

A 2009 Update of Poverty Incidence in Timor-Leste using the Survey-to-Survey Imputation Method

Summary

1. This note provides a prediction of poverty prevalence in Timor-Leste for 2009, which is comparable to earlier estimates. Those estimates were derived from the 2001 Timor-Leste Living Standards Measurement Survey (TLSS 2001) and the 2007 Timor-Leste Survey of Living Standards (TLSLS 2007).
2. In the absence of an updated survey, a team at the World Bank has put together an econometric model to predict poverty prevalence in 2009. The model is derived using TLSLS 2007 data for which household level poverty status had been prior estimated. The model is then applied to the 2009-2010 Demographic and Health Survey (DHS 2009-2010).
3. Based on this methodology, the predicted poverty incidence for 2009 is 41%. This suggests a drop of around nine percentage points compared to 2007, when poverty incidence had risen very sharply following the crisis and subsequent economic shock.

	TLSS 2001	TLSLS 2007	2009 (Prediction)
Poverty Prevalence	36%	49.9%	41% <i>CI_{.95} = 39.4, 42.5</i>

4. Final confirmation of the progress made in poverty reduction in Timor-Leste must ultimately be based on newer living standards surveys. In the meantime, the predicted fall is likely due in part to the fact that poverty incidence had itself spiked in 2007 (because of the combined effects of civil unrest and lower agricultural production). It is also likely due to high rates of economic growth in the post-2007 period, including increased consumption.

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Introduction

1. In response to a request by the Government of Timor-Leste, this note provides an estimate of poverty prevalence in Timor-Leste for the year 2009 that is comparable with earlier estimates. It thus provides the Government a sounder basis for tracking progress toward a key Millennium Development Goal. Previous poverty estimates in Timor-Leste – for the years 2001 and 2007 – were both based on household consumption data derived from concurrent surveys of living standards. However, as no surveys of living standards have been conducted since 2007, the 2009 estimate is based on survey-to-survey imputation¹ of household poverty status using the Timor-Leste Survey of Living Standards 2007 (TLSLS 2007) in conjunction with the recently completed 2009-2010 Demographic and Health Survey (DHS 2009-2010)².

Recent trends in poverty, income and other welfare outcomes

2. The first ever poverty assessment for independent Timor-Leste was based on the 2001 Timor-Leste Living Standards Measurement Survey (TLSS 2001) and the national poverty headcount was estimated to be 36%³. Even though the country made significant strides in building state institutions and improving service delivery after 2001, non-oil economic activity decelerated as the emergency reconstruction phase ended and international presence in the country substantially reduced. All in all, the period 2001-07 saw a 12% decline in real non-oil GDP per capita. In addition, the civil unrest of 2006 led to around 150,000 internally displaced people (IDP) further constraining economic activity. With the economy contracting in 2006, poverty headcount in 2007 – derived from the TLSLS 2007 data – peaked at 49.9% as consumption dropped sharply in 2006/07.

3. The post-2007 period, however, has witnessed renewed economic growth and there is emerging evidence of poverty reduction in the country even though living standards surveys permitting definitive estimates of poverty prevalence have yet to be conducted. To begin with, economic performance has been strong over 2008-2009 with the estimated GDP growth rate exceeding 9.5% per annum. The agricultural sector, where most of the poor live, rebounded in 2008 and 2009. In particular, increased coffee production in 2008 likely had a

¹ Demand for more frequent poverty assessment has led to a rapid development and testing of survey-to-survey imputation techniques in recent years (see van der Weide 2010; Fuji and van der Weide 2009; Stifel and Christiaensen 2007; Minot 2006). The procedure used in this note closely follows van der Weide 2010.

² DHS 2009-2010 data used is the version provided by the Government of Timor Leste to the World Bank expressly for the purpose of preparing this note.

³ This is different from the incidence of 41% reported in the poverty assessment (World Bank, 2003) based on TLSS 2001. The reason for the difference is that, in 2007, poverty measures for 2001 were re-estimated by applying exactly the same methodology as was used for the 2007 estimates in order to ensure maximum comparability with the 2007 estimates. As the 2009 estimate in this note is implicitly anchored to the 2007 poverty line, the 36% percent estimate is used to maintain overall comparability between 2001, 2007, and 2009.

positive impact on poverty reduction as coffee growers are among the poorest households in the country.

