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Research Report

Developing a Poverty Map for Indonesia: An Initiatory Work in Three Provinces

Part I: Technical Report

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Abstract

This report presents the results of a pilot study to apply a recently developed technique for obtaining high-resolution poverty maps, using data from three provinces in Indonesia: Jakarta, East Java, and East Kalimantan. The purpose of this pilot study is to try out the applicability of the poverty mapping method given the available data in Indonesia and, furthermore, to test the feasibility of developing a poverty map for the whole country at various administrative levels (province, district, subdistrict, and village). The report is consisted of two parts. Part I is a technical report describing the steps that have been implemented in the exercise and discussions on the results. Part II presents the results of the exercise in the forms of tables of poverty and inequality point estimates and standard errors at the provincial, district, subdistrict, and village levels for the three provinces. The results indicate that the currently available data in Indonesia are sufficient to develop a poverty map with reasonable standard errors, at least for the provincial, district, and subdistrict levels. Meanwhile, the results for village level need to be used with caution as the standard errors of the estimates for a large fraction of the villages are relatively large. Overall, the results appear to support the extension of the method's application to the rest of the country.

I. Introduction

Experience shows that locating the poor is one of the most crucial and difficult problems in the implementation of programs aimed at targeting the poor.[1] In Indonesia, a country which is very large in size and where poverty statistics are reliable only up to the provincial-urban/rural level, geographic targeting of the poor is even more difficult. Figure 1 shows the poverty map of Indonesia based on the available estimates of poverty rates at the provincial level.[2] While this map is useful for identifying poverty differential across broad regions – for example, it shows that the provinces at the eastern part of Indonesia are the poorest regions in the country – it is less useful for the purposes of practical budget allocation or program targeting.

As poverty reduction efforts will continue to be an important endeavor in Indonesia even long into the future, there is clearly a need to develop tools for more effective geographic targeting than those that have been used in the past. Ideally, geographic targeting would be based on a description of poverty incidence and other indicators of economic welfare at small areas or low administrative levels. More generally, the analysis of poverty and welfare in a country could benefit tremendously from detailed and disaggregated data on the distribution of economic welfare. In the context of Indonesia, administrative levels go from the national level all the way down to the 'village' level (*desa/kelurahan*).[3]

One could of course obtain village level information on the distribution of economic welfare by carrying out a household survey with a sample which is representative for all villages in Indonesia. However, with a total of almost 70,000 villages in Indonesia, such a household survey is prohibitively huge and expensive. For comparison, the current poverty statistics in Indonesia are based on the consumption module of the National Socio-Economic Survey (SUSENAS), which has a sample size of around 65,000 households.

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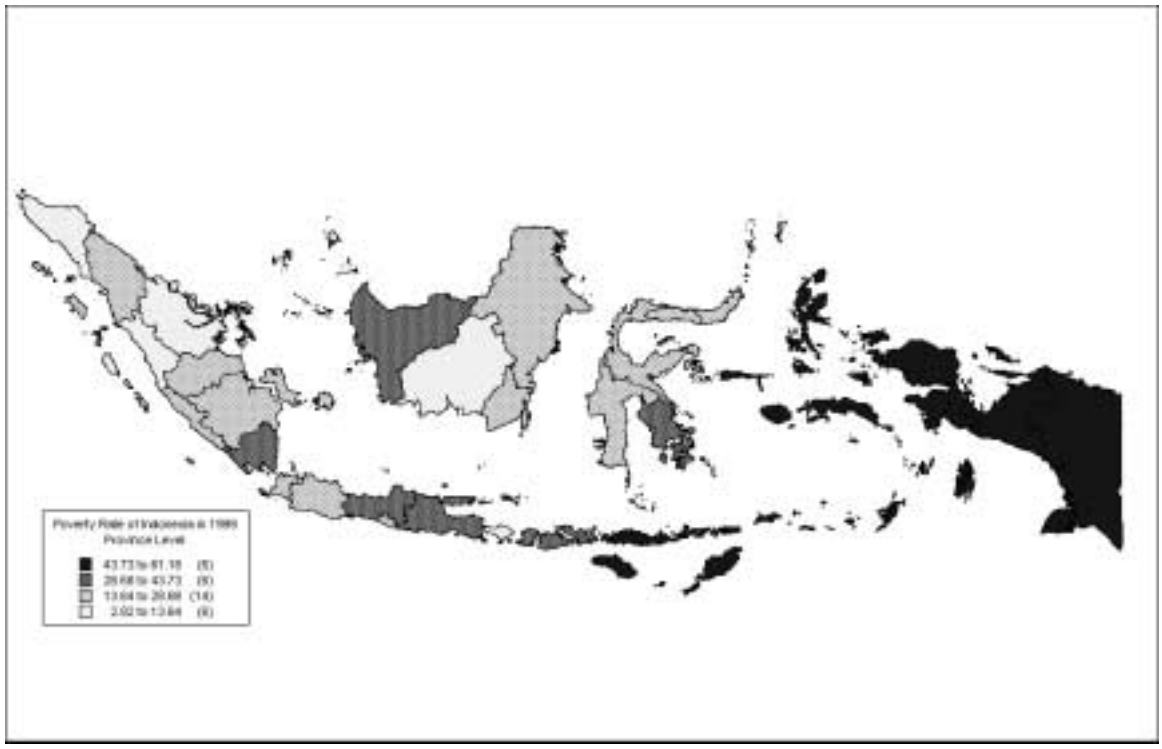
[1] See Bigman and Fofack (2000), Ravallion (2000), van de Walle (1998).

