Vulnerability to poverty in Papua New Guinea

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and
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The Arndt-Corden Division of Economics
Research School of Pacific and Asian Studies
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Vulnerability to poverty in Papua New Guinea

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Abstract

In the extant literature either income or consumption expenditures as measured over short periods of time has been regarded as proxies for the material well-being of households. However, economists have long recognized that a household’s sense of well-being depends not just on its average income or expenditures, but also on the risks it faces. Hence vulnerability is a more satisfactory measure of welfare. In this study we measure the extent of vulnerability as expected poverty and examine the importance of its determinants on the basis of an analysis of household survey data for Papua New Guinea (PNG). We find that in PNG, vulnerability and poverty are largely rural phenomena. Moreover, the distribution of vulnerability across different segments of the population can differ significantly from the distribution of poverty. In addition, there is a sizable fraction of the population of PNG who were observed to be non-poor but are estimated to be vulnerable to poverty. Thus, poverty reduction strategies in PNG need to incorporate not just alleviation efforts but also prevention.

Keywords: Poverty, Vulnerability, Cross-section data, PNG

JEL codes: C21, C23, I32

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I. Introduction

In the extant literature either income or consumption expenditures, as measured over short periods of time (say a year), has been regarded as proxies for the material well-being of households. However, economists have long recognized that a household’s sense of well-being depends not just on its average income or expenditures, but also on the risks it faces. Hence vulnerability is a more satisfactory measure of welfare. The concept of vulnerability used extends the notion of poverty to include idiosyncratic as well as system-wide (covariate) risks. If policymakers design poverty alleviation policies in the current year on the basis of a poverty threshold of income in the previous year, “the poor” who receive income support may have already escaped from poverty and “the non-poor” who do not receive income may have slipped into poverty due to various unanticipated shocks (e.g. changes in relative crop prices or an illness incapacitating the main bread winner).

Chaudhuri (2003) listed four reasons why we should be concerned about vulnerability:

- A temporal or static approach to well-being, like poverty assessment, is of limited use in thinking about policy interventions to improve well-being that can only occur in the future.
- Vulnerability assessment highlights the distinction between ex-ante poverty prevention interventions and ex-post poverty alleviation interventions.
- Analysing vulnerability helps to investigate sources and forms of risks households face. This helps to design appropriate safety net programs to reduce or mitigate risk, hence vulnerability.
- Vulnerability is an intrinsic aspect of well-being under the assumption that individuals are risk averse.

According to Holzmann and Jørgensen (2001), poverty and vulnerability are closely related concepts due to two established facts: (i) the poor are typically most exposed to diverse risks, and (ii) the poor have the fewest instruments to deal with these risks. Thus, Chaudhuri et al. (2002) state that:
Poverty and vulnerability (to poverty) are two sides of the same coin.... So if we are able to generate predicted probabilities of poverty for households with different sets of characteristics (which some but not all poverty assessments attempt), we will have, in effect, estimates of the vulnerability of these households.” (p. 3)

The purpose of this paper is to analyse poverty and vulnerability in Papua New Guinea (PNG). The paper begins in Section II by discussing the concept of social risk management and vulnerability. Section III lays out strategies to measure vulnerability for cross-section data. Section IV briefly introduces the economic and poverty situation in PNG. Section V discusses the data used in our analysis. Section VI estimates determinants of vulnerability to poverty in PNG. Section VII conducts a profile of vulnerability for PNG. Section VIII concludes the paper. To the best of our knowledge, this is the first analysis of vulnerability for PNG.

II. Social risk management and vulnerability

Globalization leads to improvements in welfare all over but also increase in income variability. Thus, according to Holzmann and Jørgensen (1999), social risk management (SRM) is concerned about four main issues:

• **Vulnerability**: can be defined as the risk of an individuals or a households to fall below the poverty line or, for those already below the poverty line, to remain in or to fall further into poverty. Anti-vulnerability policies are designed to prevent this risk. Meanwhile, traditionally, anti-poverty policy is only concerned with bringing the poor up to the poverty line. Enhancing the static anti-poverty concept with the dynamic vulnerability concept through risk management measures should prove to be welfare enhancing.

• **Consumption smoothing**: Individuals are presumed to prefer spreading the expected income over a long period (i.e., they are risk-averse). This requires appropriate risk management instruments, such as saving and dis-saving possibilities, in order to smooth consumption path.