4. Following restoration of internal stability, IDPs were able to return to their homes, and several social transfer programs were established, helping to prop up essential consumption. Increased imports of food/cereals in this period, for instance, suggest higher consumption spending among poorer households. Other contributing factors include low inflation rates, especially after mid 2008. Finally, aside from the oil and gas sector, limited external links has meant that the country has been sheltered from the effects of the global economic crisis.

5. While data on recent outcomes in living conditions is generally lacking, preliminary analyses of DHS 2009-2010⁴ does provide some evidence of improved living conditions in the country and, consequently, likely achievements in poverty reduction. Comparison of DHS 2009-2010 data with DHS 2003, for example, indicates that infant mortality declined from 60 per 1,000 live births during 1999-2003 to 44 per 1000 live births during 2004/2005-2008/2009. Also, the incidence of wasting⁵, which is closely linked with poverty conditions, was almost 6 percentage points lower in the DHS 2009-10 sample (19%) than in the TLSLS 2007 sample (24.5%). Likewise, the percentage of underweight children in DHS 2009-2010 (45%) was also somewhat lower than in TLSLS 2007 (48.6%).

Estimating Poverty Headcount using DHS 2009: Methodology

6. Because direct observations on household expenditures were not available in DHS 2009-2010, and noting that the survey is only two years apart from TLSLS 2007, a survey-to-survey imputation method that takes advantage of common household-level information collected in both surveys was used to make household level poverty status predictions for 2009. This was done in three key steps.

7. In the first step, key demographic, housing and asset ownership information collected in both surveys were identified and exact definitions were used to construct an array of variables common to both survey datasets. In the second step, using TLSLS 2007 data for which household level poverty status had been prior estimated, a stable probit equation⁶ that mapped household-level poverty outcomes to these overlapping variables was estimated. As the two surveys were only two years apart, and given that no obvious structural changes had taken place in the country over this period, it was assumed that the estimated parameters (β in footnote 5 below) remained valid in mapping the relationship between household characteristics and poverty status in 2009. As a precaution, indicators whose values changed excessively over the period (such as ownership of mobile phones) were not included. While goodness of fit was evaluated by examining percentage of correct model prediction made in

⁴ National Statistics Directorate, Ministry of Finance, Democratic Republic of Timor Leste and Measure DHS, ICF Macro. 2010. *Timor-Leste Demographic and Health Survey 2009-2010: Preliminary Report*. Dili.

⁵ Wasting, a measure that relates an individual's height to his/her weight, indicates failure to receive adequate nutrition in the short term and is closely related to changes in poverty levels.

⁶ By relating binary outcomes on poverty status (poor, non-poor) to a vector of household characteristics (\mathbf{X}), Probit regression estimates a set of parameters β such that $\Pr(y_i < z) = F(\mathbf{X}\beta)$ where $\Pr(y_i < z)$ is the probability of household's total expenditure y_i being less the poverty line Z and F defines a cumulative normal function.

TLCLS 2007⁷, a more parsimonious specification was finally retained in order to minimize possible model-related errors.

8. In the third step, the estimated probit equation was applied to DHS 2009-2010 dataset to generate household level predictions of poverty status for 2009-2010 and the incidence of poverty at the national level was computed as the average estimated probability of being poor in the full DHS 2009-2010 sample⁸. Finally, a 95% confidence interval for the poverty prediction was also computed. As survey-to-survey imputations are subject to both imputation- and sampling- errors, analytical expression for the total error are difficult to derive and bootstrapping standard errors is usually recommended⁹. In this case, however, a jackknife estimate of the standard error of the final prediction is used as this procedure is easier to apply given multi-stage sampling and varying sampling weights used in DHS2009-2010.

Result: Poverty incidence has declined since 2007

9. Table 1 shows the coefficients of the probit equation estimated using TLCLS 2007 data and used to make poverty prediction using DHS 2009-2010 data¹⁰.

Table 1: Estimated Correlates of household poverty status			
	Estimated Probit coefficient†	Variable means	
		2007 LSLS	DHS 2009-2010
Household size	0.225***	6.50	5.77
Household is urban based	0.133*	25.9%	22.9%
Household has access to some form of protected water source	0.016	62.9%	63.2%
Household owns at least one TV set	-0.685***	15.3%	22.3%
Household owns at least one motorcycle	-0.680***	6.8%	13.2%
Household head has no formal education	0.311***	50.6%	48.2%
Dwelling has dirt floor	0.471***	61.0%	61.4%
Constant	-1.85***		
N	4,477	4,477	11,462

† Probit equation estimated from TLCLS 2007 data. Dependent variable =1 if household is poor, zero otherwise.
 *** indicates statistical significant at the 5% level.
 ** indicates statistical significant at the 10% level.
 * indicates statistical significance at the 15% level

⁷ In doing so, a household was classified as poor if its predicted probability of being poor was ≥ 0.5 .