[2] The estimates of poverty rates are taken from Pradhan *et al.* (2001).

[3] The hierarchy of government administrative units in Indonesia below the central government is provinces (*propinsi*), districts (*kabupaten*) or cities (*kota*), subdistricts (*kecamatan*), and villages. A village which is located in a rural area is called a *desa*, while a village which is located in an urban area is called a *kelurahan*.

Figure 1. Poverty Map of Indonesia
Based on Provincial Poverty Rates



Fortunately, as a result of recent methodological advances in this area, a new methodology has been developed to estimate such description from statistical data collections that are normally available in a country.[4] The core of the method is to combine the information obtained from a household survey with the information collected through a population census. A household survey usually collects very detailed information on household characteristics, including consumption level, but the coverage is generally limited and only representative at a relatively large geographical unit. On the other hand, a population census has a complete coverage of all households, but usually collects very limited information on household characteristics. Hence, the method tries to combine the advantage of detailed information on household characteristics obtained from a household survey with the complete coverage of a population census.

Essentially, the method imputes estimates of per capita consumption for each household in the population. This is done by applying observed correlation patterns between household characteristics and household per capita consumption to census

[4] See Elbers *et al.* (2001), Hentschel *et al.* (2000).

data on household characteristics. The correlation patterns are estimated on the basis of household survey data.

This study is a pilot and the first attempt to apply the method in Indonesia. The objective is to obtain estimates of poverty incidence at geographical units smaller than a province-urban/rural area, which is the lowest level of aggregation for which reliable (but still very imprecise) poverty statistics are currently available. The study is planned to be conducted in two stages. The first stage is the current pilot study to test the feasibility of the method in the context of Indonesia. It uses data from three provinces out of 32 provinces in Indonesia: East Kalimantan, Jakarta, and East Java. The results of this pilot study are summarized in this report. The pilot study has been carried out by the SMERU Research Institute. The next scale will entail a larger-scale application to Indonesia's remaining provinces and will be carried out by Statistics Indonesia (BPS), building on the experience gained during the pilot phase.

The rest of the report is organized as follows. Chapter two discusses in brief the method used to obtain these estimates. Chapter three discusses the sources of data utilized in this exercise. Chapter four discusses the model application and the procedures for implementing it. Chapter five presents the results of the exercise in the forms of poverty and inequality maps from the province level down to the village level. Finally, chapter six provides the concluding remarks. In addition, a separate Part II of this report provides the complete poverty mapping results for the three pilot provinces in table form.

II. The Method

The method used in this study basically involves a two-step procedure. First, a model of consumption determination is estimated using the data from household survey. In the second step, the parameters estimated in the first step are then transferred to the data from the population census to simulate the consumption level of each and every household enumerated in the population census. The simulated household consumption is then used as the basis for calculating poverty and other welfare indicators.

A. The Consumption Model

Following *Elbers et al.* (2001, 2002), the empirical model of household consumption is defined as:

$$\ln y_{vh} = E(y_{vh} \mid x_{vh}) + u_{vh} \qquad (1)$$

where $\ln y_{vh}$ is the logarithm of per capita consumption of household h in village v, x_{vh} is a vector of observed characteristics of this household (including village level variables), and u_{vh} is the error term. Note that u_{vh} is uncorrelated with x_{vh}. This model is simplified by using a linear approximation to the conditional expectation $E(y_{vh} \mid x_{vh})$ and decomposing u_{vh} into uncorrelated terms:

$$u_{vh} = \eta_v + \varepsilon_{vh} \qquad (2)$$

where η_v represents a village level error term common to all households within the village, and ε_{vh} is a household specific error term. It is further assumed that the η_v are uncorrelated across villages and the ε_{vh} are uncorrelated across households.