• **Improved equity**: Improved equality eases constraints in the ability of the poor to smooth their consumption, resulting in a better risk management (Holzmann and Jørgensen, 2001)
• *Economic development:* Undoubtedly, economic development is an important factor in reducing poverty.

Among the above issues, vulnerability is the central concept of SRM (Holzmann et al., 2003). Holzmann et al. (2003) review three definitions of vulnerability:

1. Vulnerability is the risk that a household will, if currently non-poor, fall below the poverty line, or if currently poor, will remain in poverty or fall deeper into poverty. Thus, vulnerability is synonymous with a high probability of becoming poor or poorer in the future. This definition is referred as *outcome approach* to vulnerability in Scaramozzino (2006).

2. Vulnerability is the households’ ability to smooth (insure) consumption when faced income shocks while preserving a minimum level of assets. Under this approach, vulnerability is tantamount to consumption volatility. More precisely, household vulnerability is the conditional covariance between changes in household consumption and changes in income, subject to an asset constraint.

3. Vulnerability is the utility lost due to risks, as the difference between the expected household consumption and the certainty-equivalent consumption. This definition is referred as *utility-based approach* to vulnerability in Scaramozzino (2006). Especially, the utility function can be decomposed into two distinct components measuring vulnerability: poverty and risk (aggregate and idiosyncratic risk) (Ligon and Schechterd, 2003).

### III. Empirical strategy toward measuring vulnerability

This section discusses econometric methods for vulnerability assessments corresponding to the first definition of vulnerability – outcome approach. Ideally, according to Holzmann et al. (2003), the implementation of vulnerability assessment requires panel data, and information on (i) the shocks that affect the households, and (ii) the household ability to withstand those shocks. Such data are typically not available, especially in developing countries. However, cross-sectional data have...
been advised to estimate vulnerability, namely *vulnerability as expected poverty* (VEP), as a second-best solution (Chaudhuri, 2003; Chaudhuri et al., 2002).

With VEP, the vulnerability level of household (or individual) *i* at time *t* is defined by

$$ VEP_t = \Pr(c_{i+1}^t \leq z) $$

where $c_{i+1}^t$ is the per capita consumption (or income) of household *i* at time *t* + 1 and *z* is the per capital expenditure requirement defined as the poverty line. If we can estimate the ex ante probability distribution $f$ of the consumption $c$, the vulnerability of household *i* can be identified as

$$ VEP_t = \int_0^z f(c_{i+1}^t) dc_{i+1}^t $$

Here, we assume a stationary environment where the probability of possible future consumption outcomes remain the same across time (Ligon and Schechter, 2004).

The major challenge in measuring vulnerability is to estimate the probability distribution $f$ (Christiaensen and Boisvert, 2002). Given a limited panel data set for two years, in the case of Tajikistan, we assume that consumption is log-normally distributed as in Chaudhuri et al. (2002). Thus, vulnerability is estimated by

$$ VEP_t = \Phi\left(\frac{\ln z - \ln c_{i+1}^t}{\sigma_i}\right) $$

with $\Phi$ is the cumulative log-normal distribution function.

Thus, to estimate a household's vulnerability we need to estimate its expected consumption and the variance of its consumption. To predict the consumption of

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* With a panel data of sufficient length we can directly estimate the probability distribution of the household's consumption without the need for auxiliary assumptions.
household $i$ at time $t + 1$ and the variance of consumption $\sigma_i^2$ we specify the following heteroscedasticity regressions:

$$\ln c_i = X_i \beta + \varepsilon_i \quad (1)$$

$$\sigma_i^2 = X_i \theta + e_i \quad (2)$$

where $X_i$ presents a bundle of observed household characteristics, such as the number of household members or the proportion of children.

According to Chaudhuri et al. (2002), there are two vulnerability thresholds. The first is the observed current poverty rate in the population. The alternative thresholds is 0.5. This threshold indicates that a household whose vulnerability level exceeds 50 percent is more likely than not to end up being poor and can thus be considered to be vulnerable. In this paper, in conformity with extant practice we chose the later threshold so a household $i$ would be included among the vulnerable if $VEP_i > 0.5$.

**IV. Economic and poverty situation in PNG**

PNG is a poor country among the Pacific island courtiers with GDP per capita much lower than that of Fiji, Samoa, Tonga and Vanuatu (Figure 1). PNG’s recent growth rate has been around the average growth rate of the Pacific island countries (Figure 2). Inflation was remarkably high in PNG from 1998 to 2003, and stabilised just recently (Figure 3). The high inflation rate in Papua New Guinea reflects high budget deficits, which began to get narrowed in 2001 (ESCAP, 2004).

