line. A household will be considered vulnerable in next period if the probability of being vulnerable to poverty is greater than a pre-determined threshold. The main difference of poverty and vulnerability could be seen from this equation. Vulnerability is forward looking measure of well-being and inferences could be made about household's future poverty status. In addition, consumption literature suggest that household consumption depends on its endowment, current income, expected future income, the uncertainty regarding future income, and its ability to smooth consumption in the presence of various shocks (Deaton 1992). It follows that consumption could be written as:

$$C_{ht} = c(X_h, \beta_t, \alpha_h, e_{ht}) \tag{2}$$

Where X include household h's observable characteristics, β represents a bundle of parameters explaining the state of the economy at time period t, and α represents an unobserved time invariant effect for household h, e represents idiosyncratic shocks that causes difference in welfare level for observationally identical household. Equation (1) and (2) states that household vulnerability level is derived from stochastic properties of inter-

temporal consumption it faces. Additionally, inter-temporal consumption depends on household characteristics and the characteristics of the market it exists in. The extent of generality shown in this expression is not attainable due to data constraints and so a number of assumptions are required.

ii. Econometric Strategy

Vulnerability to poverty estimation requires the estimation of future mean consumption as well as its volatility. A household probability of being poor in future depends both on its mean consumption and variation in consumption. For instance, in the context of Afghanistan, a household with fertile irrigated land will have stable consumption compared to a household headed by unskilled labourer with no formal education who mostly depends on day-to-day labour earnings. It is uncertain in the latter case to ensure income on daily bases and therefore consumption is more volatile.

However, using cross-section data we need to impose restriction to make the estimation of VEP possible. Therefore, similar to Jha and Dang (2009) we assume that households has the same conditional distribution of log-consumption overtime (p.237). We regress log-consumption over a bundle of observable household characteristics X and an identically and independently distributed error term e.

$$ln\, c_h = X_h\beta + e_h \tag{3}$$

The error term captures idiosyncratic factors (shocks) which causes differences in household consumption level. Also, we assume stationary environment and ignore the effects of uncertainty on household consumption. These assumptions are forced on the study because it uses a single cross-section. However, it is worth mentioning that these assumption are not as stringent as the implicit assumption made by a typical poverty analysis. The variance of log-consumption is assumed to depend on the household characteristics as :

$$\sigma^2_{e,h}=X_h\theta \tag{4}$$

Following Chaudhuri et al. (2002) we use three-stage feasible generalized least squares (FGLS) proposed by Amemiya (1977) . After estimating equation (3) using ordinary least squares (OLS), we use estimated error terms to estimate:

$$\hat{e}^2_{OLS,h} = X_h\theta + \eta_h \tag{5}$$

We predict $\hat{e}^2$ and use it to transform the equation as follows:

$$\frac{\hat{e}^2{}_{OLS,h}}{X\hat{\theta}} = \left(\frac{X_h}{X\hat{\theta}}\right)\theta + \left(\frac{\eta_h}{X\hat{\theta}}\right) \tag{6}$$

The prediction from equation (6) is a consistent estimate of $\sigma^2{}_{e,h}$ of the variance of idiosyncratic component of household consumption. After taking the square root we use this estimate to transform the log consumption equation.

$$\sigma_{e,h} = \sqrt{X\hat{\theta}}$$

$$\frac{\ln c_h}{\sigma_{e,h}} = \left(\frac{X_h}{\sigma_{e,h}}\right)\beta + \frac{e_h}{\sigma_{e,h}} \tag{7}$$

We estimate the equation (7) using OLS, which produces consistent and asymptotically efficient estimates of β . Using $\hat{\beta}$ and $\hat{\theta}$ obtained from equation (6) and (7) we are able to directly estimate expected log consumption and variance of log consumption:

$$\hat{E}[\ln c_h \,|X_h] = X_h\hat{\beta}$$

$$\hat{v}[\ln c_h \,|X_h] = \sigma^2_{e,h} = X_h\hat{\theta}$$

We get both of these estimates for each household h. Based on our assumption that consumption is log normally distributed; the next step is to calculate the probability of vulnerability as expected poverty. Using standard normal cumulative density function Φ (.) to generate the VEP estimate for each household h:

$$VEP_h = \hat{V}_h = \widehat{Pr}\,(\ln c_h \leq \ln z|\, X_h) = \Phi\left(\frac{\ln z - X_h\hat{\beta}}{\sqrt{X_h\hat{\theta}}}\right)$$