With these assumptions, equation (1) reduces to

$$\ln y_{vh} = x_{vh}\beta + \eta_v + \varepsilon_{vh}. \qquad (3)$$

Estimation of the parameters underlying this equation, in particular the vector of parameters β and the distributional characteristics of the error terms, can be done by using standard tools from econometric analysis (see Elbers *et al.*, 2002).

B. The Estimators

The consumption model specification in equation (3) allows for an intra-village correlation in the error terms. Household income or consumption is certainly affected by the location where the household lives. Even though x_{vh} has some variables representing village level characteristics, it is quite plausible that some of the location effects will remain unexplained. The consequence of failing to take into account this within-village correlation of the error terms can result in biased welfare

estimates (in particular for inequality indicators) and will generally lead to underestimation of the standard errors of welfare estimates.

Take village averages over equation (2):

$$u_{v\bullet} = \eta_v + \varepsilon_{v\bullet} \tag{4}$$

where a subscript "$\bullet$" indicates an average over the index. Since the two error components are uncorrelated, then:

$$\mathrm{E}\left[u_{v\bullet}^2\right] = \mathrm{var}(\eta) + \mathrm{var}(\varepsilon_{v\bullet}) = \sigma_\eta^2 + \tau_{v\bullet}^2 \tag{5}$$

An unbiased estimator for σ_η^2 can be defined as:

$$\hat{\sigma}_\eta^2 = \frac{\sum_v w_v u_{v\bullet}^2}{\sum_j w_j (1-w_j)} - \frac{\sum_v w_v (1-w_v)\hat{\tau}_v^2}{\sum_j w_j (1-w_j)} \tag{6}$$

where:

$$\hat{\tau}_v^2 = \frac{1}{n_v (n_v - 1)} \sum_h (\varepsilon_{vh} - \varepsilon_{v\bullet})^2 \tag{7}$$

and w is a set of non-negative weights summing to one.

Elbers *et al.* (2001, 2002) give the following formula for the sampling variance of $\hat{\sigma}_\eta^2$:

$$\begin{aligned} \mathrm{var}\left(\hat{\sigma}_\eta^2\right) &\approx \sum_v \left[a_v^2 \, \mathrm{var}\left(u_{v\bullet}^2\right) + b_v^2 \, \mathrm{var}\left(\hat{\tau}_v^2\right) \right] \\ &\approx \sum_v 2 \left[a_v^2 \left\{ \left(\hat{\sigma}_\eta^2\right)^2 + \left(\hat{\tau}_v^2\right)^2 + 2\hat{\sigma}_\eta^2 \hat{\tau}_v^2 \right\} + b_v^2 \frac{\left(\hat{\tau}_v^2\right)^2}{n_v - 1} \right], \end{aligned} \tag{8}$$

where $a_v = \dfrac{w_v}{\sum_j w_j (1-w_j)}$ and $b_v = \dfrac{w_v (1-w_v)}{\sum_j w_j (1-w_j)}$.

III. Data Sources

Four sources of data are used in this study: (i) Consumption Module SUSENAS 1999, (ii) Core SUSENAS 1999, (iii) Population Census 2000, and (iv) PODES (Village Potential) 1999. In the consumption model estimation, the data on household consumption is obtained from the Consumption Module SUSENAS, the data on household characteristics is obtained from the Core SUSENAS, and the data on village-level characteristics is obtained from the PODES and village means of the population census.

SUSENAS, the National Socio-Economic Survey, is a nationally representative household survey, covering all areas of the country. A part of the SUSENAS is conducted every year in the month of February, collecting information on the characteristics of over 200,000 households and over 800,000 individuals. This part of the SUSENAS is known as the 'Core' SUSENAS. Another part of the SUSENAS is conducted every three years, specifically collecting information on very detailed consumption expenditure from around 65,000 households. These households are a randomly selected subset of the 200,000 households in the Core SUSENAS sample of the same year. This consumption module part of the SUSENAS is commonly known as the 'Module' SUSENAS.