[Figures 1, 2, 3 here]

The agriculture sector accounted for the largest share of GDP in PNG, followed by industry and the service sector (Table 1). The experience of many Asian countries indicates that one of the important factors responsible for poverty reduction is high economic growth, which PNG has not had so far.

[Table 1 here]
Despite poor economic performance, some social indicators of this country have been improving moderately PNG (Table 1). For instance, life expectancy improved from 56.8 years in 2000 to 57.3 years in 2006. Infant mortality rates declined to 54.4 deaths per 1,000 live births in 2006, compared with 59.5 in 2000. The Gini index is low at only 30.3 which is better than that for many developed countries (UNDP, 2007).

V. Data

The data for PNG are from the 1996 Papua New Guinea Household Survey (PNGHS96) which is the first and, to the best of our knowledge the only available, national study of consumption, living standard and poverty in PNG. The survey used a stratified, two-stage random sample of 1200 households (but for only 1144 households do we have complete information) residing in 120 Census Units that were selected from the 1990 Census sample frame (Gibson, 2000). The survey represents four regions: Highlands, Islands, Momase, and Papua (including Nation Capital District). Table 2 summarizes the basic statistics of the sample.

[Table 2 here.]

For 1996, the poverty line is not available but the poverty rate of 37.5% (PNG: Poverty Assessment - WB 2004) is. Hence, the poverty line can be estimated from the sample. PNGHS96 provides sampling weights.

VI. Determinants of vulnerability in PNG

Based on the specification described in Section III, we estimated the coefficients on the different determinants of the ex ante mean and variance of future consumption as specified by (1) and (2). The estimated results, i.e. the relative importance of different factors to vulnerability, are presented in Table 3.

[Table 3 here]

Households in Highland, Island and Momase regions tend to have lower expectation of future consumption (per capita) than households in Papua. However, there is less significant evidence that households in Highland and Momase have larger
variances of consumption than the other regions. Thus we can say that households in Highland and Momase are comparatively more vulnerable to poverty.

Controlling for all other determinants, large household size significantly reduces expectation of consumption, thereby increasing household vulnerability. It is well-known that families with many children are on average poorer. However, this negative effect weakens with the household size because the coefficient on (average) household size squared is positive and significant. We also find significant evidence that in PNG larger household size is associated with a decrease in the variance of consumption. This negative effect also weakens with the household size. We don’t find any significant evidence that age and gender of household heads are associated with mean and variance of future consumption.

In general, there is significant association between the dependency ratio in a household and the expectation and variance of the household consumption. The larger the household size the greater is its vulnerability, as manifested by a significantly lower expectation of future consumption. The dependency ratio is measured as the proportion of the household under the age of 15.

VII. Profile of vulnerability in PNG

a. Distribution of vulnerability at the aggregate level

Based on the estimation results for determinants of vulnerability above we conduct a vulnerability profile for PNG. Using the crucial assumption that income is lognormally distributed we can calculate the probability that a household has a per capita income falling below the poverty line in the future. A household (or a person) is then considered as vulnerable to poverty if this probability exceeds some threshold.

To investigate the distribution of the vulnerability we chose a threshold of 0.5 for the reason that a household whose vulnerability level exceeds 0.5 is more likely than not to end up poor (Chaudhuri, 2003; Chaudhuri et al., 2002).

Table 4 describes the distribution of vulnerability at the aggregate level in PNG. It can be seen that, in this case, the poverty rate overestimates the fraction of the
population vulnerable to poverty. While 37.5% of the population is observed to be poor, we estimate only 34.1% of the population is vulnerable to poverty.

Table 4 also shows that there a sizable fraction of non-poor are vulnerable to poverty. Indeed, of the 62.6% of the population observed to be non-poor, 15.7% are estimated to be vulnerable to poverty. Thus poverty reduction strategies need to incorporate not just alleviation efforts but also prevention. Of course, programs that aim to reduce the vulnerability in the population need to be targeted differently from those aimed at poverty alleviation. This can be seen in the next subsection, where we analyse the distribution of vulnerability to poverty over segments of the population.