The estimate from this equation is the probability of household being consumption poor in next period conditional on a bundle of household characteristics. Table 1 provides a summary statistics of household characteristics included in the log consumption and its variance regressions:

Table 1 **Descriptive statistics of households characteristics used to calculate VEP**

Variable	Observation	Mean	Standard Deviation
Location	18092	1.86	0.47
HH head gender	18092	0.98	0.14
HH head age	18092	43.49	14.06
HH head age square	18092	2089.43	1371.56
HH size	18092	7.37	3.23
HH size squared	18092	64.77	63.90
Proportion of under 15	18092	0.49	0.20
Proportion of over 50	18092	0.10	0.16
Irrigated land ownership	18092	2.82	11.35
HH head Education	18092	0.91	1.72
Toilet facility	18092	0.64	0.48

This estimation strategy is similar to standard poverty analysis which uses regressions, with only one important difference. The error term in poverty analysis is considered to arise from measurement error and some omitted unobservable variable and for these reasons it is mostly ignored. While vulnerability assessments specify a separate equation such as (4) in which the variance of household consumption depends on observable household characteristics. With the assumption that household consumption is log normally distributed this term can be obtained by OLS.

Two problems arise using this econometric strategy. First, is the measurement error observed in the data, which affects our variance of consumption estimates in equation (6). The reason for this bias is that the mean of squared error terms from equation (3) will be biased by the variance of disturbance term. This bias will transfer to the intercept term in equations (6) and (7) and we will estimate an upward bias mean consumption and variance of consumption. However, to correct for such effect we drop the intercept term in both regression and instead we add a new constant term. The new constant term is equal to the weight with which we weight all other variables in the model. A minor second issue is that we get a few negative prediction of $\sigma^2_{e,h}$ from equation (6) because of our linear specification. These observations were simply dropped from the sample.

Mean VEP level should approximately equal to the poverty level in that sample. However, the interpretation of the whole distribution will be inappropriate and therefore it is necessary

to choose some threshold level for this purpose. Chaudhuri et al. (2002) suggest using the mean VEP, the percentage of currently observed poverty, or a threshold of 0.5 (p.11). In the case of using mean VEP as threshold this implies that if a household's VEP is higher than the mean VEP for the population will be considered in greater risk of being poor in the future.

Similarly, using the observed poverty level indicates that a household with higher VEP than the current poverty level is more likely to be poor. Considering poverty estimates of 42 per cent from this paper, this cut off is a probability higher than 0.42. Moreover, Pritchett et al. (2000) use the threshold of 0.5 and argue that this level implies that a household faces even or higher probabilities of being poor (p.5). They further argue that, with this threshold in infinite time horizon poverty and vulnerability level will coincide (p.5). For the purpose of our analysis we consider both the poverty level equivalent threshold of 0.42 and the 0.5 threshold level. Therefore, a household with higher vulnerability level than both these thresholds is considered more likely to be poor in the future.

IV.Results

For the purpose of generating VEP estimates for Afghanistan we used two VEP thresholds. Firstly, we used the threshold of 0.42 which is observed poverty rate equivalent probability threshold. Based on this threshold 66 per cent of the population in Afghanistan is vulnerable to poverty in the near future (in one year time). We also use a threshold of probability 0.5; in other words a household has an even or higher probability of being poor in next period. Based on this threshold 41 per cent of the population is vulnerable to poverty. Both these figures provide very important information about the nature of poverty in Afghanistan. For instance, at national level 42 per cent people are poor; while 66 per cent are vulnerable to poverty at the poverty line of a dollar-a-day. In addition, the regression result provides information about the impact of individual household characteristics on mean consumption and variance of consumption. To better explain our results, we provide details of the results in three sub-sections.

i. Determinants of Vulnerability

Table 2 presents the results on the determinants of predicted mean consumption and variance of consumption regression. These determinates are the foundation of the VEP estimates briefly explained in the previous section and a detailed explanation will be provided in later

section. Location (urban or rural) and the number of dependents in a household are negatively correlated with consumption. In other words, households in urban areas are less vulnerable compared to households from rural and from Kuchi (nomadic) population. This result is consistent with the poverty estimates from our analysis and the World Bank estimates (2010).