Population census 2000 is the fifth population census conducted in Indonesia after independence. The previous censuses were conducted in 1961, 1971, 1980, and 1990. The 2000 population census was conducted in the month of June, covering all people living in the territory of Indonesia, including foreigners. Data on 15 demographic, social, and economic variables at both individual and household levels were collected in the census.

PODES, meanwhile, is a complete enumeration of villages throughout Indonesia. The information collected through this survey only includes village characteristics such as size of area, population, infrastructure, and local industries characteristics. The questionnaires are filled out by the local subdistrict officials who are responsible for collecting statistical data (*mantri statistik*). The information is obtained from official village documents as well as interviews with village officials. The PODES survey is usually conducted three times every ten years, usually prior to and as a preparation for an agricultural census, an economic census, or a population census. A PODES survey was conducted in the months of September and October 1999 as a preparation for the population census in 2000. In total, the 1999 PODES enumerates 68,783 villages.[5]

[5] Officially it is called PODES 2000.

IV. Model Application

This chapter outlines the stages and procedures implemented in applying the model to obtain poverty maps for three provinces: East Kalimantan, Jakarta, and East Java. For each province, the estimations for urban and rural areas are implemented separately, except for Jakarta which is a wholly urban area. The poverty line for each region is taken from Pradhan *et al.* (2001).

A. Stage 1: Matching Variables in the Survey and the Census

In order to obtain rigorous estimates of consumption levels of the households in the census, the explanatory variables selected in the consumption determination model have to exist and are measured in the same way in both the household survey and in the census. If the sample of the household survey was randomly selected and nationally representative, the distribution of each explanatory variable in the household survey can be expected to be the same as its distribution in the census.

The means and standard deviations of the matched variables in SUSENAS and Population Census data are shown in the Appendix: Table A1 for urban East Kalimantan, Table A2 for rural East Kalimantan, Table A3 for Jakarta, Table A4 for urban East Java, and Table A5 for rural East Java.

B. Stage 2: Selecting Explanatory Variables for the Consumption Model

The procedure in selecting the explanatory variables of equation (3) starts by running a regression of log consumption on the matched variables identified in Stage 1, plus some variables that can be created from those variables such as the square and cube of household size or the square and cube of the age of the household head.[6] In order to obtain a robust specification, variables are only selected for inclusion in equation (3) if they contribute significantly to the explanation of (log) per capita consumption. Hence variables with low t-values are dropped.

After a promising set of variables has been selected in this way, the regression is run again and the residuals of this regression are saved. These residuals need to be scrutinized to check if there are some outliers in the observation. If indeed there are some residual values which are far out of the range of most residual values, then these observations must be checked for coding or other errors. Ultimately it may be necessary to delete them from the data. Fortunately, this is extremely rare.

[6] Experience with poverty mapping in other countries suggests that these regressions should be weighted using cluster expansion factors. In the case of SUSENAS, cluster expansion factors within urban or rural areas in a province are all equal. Since the estimations are implemented at this level, the issue of weighting does not arise.

The next step is to select village-level independent variables to complete the consumption model specification. The village level variables are obtained from either the census data aggregated at the village level (for example the total number of individuals in the population or means of the ages of household heads in each village) or from the PODES data. These variables are then grouped into several sets such as demographic variables, village infrastructure variables, and village economic variables.

The residuals of the last regression are then aggregated at the village level to calculate the mean of these residuals for each village. The variable selection is then done by running separate regressions of the village-level mean of residuals on each set of the village-level variables. The variables with significant t-values are selected as the candidates for inclusion in the consumption model.

The feasibility of including these candidates for village-level variables in the consumption model is tested by running regressions of village dummy variables on these variables. One regression is run for each independent variable candidate. If the coefficient of a certain variable in a regression is one, it shows that there is a perfect multicollinearity between this variable and the village dummy variable. This will happen if, for example, a village has a certain infrastructure which no other villages have, or on the other hand, all villages except one have a certain infrastructure. Such variables are necessarily excluded from the model. This test may explain why, for example, electricity is included in the model for rural areas but excluded from the model for urban areas.

C. Stage 3: Estimating the Consumption Model

The result of stage 2 is a complete specification of the consumption model, incorporating both household-level and village-level independent variables of the model. The next step is to test whether there is heteroscedascity in the data. This will determine the method to be employed to estimate the model. The first step to do this is to estimate the model of equation (3) using Ordinary Least Squares (OLS) and save the residuals as a variable $\hat{u}_{vh}$.