To check for other vulnerability threshold, Figure 4 depicts the estimated incidence of vulnerability to poverty for the population, the poor and the non-poor for given vulnerability thresholds - ranging from 0 to 1 – measured along the horizontal axis. The horizontal line illustrates the (observed) poverty rate of the population. The figure shows that for any threshold less than 0.5 the vulnerability rate of the population is higher than the poverty rate. Figure 4 also suggests that for almost any threshold, the incidence of vulnerability to poverty of the population across the poor and the non-poor are significantly different and a positive fraction of the non-poor is vulnerable to poverty. The vulnerable fraction of the non-poor is much closer to the vulnerable fraction of the population than the vulnerable fraction of the poor. This implies that the incidence of vulnerability of the poor is much higher than that of the overall population. This is in line with the argument of Chaudhuri et al. (2002) that “poverty and vulnerability are closely related concepts”.

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b. **Distribution of vulnerability over selected segments**

We now analyse the distribution of vulnerability (along with poverty) over locations and selected household characteristics (see Table 5).

Table 5 here]
In Table 5 reports on the imbalances in the contribution of various areas and household characteristics to overall poverty and vulnerability. The observed poverty rates underestimated the vulnerability to poverty only in Island and Momase and overestimated the vulnerability in Highlands and Papua. We also find that in PNG inter-regional differences in vulnerability rates are more obvious than the regional disparities in poverty rates. Indeed, the fraction of population poor that is poor ranges from a low of 14.8% in Papua to a high of 67.5% in Momase. However, the fraction of population vulnerable to poverty ranges from a low of only 9.5% in Papua to a high of 67.8% in Momase. One reason for the high poverty and vulnerability rates in Momase is the high incidence of inequality (Figure 5).

[Figure 5 here]

The reason for the imbalance in the contribution of the divisions in PNG to overall poverty and vulnerability is their small size, remoteness and geographical fragmentation. Because of this, the divisions suffer disproportionately from external shocks, such as natural disasters, and are vulnerable to poverty differently.

Clearly, poverty and vulnerability increase with household size. For instance, of the 2.3% of the population which lives in households with 2 members, the latter accounting for 4% of the poor and 0.8% of the vulnerable, 23.1% are poor and 12.3% are vulnerable to poverty. Meanwhile, of the 64.2% of the population living in households with 6 or more members and more, the latter accounting for 66.9% of the poor and 69.4 of the vulnerable, 39% are poor and 36.9% are vulnerable to poverty.

We don’t find any pattern of the distribution of poverty and vulnerability over gender of household head.

In general, people who live in households headed by individuals having lower education are poorer and more vulnerable to poverty. For example, of the 37.5% of the population that lives in households headed by individuals with no grade, the latter accounting for 56.7% of the poor and 62.8% of the vulnerable, about 56.7% are poor and 57.1% are vulnerable to poverty. Meanwhile, of the 13.5% of the population that lives in households headed by individuals with certificate level education only 5.6%
are vulnerable to poverty. In particular no household headed by individuals with diploma, bachelor’s degree and postgraduate is poor or vulnerable to poverty.

VIII. Conclusions

We found that in PNG, vulnerability (and poverty) are significantly different across different regions of the country. Policies to reduce inequality both within and across regions are recommended. An important policy measure would be to improve transport and social infrastructure to make opportunities available to those living in poor regions. The construction of roads would provide access to markets, health, education and other services. In particular we find that no household headed by individuals with diploma or higher is observed to be poor or to be vulnerable to poverty. This means that for the poor to participate fully in economic activities, they need to be provided with improved access to education.