Also, the number of family members over-50 and under-15 years of age in a household makes households more vulnerable, while considering that the square of household size has a positive sign, which indicate as household size increases the predicted consumption level also increases. Household head education has a positive correlation with predicted consumption level. The higher the level of the household head education the less likely the household will be poor in future. Gender of the household head and age of the household head also provides useful insights. Household head being male increases consumption and therefore, decreases the probability of being vulnerable. However, the household head age has a quadratic relationship with mean log consumption level. Initially, the household head age increases consumption level and reaches a maximum. After this maximum the household head age has a negative relationship with consumption level. This relationship is shown by the squared term in the regression. These results show that household headed by female, older and person with less formal schooling will have lower levels of consumption and are more likely to be vulnerable.

Similarly, land ownership increases predicted consumption level and decrease the probability of household being poor in the future. We consider land ownership as proxy for physical capital ownership and household head education as proxy for human capital ownership of the household as reflected in most poverty assessments. Therefore, household with higher physical and human capital will enjoy higher consumption. Further, these household will be less vulnerable to poverty in the future.

In addition, availability of a toilet facility has a positive relationship with household consumption. Availability of toilet facility in a house is considered as proxy for good housing conditions. Therefore, better housing conditions will decrease the probability of a household being vulnerable to poverty. The correlation between the variables explained above and used by our study with consumption and through consumption to VEP could be found elsewhere in poverty and vulnerability literature (see Dercon 2002; Jha and Dang 2010; Baulch and Hoddinott 2000; Jalan and Ravallion 2000).

Table 2 **Regression output**

VARIABLES	Log Consumption		Variance	
Location	-0.213***	(0.008)	0.00005	(0.005)
HH head gender	0.150***	(0.024)	-0.07251***	(0.023)
HH head age	0.00689***	(0.0013)	-0.00118	(0.001)
HH head age2	-6.26e-05***	(1.36e-05)	0.00001	(0.000)
HH size	-0.0992***	(0.0037)	-0.01200***	(0.003)
HH size2	0.00354***	(0.00017)	0.00059***	(0.000)
HH head Education	0.0128***	(0.00196)	0.00809***	(0.002)
Proportion over 50	-0.218***	(0.0303)	0.05793**	(0.025)
Proportion under 15	-0.389***	(0.0212)	-0.02570*	(0.015)
Land ownership	0.00472***	(0.000)	-0.00050	(0.000)
Toilet facility	0.247***	(0.00734)	-0.00614	(0.005)
Constant	8.035***	(0.0418)	0.34775***	(0.034)
Observations	18,092		18,092	
R-squared	0.997		0.277	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ii. Poverty and vulnerability profile

We produce poverty and vulnerability profiles for Afghanistan based on our estimates of poverty and vulnerability. The distribution of vulnerability and poverty by location and seasons in Afghanistan is important for a number of reasons. First, classifying population into urban, rural and Kuchi (nomadic) population provides very useful insights about poverty and vulnerability. Urban population in the data is defined as households living in the capitals of 11 out of 34 provinces; the rest of the country is classified as rural. Kuchi population or nomadic population are people who does not have land or home and travel around the country in different seasons. This category is mostly involved with livestock activities and is looking for pastoral areas to herd their animals; they make up 6.3 per cent of the NRVA 2007/08 sample.

Table 3 lists the poverty and vulnerability estimates for these categories in the population. It is evident that urban households are less vulnerable compared to rural and Kuchi households.

Poverty shows a similar distribution with approximately 55 per cent Kuchi, 46 per cent rural and 20 per cent urban households live under the poverty line. At 0.5 vulnerability threshold 91.4 per cent of Kuchi population is vulnerable to poverty in future; while 46 per cent rural and approximately 10 per cent urban population are vulnerable to poverty.