Based on equation (2) the residuals $\hat{u}_{vh}$ are then decomposed into uncorrelated components as

$$\hat{u}_{vh} = \hat{u}_{v\bullet} + \left(\hat{u}_{vh} - \hat{u}_{v\bullet} \right) = \hat{\eta}_v + e_{vh} \qquad (9)$$

To investigate the presence of heteroscedasticity in the data, a set of potential variables that best explain the variations in e_{vh}^2 are used to estimate the following logistic model:

$$\ln\left[\frac{e_{vh}^2}{A - e_{vh}^2} \right] = z_{vh}^T \hat{\alpha} + r_{vh} \qquad (10)$$

where we take A equal to $1.05 * \max\{e_{vh}^2\}$ as in Elbers *et al.,* (2002). This specification puts bounds on the predicted variance of ε_{vh}^2.

The results of the OLS and heteroscedasticity regressions are shown in the Appendix: Table B1 for urban East Kalimantan, Table B2 for rural East Kalimantan, Table B3 for Jakarta, Table B4 for urban East Java, and Table B5 for rural East Java. In the case where homoscedasticity is rejected, a household specific variance estimator for ε_{vh} is calculated as:

$$\hat{\sigma}_{\varepsilon,vh}^{2} = \left[\frac{AB}{1+B}\right] + \frac{1}{2}\hat{\mathrm{Var}}(r)\left[\frac{AB(1-B)}{(1+B)^3}\right] \qquad (11)$$

where $B = \exp\left\{z_{vh}^T \hat{\alpha}\right\}$. The consumption model is then re-estimated using the Generalized Least Squares (GLS) method, utilizing the estimated variance-covariance matrix, $\hat{\Sigma}$, resulting from equation (11) and weighted by the population weight, l_{vh}. The estimated parameters, $\hat{\beta}_{GLS}$, and their variance, $\mathrm{Var}\left(\hat{\beta}_{GLS}\right)$, are saved for use in the simulation. The results of these GLS regressions are shown in the Appendix: Table C1 for urban East Kalimantan, Table C2 for rural East Kalimantan, Table C3 for Jakarta, Table C4 for urban East Java, and Table C5 for rural East Java.

D. Stage 4: Simulations on Census Data

The purpose of this procedure is to apply the parameters estimated in the previous procedure to the census data. However, since the values of these parameters are obtained through estimations, they are not precise values of these parameters and are subject to sampling error. This needs to be taken into account in applying the parameters to the census data, i.e. by incorporating the standard errors of the coefficient estimates in the application process. To start, recall that the purpose is to calculate the simulated version of equation (3):

$$\ln y_{vh}^s = x_{vh}\beta^s + \eta_v^s + \varepsilon_{vh}^s \qquad (12)$$

where the superscript *s* refers to simulated version of each parameter or variable and now x_{vh} refers to characteristics of the households in the population census data.

Simulation of β

The simulated value of β is obtained through a random draw, assuming $\beta \sim N\left(\hat{\beta}_{GLS}, \mathrm{Var}\left(\hat{\beta}_{GLS}\right)\right)$. Note that the draw has to take into account the covariance across β's. The randomly drawn parameter is defined as β^s. The next

step is then to apply this simulated parameter to each household in the census data to calculate the value of $x_{vh}\beta^s$.

Simulation of η_v

The process of obtaining the simulated value of η_v requires two steps of simulations. This is because the variance of η itself is estimated with error. Hence, the first step is to obtain the simulated variance of η, σ_η^{2s}. Elbers *et al.* (2002) propose to draw σ_η^{2s} from a gamma distribution: $\sigma_\eta^2 \sim G\left(\hat{\sigma}_\eta^2, \hat{\text{Var}}\left(\sigma_\eta^2\right)\right)$. Accordingly, a random draw of the variance for the whole sample is exercised and its mean is defined as σ_η^{2s}. Then the second step is to randomly draw η_v^s for each village in the census data, assuming $\eta_v \sim N\left(0, \sigma_v^{2s}\right)$.