We also found that the fraction of the population that faces a risk of poverty is considerably different from the fraction that is observed to be poor. Thus, poverty reduction strategies in PNG need to incorporate not just alleviation efforts but also prevention. There is a sizable fraction of the population in PNG who were observed to be non-poor but are estimated to be vulnerable to poverty. Moreover, the distribution of vulnerability across different segments of the population can differ significantly from the distribution of poverty. Therefore, programs that aim to reduce the vulnerability in the population need to be targeted differently from those aimed at poverty alleviation.
<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation, consumer prices (annual %)</td>
<td>4.0</td>
<td>13.6</td>
<td>14.9</td>
<td>15.6</td>
<td>9.3</td>
<td>11.8</td>
<td>14.7</td>
</tr>
<tr>
<td>GDP growth (annual %)</td>
<td>-3.9</td>
<td>-3.8</td>
<td>7.5</td>
<td>-1.2</td>
<td>-0.1</td>
<td>-0.2</td>
<td>2.2</td>
</tr>
<tr>
<td>GDP per capita (constant 2000 US$)</td>
<td>673</td>
<td>631</td>
<td>660</td>
<td>636</td>
<td>619</td>
<td>602</td>
<td>601</td>
</tr>
<tr>
<td>Agriculture, value added (% of GDP)</td>
<td>28.4</td>
<td>34.7</td>
<td>41.0</td>
<td>42.0</td>
<td>41.8</td>
<td>.. ..</td>
<td>.. ..</td>
</tr>
<tr>
<td>Industry, value added (% of GDP)</td>
<td>44.0</td>
<td>38.8</td>
<td>37.7</td>
<td>38.3</td>
<td>39.1</td>
<td>.. ..</td>
<td>.. ..</td>
</tr>
<tr>
<td>Services, etc., value added (% of GDP)</td>
<td>27.7</td>
<td>26.5</td>
<td>21.3</td>
<td>19.7</td>
<td>19.0</td>
<td>.. ..</td>
<td>.. ..</td>
</tr>
<tr>
<td>Poverty rate (% of population)</td>
<td>37.5(^{(1996)*})</td>
<td>.. ..</td>
<td>.. ..</td>
<td>.. ..</td>
<td>.. ..</td>
<td>.. ..</td>
<td>.. ..</td>
</tr>
<tr>
<td>Gini index</td>
<td>52.9(^{(1996)**})</td>
<td>.. ..</td>
<td>.. ..</td>
<td>.. ..</td>
<td>.. ..</td>
<td>.. ..</td>
<td>.. ..</td>
</tr>
<tr>
<td>Life expectancy at birth, total (years)</td>
<td>56.8</td>
<td>..</td>
<td>56.9</td>
<td>..</td>
<td>..</td>
<td>57.2</td>
<td>57.3</td>
</tr>
<tr>
<td>Infant mortality rate (per 1,000 live births)</td>
<td>59.5</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>55.2</td>
<td>54.4</td>
</tr>
<tr>
<td>Population growth (annual %)</td>
<td>2.6</td>
<td>2.5</td>
<td>2.5</td>
<td>2.4</td>
<td>2.3</td>
<td>2.2</td>
<td>2.2</td>
</tr>
</tbody>
</table>

* PNG Poverty Assessment – WB 2004. ** Our estimate
## Table 2: Basic Characteristics of PNG Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household consumption per year per capita</td>
<td>1144</td>
<td>1239</td>
<td>1829.51</td>
<td>48</td>
<td>20568</td>
</tr>
<tr>
<td>Household size</td>
<td>1144</td>
<td>6</td>
<td>3.27</td>
<td>1</td>
<td>24</td>
</tr>
<tr>
<td>Age of household head</td>
<td>1144</td>
<td>40</td>
<td>12.18</td>
<td>16</td>
<td>85</td>
</tr>
<tr>
<td>Highest education qual. of hh head (schooling years)</td>
<td>1144</td>
<td>5</td>
<td>5.41</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>No of children (&lt;=15)</td>
<td>1144</td>
<td>3</td>
<td>1.96</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>No of old (&gt;55)</td>
<td>1144</td>
<td>0.3</td>
<td>0.648</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>log household consumption per capita</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------</td>
<td>----------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>expectation</td>
<td>variance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whether household in</td>
<td></td>
<td>0.116**</td>
<td>0.116**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highlands</td>
<td>-0.119***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Island</td>
<td>-0.507***</td>
<td></td>
<td>-0.076</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Momase</td>
<td>-0.712***</td>
<td>0.126**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household size</td>
<td>-0.164***</td>
<td>-0.053**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household size squared</td>
<td>0.005***</td>
<td>0.002*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whether hh head is male</td>
<td>-0.101</td>
<td>-0.002</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of hh head</td>
<td>0.003</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest educational qualification completed by hh</td>
<td>0.042***</td>
<td>0.008**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prop. of child (&lt;=14)</td>
<td>-0.612***</td>
<td>-0.093</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prop. of old (&gt;=55)</td>
<td>-0.152</td>
<td>-0.230*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whether hh owns agriculture capital goods</td>
<td>0.057</td>
<td>-0.076*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log of total current value of durables</td>
<td>0.181***</td>
<td>0.004</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>6.877***</td>
<td>0.502***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of obs.</td>
<td>1144</td>
<td>1144</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.6103</td>
<td>0.03021</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4: Cross-distribution between poverty and vulnerability in PNG