Vulnerability estimates at current observed poverty level are high; the presence of high level of uncertainty about future and risks are a possible explanation. This argument also provides evidence on the transient nature of poverty in Afghanistan. In other words, the consumption level of a large number of households is close to the poverty line and these household will change places with households below poverty line overtime. Ravallion and Jalan (1998) argue that transient poverty is inter-temporal variability in consumption and a part of the poverty observed at a point in time will be transient in nature (p.338).

Afghanistan has started a transition to take more responsibility for security, governance and economic activity. The transition leaves the Afghan economy at a higher level of uncertainty due to security threats, a decline in aid flow, and no international military spending. Additionally, it is expected that the transition will slow down the process of economic growth observed in last 10 years. Considering the high poverty and vulnerability to poverty in Afghanistan, it will be necessary for the Afghan government and international community to fill these gaps. Alternative programs will be required to ensure that poor households have access to public services and employment opportunities. For instance, investment to increase agricultural productivity will help most rural households to increase or keep current level of consumption. Rural households are mostly busy with agricultural activities in two ways either they own land and live off farming or they are unskilled labourers living with employment in agriculture.

Table 3**Poverty and vulnerability by location**

Location	Total observations	Poverty	VEP 0.42	VEP 0.5
Urban	3447	20.1%	40.1%	9.5%
Rural	13782	46.4%	70.8%	45.7%
Kuchi	863	54.6%	96.2%	91.4%

Geography has an important role in poverty assessment and poverty eradication policies. Afghanistan is a land locked and mountainous country with poor infrastructure. The country also suffers from food shortages and imports food products from neighbouring countries. Food shortages and price volatility are common in the country and particularly in remote mountainous areas. Therefore, households are prone to price shocks and suffer high consumption instability. In addition, a number of other factors might contribute to poverty level in different geographic areas such as conflict, violence, opium, irrigation infrastructure, and distance from urban centres.

Table 4 presents poverty and vulnerability estimates for seven official geographical regions in Afghanistan. The least poor and vulnerable region is south western region which includes two of the most land abundant provinces of Kandahar and Helmand. However, this region also includes Dai-Kundi province which is considerably poor and vulnerable (see Appendix for provincial estimates). Moreover, this part of the country was badly affected by violence during the survey period. Also, this part of the country has large illicit drug industry, which creates jobs and income source for farmers. This region has approximately 16 per cent poverty and 43 per cent vulnerability to poverty.

On the other hand, the poorest region is the eastern region which is home to 58 per cent poor and 83 per cent vulnerable population. Eastern region includes two of the mountainous provinces with higher population density and relatively little agricultural land. However, these two provinces enjoy the economic benefits of one of the most important highways which connect Afghanistan to the nearest port located in Pakistan. Therefore, it will be essential to further explore the main explanations behind such high poverty and vulnerability in this region.

The second and third poorest regions are south east and north east, which respectively suffer from 51 and 50 per cent poverty and 67 and 75 per cent vulnerability. Additionally, central region which includes the capital Kabul is the second least poor and vulnerable area in the country. This region has poverty of approximately 31 per cent and vulnerability to poverty of 61 per cent. However, it is worth mentioning that central region includes some of the remote and mountainous areas after north east region so it is expected that poverty and vulnerability in these provinces will be very high (see appendix). Based on this breakdown we can

conclude that most of the provinces located in the north and east of the country are the most poor and vulnerable to poverty provinces.

An interesting finding from these results is that the most war affected areas such as south-west show relatively smaller poverty rates compared to national poverty rate. One explanation is that the war and presence of international troops creates economic opportunities. The international troops provide higher salary jobs at their military bases and also implement some projects in the surrounding areas. Additionally, areas with war and violence are more prone to illegal activities such as narcotics cultivation and trade. For instance a recent survey by the United Nation Drug Control Agency shows that around 84 per cent of opium was produced in southern region of Afghanistan in 2008 (p.15). To better understand the distribution of poverty and vulnerability estimates by geography we provide a more detail estimates for each province in Table 7 in the Appendix.