Simulation of ε_{vh}

The process of obtaining the simulated value of ε_{vh} requires the use of the results of estimation of equation (10). Assuming $\alpha \sim N\left(\hat{\alpha}, \text{Var}\left(\hat{\alpha}\right)\right)$, a random draw of α is made and defined as α^s. Like in the case of β, the draw has to take into account the covariance across α's. The simulated parameter is then used to simulate the household specific variance estimator for ε_{vh} as defined in equation (11) for each household in the census data. Finally, the simulated value of household specific idiosyncratic shock, ε_{vh}^s, for every household in the census data is obtained by taking a random draw, assuming $\varepsilon_{vh} \sim N\left(0, \sigma_{vh}^{2s}\right)$.[7]

Collecting

Now all the three components of equation (12) have been simulated, the value of $\ln y_{vh}^s$ for all households in the census data can be calculated by summing up the values of $x_{vh}\beta^s$, η_v^s, and ε_{vh}^s that have been obtained. The whole set of simulations is then repeated a number (100) of times, so that in the end a database of 100 simulated values of (log) per capita household expenditure of all the households in the census data is created.

[7] Elbers *et al.* (2002) mention alternatives for the assumption that the error component terms follow normal distributions. In separate sets of simulations we have experimented with these alternative assumptions. In no case did this lead to significantly different results.

E. Stage 5: Calculation of Poverty and Inequality Indicators

The final output of stage 4, a database of 100 simulated values of household expenditure of all households in the census data, is used as the basis for calculating various poverty and inequality measures at the provincial, district, subdistrict, and village levels. The point estimate of each measure is the mean of the calculated measure over the 100 simulation values. Meanwhile, the standard error of this estimate is equal to the standard deviation of the calculated measure over the 100 simulation values.[8]

A word of warning should be issued here on interpreting the results obtained from this exercise. Suppose a headcount poverty indicator of 0.10 is listed for a location, along with a standard error of 0.03. This should be taken to mean that if there were to be found other locations, with similar patterns of household characteristics, and if one had direct measurements of poverty headcounts in these locations, then we would predict that the poverty headcount in these locations are likely to fall between 0.07 and 0.13 (with a 70% confidence interval). In particular, we do not claim that all these similar locations share the same headcount, nor is there a good reason to attach too much significance to the 'point estimate' of 0.10.

The pair of point estimate *and* standard error express that, conditionally on the information about the location that we have, it is just as likely that its headcount is between 0.07 and 0.13 as it would be 'centered' in the slightly narrower interval between 0.095 and 0.105. This uncertainty in the poverty estimates reflects the fact that the parameters of the consumption model (3) cannot be estimated with infinite precision, and that there is no way to deduce the error terms u_{vh} from the available data.

Similarly, to conclude that the headcount in one location (A) is bigger than in another (B), it is not sufficient to note that the point estimate for the headcount in A is higher than the one for B. Again, one has to take into account the error margins on the point estimates. For example, suppose that the headcount in A is h_A with a standard error of s_A and similarly for location B with h_B and S_B, where A's point estimate is higher: $h_A > h_B$. Then one can only conclude with reasonable confidence (more than 70%) that A's true headcount is higher than B's if $h_A - s_A > h_B + s_B$. In other words one should account for the possibility that the estimated headcount for A is an overestimate, while B's estimate is an underestimate.

[8] The application of this poverty mapping exercise from stage 3 to 5 is implemented using a software package called PovMap (Version 1.0 BETA), developed by Qinghua Zhao at the World Bank.

V. Poverty and Inequality Maps

Poverty analysis is often based on national level indicators that are compared over time or across regions. The broad trends that can be identified using aggregate information are useful for evaluating and monitoring the overall performance of a country. For many policy and research applications, however, the information that can be extracted from aggregate indicators is not sufficient, since they hide significant local variations in living conditions within countries. The detailed poverty maps at small administrative areas that are the ultimate output of this exercise provide benefits to help address this shortcoming of aggregate poverty analysis. This chapter provides the poverty and inequality maps at various administrative levels as a result from this exercise.

A. Poverty Estimates and Their Standard Errors

Part II of this report provides the complete results of this pilot study in the forms of tables of various poverty and inequality measures. The poverty measures calculated are the poverty headcount index (P0), poverty gap index (P1), and poverty severity index (P2), commonly known as the FGT family of poverty measures.[9] Meanwhile, the inequality measure calculated is the Gini ratio.

In addition to the estimates of poverty and inequality indicators as usually presented, the results of this poverty mapping exercise also provide the standard errors of these estimates as a measure of their precision. Table 1 compares the estimated headcount poverty rate for East Kalimantan, Jakarta, and East Java as calculated directly from the SUSENAS data and those estimated from the Population Census data through the poverty mapping method. Note the increase in precision of the census-based estimates compared to the SUSENAS-based estimates. This is a well-known phenomenon, employed extensively in the statistical technique of 'small area estimation'.[10]

[9] Foster *et al.* (1984).