<table>
<thead>
<tr>
<th></th>
<th>Non-vulnerable</th>
<th>Vulnerable</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-poor</td>
<td>84.3</td>
<td>15.7</td>
<td>62.6</td>
</tr>
<tr>
<td>Poor</td>
<td>35.2</td>
<td>64.8</td>
<td>37.5</td>
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<tr>
<td>Overall</td>
<td>65.9</td>
<td>34.1</td>
<td>100</td>
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Table 5: Distribution of poverty and vulnerability in PNG

<table>
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<tr>
<th>By regions</th>
<th>Share of population</th>
<th>Share of poor</th>
<th>Share of vulnerable</th>
<th>Poverty rate</th>
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<tr>
<td>Highlands</td>
<td>34.0</td>
<td>35.9</td>
<td>34.5</td>
<td>39.5</td>
<td>34.6</td>
</tr>
<tr>
<td>Island</td>
<td>8.3</td>
<td>9.0</td>
<td>10.2</td>
<td>40.9</td>
<td>42.0</td>
</tr>
<tr>
<td>Momase</td>
<td>22.9</td>
<td>41.3</td>
<td>45.6</td>
<td>67.5</td>
<td>67.8</td>
</tr>
<tr>
<td>Papua</td>
<td>34.8</td>
<td>13.8</td>
<td>9.7</td>
<td>14.8</td>
<td>9.5</td>
</tr>
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</table>

<table>
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<tr>
<th>By household size</th>
<th>Share of population</th>
<th>Share of poor</th>
<th>Share of vulnerable</th>
<th>Poverty rate</th>
<th>Vulnerability rate</th>
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<tbody>
<tr>
<td>1 member</td>
<td>0.5</td>
<td>0.1</td>
<td>0.1</td>
<td>11.1</td>
<td>7.4</td>
</tr>
<tr>
<td>2 members</td>
<td>2.3</td>
<td>1.4</td>
<td>0.8</td>
<td>23.1</td>
<td>12.3</td>
</tr>
<tr>
<td>3 members</td>
<td>7.3</td>
<td>6.2</td>
<td>5.0</td>
<td>31.9</td>
<td>23.7</td>
</tr>
<tr>
<td>4 members</td>
<td>11.8</td>
<td>10.7</td>
<td>10.1</td>
<td>34.1</td>
<td>29.3</td>
</tr>
<tr>
<td>5 members</td>
<td>14.0</td>
<td>14.6</td>
<td>14.5</td>
<td>39.1</td>
<td>35.3</td>
</tr>
<tr>
<td>6 members +</td>
<td>64.2</td>
<td>66.9</td>
<td>69.4</td>
<td>39.0</td>
<td>36.9</td>
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<table>
<thead>
<tr>
<th>By gender of household head</th>
<th>Share of population</th>
<th>Share of poor</th>
<th>Share of vulnerable</th>
<th>Poverty rate</th>
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<tbody>
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<td>7.5</td>
<td>39.4</td>
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<td>Male</td>
<td>92.9</td>
<td>92.5</td>
<td>92.5</td>
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<td>33.9</td>
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<th>By qualification of household head</th>
<th>Share of population</th>
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<th>Share of vulnerable</th>
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<th>Vulnerability rate</th>
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<tr>
<td>No grade</td>
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<td>56.7</td>
<td>62.8</td>
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<tr>
<td>1-12 years schooling</td>
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<td>37.7</td>
<td>34.9</td>
<td>32.3</td>
<td>27.2</td>
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<tr>
<td>Certificate</td>
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<td>5.6</td>
<td>2.3</td>
<td>15.6</td>
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<tr>
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<td>Bachelor's degree</td>
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<tr>
<td>Postgraduate</td>
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<td>0.0</td>
<td>0.0</td>
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Figure 1: GDP per capita in selected Pacific island economies, 1997-2006 (Source: World Development Indicators, WB)
Figure 2: Rates of GDP growth in selected Pacific island economies, 1997-2006 (Source: World Development Indicators, WB)
Figure 3: Inflation rates in selected Pacific island economies, 1997-2006 \((Source: World Development Indicators, WB)\)
Figure 4: Estimated incidences of vulnerability to poverty for poor and non-poor in PNG
Figure 5: Lorenz curves by regions in PNG


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