Table 4 **Poverty and vulnerability by geographic regions**

Region Name	**Number of Provinces**	**Total Observation**	**Head Count Poverty**	**VEP at Poverty Line Threshold (0.42)**	**VEP at 0.5 Threshold**
North East	7	3895	49.6%	75.0%	48.9%
West	4	2765	48.0%	73.2%	52.7%
Central	7	3031	30.6%	60.6%	28.2%
South West	3	2093	15.7%	42.7%	21.6%
North West	5	2772	40.5%	62.2%	35.0%
South East	6	2318	51.5%	66.5%	44.3%
East	2	1236	58.4%	82.8%	61.0%

Poverty and vulnerability estimates show variation over seasons as well. Afghanistan has four distinct seasons with cold and snowy winters and dry and warm summers. Some parts of Afghanistan suffer from harsh winters with snow fall and freezing temperatures. The combination of harsh winters and poor transport infrastructure causes higher prices and episodes of food shortages and therefore distort consumption. D'Souza and Joliff (2010) find that a 1 per cent increase in wheat flour price in Afghanistan decreases consumption by 0.2 per cent (p.17). Conversely, during summer and autumn where farmer collect their harvests so more local produce are available and prices are lower. Also, there are more employment

opportunities in agriculture in particular compared to winter. Therefore, as expected poverty tends to be lower during summer and autumn; but will be high during winter.

Table 5 presents poverty and vulnerability to poverty by four seasons in Afghanistan. As expected, autumn is the least poor season with 37 per cent poverty and 65 per cent vulnerability. In contrast, winter is the poorest season with 48 per cent poverty and 69 per cent vulnerability to poverty. An important point to note is that vulnerability to poverty with poverty level equivalent probability threshold does not fluctuate much. This implies that even though poverty level fluctuates between quarters of the year vulnerability to poverty does not fluctuate significantly.

Table 5 **Poverty and vulnerability by quarter/season of year**

Quarter	Total Observation	Head Count Poverty	VEP at Poverty Line Threshold (0.42)	VEP at 0.5 Threshold
Spring	5293	43%	65%	38%
Summer	5470	38%	66%	42%
Autumn	2883	37%	65%	40%
Winter	4446	48%	69%	45%

iii. Level of Vulnerability

Table 6 divide the sample by VEP level and mean consumption into three groups as proposed by Chaudhuri et al. (2002). The non-vulnerable are the group which has lower than 0.42 probability of being vulnerable to poverty and this group will by default have a higher mean consumption than the poverty level. This group based on assigned criteria is non-poor and non-vulnerable portion of the population. The second group are households whose vulnerability is higher than 0.42 but which has a higher mean consumption than the poverty line. This includes people who are not consumption poor, but their consumption suffers from a high volatility. This group is particularly prone to fall below poverty by experiencing an adverse shock. This group needs to be assisted with consumption and income stabilization interventions.

The last group are the people who have probability of being vulnerable higher than 0.42 and mean consumption lower than the poverty line. Therefore, the last group is essentially consumption poor and vulnerable to poverty in next period. To assist this group to come

above poverty line long term poverty alleviation strategies will be necessary. This classification is particularly important if we look at the nature of poverty in terms of being transient or chronic. The high volatility group are likely to be transient poor; while the low mean vulnerable would be the chronic poor.

Table 6 **Vulnerability levels**

Level	
Non-Vulnerable	34%
High Volatility	31%
Low Mean Vulnerable	35%

V. Conclusions

Poverty and vulnerability are two similar concepts but vulnerability explains prospects of poverty. Therefore, complementing poverty estimates with vulnerability to expected poverty estimates should better inform policy. This assessment we developed a measure of vulnerability to expected poverty, using representative cross-section data from Afghanistan. The estimates explain the nature of poverty in the case of Afghanistan, where very little quantitative evidence exists on the topic of poverty and almost no previous analysis of vulnerability has been conducted. We found that 66 per cent of the population is vulnerable to poverty in the future compared to a current poverty headcount rate of 42 per cent. However, the vulnerability level is 41 per cent when we use a threshold of 0.5. Moreover, poverty estimation was carried out as a necessary condition to conduct vulnerability analysis. We estimated a headcount poverty rate of 42 per cent.