[10] However, when the sample size in the SUSENAS is sufficiently large, such as in the case of East Java, the increase in the precision of the estimates is not large.

Table 1. Estimates of Headcount Poverty Rates in Jakarta, East Java, and East Kalimantan Based on SUSENAS and Poverty Mapping Method

Area	Poverty Rate (%)	Standard Error (%)		Sample Size	
		Points	Proportion	Household	Individual
Jakarta:					
SUSENAS 1999	2.82	0.62	21.99	2,959	12,460
Poverty Mapping:	2.98	0.53	17.78	2,204,219	8,246,736
East Java:					
SUSENAS 1999:					
- Urban	19.51	1.73	8.87	3,250	12,535
- Rural	40.94	1.55	3.79	5,285	19,593
- Total	33.34	1.24	3.72	8,535	32,128
Poverty Mapping:					
- Urban	20.32	1.33	6.55	3,703,652	13,761,133
- Rural	40.07	1.29	3.22	5,655,930	20,730,848
- Total	32.10	1.31	4.08	9,359,582	34,131,981
East Kalimantan:					
SUSENAS 1999:					
- Urban	9.09	3.38	37.18	442	1,882
- Rural	33.33	4.61	13.83	561	2,409
- Total	21.05	3.38	15.94	1,003	4,291
Poverty Mapping:					
- Urban	10.50	1.26	12.00	349,323	1,399,814
- Rural	33.72	3.28	9.73	271,593	1,062,777
- Total	20.52	2.35	11.47	620,916	2,462,591

Source: Authors' computations. The standard errors on the SUSENAS-based headcounts are calculated by bootstrapping.

Table 1 shows the advantage of using the poverty mapping method to increase the precision of poverty estimates. However, the real advantage of the method is its ability to produce poverty estimates and other welfare indicators at much smaller areas than the one presented in Table 1. A separate volume as a part of this report provides point estimates and standard errors of poverty headcount (P_0), poverty gap (P_1), poverty severity (P_2), and Gini ratio at the provincial, district, subdistrict, and village levels in the three pilot provinces.[11]

Table 2 provides the summary of the precision of poverty headcount estimates at various levels of areas. The numbers in this table show summary statistics of the standard errors as a proportion of the point estimates. For example, the table shows that the mean of standard errors across districts within a province ranges from 11 percents of the point estimates for East Java to 27 percent for Jakarta. For the subdistrict level, the mean of standard errors ranges from 23 percent for East Java to 63 percent for Jakarta. Meanwhile, for the village level, the mean of standard errors ranges from 53 percent for East Kalimantan to 128 percent for Jakarta.

Table 2. Summary Statistics of Standard Error as a Proportion of Point Estimate for the Poverty Headcount Measure

Region	Mean	Std. Dev.	Minimum	Maximum	N
Jakarta:					
- Province	0.1765	-	0.1765	0.1765	1
- District	0.2678	0.0169	0.2489	0.2885	5
- Subdistrict	0.6298	0.1471	0.4376	1.2109	43
- Village	1.2796	0.2489	0.7472	2.2276	265
East Java:					
- Province	0.0408	-	0.0408	0.0408	1
- District	0.1165	0.0515	0.0531	0.2063	37
- Subdistrict	0.2267	0.0887	0.0620	0.5624	621
- Village	0.5501	0.2029	0.0893	1.6867	8,412
East Kalimantan:					
- Province	0.1147	-	0.1147	0.1147	1
- District	0.1873	0.1040	0.0995	0.4572	12
- Subdistrict	0.2552	0.1108	0.1300	0.6618	87
- Village	0.5282	0.3586	0.1052	4.4104	1,102