⁸ In order to minimize errors in prediction, prediction is made only at the country level where the zero mean assumption is most likely to hold.

⁹ See Fuji and van der Weide 2009 on this.

¹⁰ In the current context, all estimated coefficients are interpreted to measure degree of correlation with poverty status, not causality.

10. It is noted that ownership of durables (TV, motorcycle) significantly decreases the probability of being poor while household size, location in urban area, no formal education of the household head, and living in dwellings with dirt floor increase the probability of being poor. Finally households that have access to some form of protected water source are less likely to be poor, even though the coefficient is not statistically significant. This variable was retained in the final estimated equation both because it improved predictions and also because an F-test indicated all included variables to be jointly significant. Quite expectedly, the coefficients for the consumer durable variables are the largest in absolute size. The estimated probit equation correctly predicted poverty status of TLSLS 2007 households in 70 percent of the cases when the arbitrary cutoff of point specified in footnote 6 was used.

11. Obtaining 2009-2010 household-level poverty status predictions by applying the estimated probit equation to DHS 2009-2010 produces a point estimate of national poverty prevalence at 41% with the 95% confidence interval bounded by 39.4% and 42.5% respectively (Table 2). Given that most of the households in DHS 2009-10 were interviewed between August-December 2009 and that the entire fieldwork had been completed by February 7, 2010, the estimates above are considered valid for the year 2009.

Table 2: Poverty estimates for Timor Leste			
	TLSS 2001	TLSLS 2007	2009 (Prediction)
Poverty Prevalence	36%	49.9%	41%
			<i>CI₉₅ = 39.4, 42.5</i>

Cross-check using PovStat¹¹

12. Poverty simulation using PovStat was also done to broadly cross-check results obtained from the survey-to-survey prediction. Using TLSLS 2007 as the benchmark and using estimates of sector-specific growth rates for Timor Leste for the period 2007-2009, PovStat projection yielded a poverty rate of 39.59% for 2009. While the survey-to-survey imputation is clearly the preferred method, the fact that PovStat projection falls within the 95 percent confidence band of the survey-to-survey prediction does provide some measure of validation.

¹¹ PovStat is a tool developed in the World Bank to simulate poverty measures under alternative growth scenarios, and to forecast or project poverty measures over a future projection horizon. At its core, PovStat methodology relies on decomposing change in poverty two parts: a component related to the uniform growth of income and a component due to changes in relative incomes.

Conclusion

13. While final confirmation of the progress made in poverty reduction in Timor-Leste must ultimately be based on newer living standards surveys, predictions made in this note indicate that between 2007 and 2009, poverty incidence in the country fell by about nine percentage points. This noticeable fall is partly due to the fact that poverty incidence had itself spiked in 2007 (because of the combined effects of civil unrest and lower agricultural production). It is also likely due to high rates of economic growth in the post-2007 period, including increased consumption due to rapidly rising government spending, particularly on social protection programs and labor-intensive infrastructure works.

References

Fujii, T. and R. van der Weide .2009. Combining surveys with applications to poverty and child malnutrition in Tanzania, mimeo, REPOA, Dar Es Salaam.

National Statistics Directorate, Ministry of Finance, Democratic Republic of Timor Leste and Measure DHS, ICF Macro. 2010. Timor-Leste Demographic and Health Survey 2009-2010: Preliminary Report, Dili.

Stifel, D. and L. Christiaensen. 2007. Tracking poverty over time in the absence of comparable consumption data, *World Bank Economic Review*, 21 (2), p317-341.

van der Weide, R. 2010. Estimating poverty for Gaza in 2008: a survey-to-survey exercise. Mimeo, World Bank. World Bank. 2003. Timor Leste: Poverty in a new nation: analysis for action. Washington DC.

World Bank and Directorate of National Statistics, Ministry of Finance Democratic Republic of Timor Leste. 2008. Timor-Leste: Poverty in a Young Nation, Dili.