Our analysis shows that future expected poverty is not uniform. To illustrate, the eastern region seems to be the poorest region with 58 per cent poverty and 83 per cent vulnerability level. Conversely, the south-west region is the least poor and vulnerable with 16 per cent and 43 per cent of poverty and vulnerability respectively. Importantly, this analysis does not take into account the likely impact of international community withdrawal. Moreover, south-west region, affected by war may currently receive greater economic benefits due to the presence of international troops. However, their withdrawal could reduce employment opportunities and increase poverty. In future research, we plan to consider the impacts of this withdrawal on vulnerability estimates.

Poverty and vulnerability estimates show that winter is the poorest season with 48 per cent poverty and 69 per cent vulnerability while autumn is the least poor season with 37 per cent poverty and 65 per cent vulnerability. This appears reasonable given that agricultural activity decreases during winter and people are forced to decrease consumption as a coping strategy.

Our regression analysis shows that the urbanization level increases mean consumption. Urban families enjoy higher mean consumption comparing to rural and Kuchi households. Also, as the number of dependents increases in a household the average consumption of the household will fall. However, household size has a negative impact on consumption level. Household head education and ownership of irrigated agriculture land increases mean consumption. Further, households headed by men tend to have higher consumption. Similarly, house condition explained by availability of a toilet facility in a house also increases consumption level. These results provide some useful insights about determinants of consumption in Afghanistan. Our analysis allows for targeted policy prescriptions across geography and seasons.

Further, we can separate the Afghan population into a not-poor and non-vulnerable group (34per cent), a high volatility group who are currently not poor but vulnerable (31 per cent) and a low mean consumption group who are poor and vulnerable (35 per cent). The second group are transient poor and need some consumption or income stabilization intervention. The third group is chronically poor and will need some poverty eradication policy.

Ultimately, our analysis provides just a glimpse of what's possible with the available data. The use of panel data, from early waves of the survey and 2009 wave will provide a richer source of material for future analysis. The NRVA 2007/08 is the latest available data set, as the 2009 round is not yet available for public access.

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Appendix

Table 7 **Poverty and vulnerability by province**

Province Code	Province Name	Total Observation	VEP at Current Poverty rate (0.42)	VEP at 0.5 Threshold	Head Count Poverty
1	KABUL	1117	43%	15%	10%
2	KAPISA	270	71%	44%	26%
3	PARWAN	388	77%	48%	22%
4	WARDAK	388	37%	26%	62%
5	LOGAR	312	71%	31%	70%
6	GHAZNI	715	57%	29%	29%
7	PAKTIKA	467	88%	64%	94%
8	PAKTYA	368	88%	70%	78%
9	KHOST	218	84%	62%	75%
10	NANGARHAR	944	82%	60%	50%
11	KUNARHA	319	92%	80%	76%
12	LAGHMAN	292	84%	63%	85%
13	NOORISTAN	260	93%	67%	69%
14	BADAKHSHAN	759	79%	52%	81%
15	TAKHAR	806	67%	38%	42%
16	BAGHLAN	775	70%	44%	29%
17	KUNDUZ	689	68%	41%	37%
18	SAMANGAN	268	75%	50%	72%
19	BALKH	929	53%	25%	68%
20	JAWZJAN	460	53%	28%	9%
21	SAR-I-POUL	347	74%	46%	19%
22	FARYAB	768	70%	41%	24%
23	BADGHIS	428	93%	75%	67%
24	HERAT	1486	74%	50%	46%
25	FARAH	373	34%	18%	17%
26	NIMROZ	287	49%	30%	13%
27	HELMAND	875	24%	7%	4%
28	KANDAHAR	856	45%	18%	8%
29	ZABUL	263	30%	15%	23%
30	UROZGAN	282	67%	13%	2%
31	GHOR	478	85%	67%	63%
32	BAMYAN	256	85%	60%	76%
33	PANJ SHER	287	81%	55%	29%
34	DAYKUNDI	362	83%	64%	62%