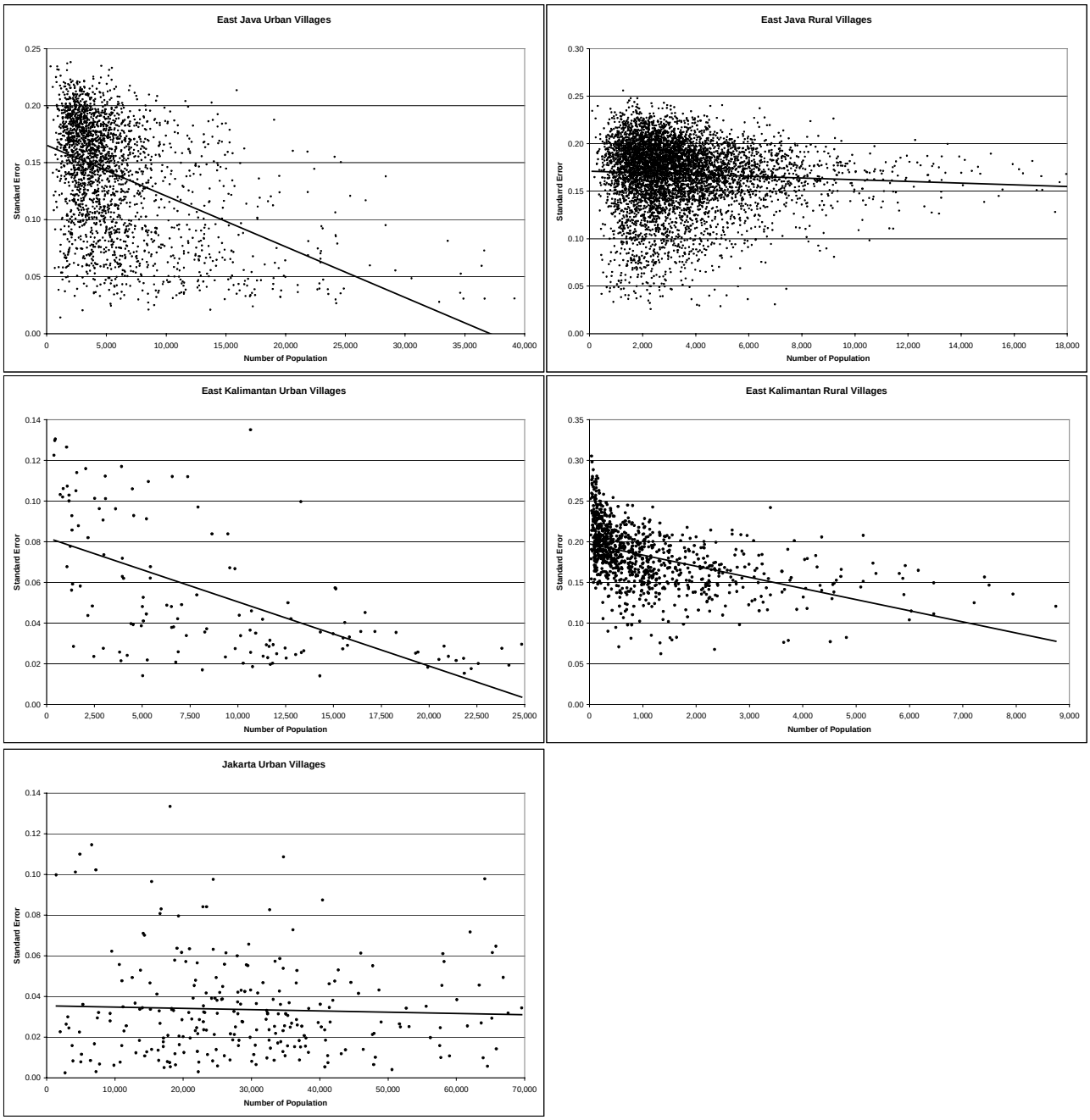
[11] See Part II: Tables of Poverty and Inequality Estimates.

Table 2 indicates that the standard errors at the provincial, district, and subdistrict levels are reasonably acceptable. At the village level, however, there are great variations in the precision of poverty headcount estimates across villages within a province. In East Java, the standard errors at the village level range from 9 percent of the point estimates to 169 percent. In East Kalimatan, they range from 11 percent to 441 percent, while in Jakarta the range is from 75 percent to 223 percent. This implies that the poverty mapping results for the village level need to be used with caution. For villages with high standard errors, other information is required to verify the estimates.

In interpreting the statistics in Table 2, a word of caution is warranted. The proportion of standard error from point estimate can be high due to two different reasons: large magnitude of the standard error or small magnitude of the point estimate. A good example of the latter is the statistics for Jakarta. It appears that the estimates for Jakarta at various levels always have higher standard errors compared to the other two provinces. This, however, is due to the fact that Jakarta has much smaller poverty headcount point estimates than other provinces in Indonesia. In such cases, it is better to examine the absolute magnitudes of the standard errors rather than their proportions from the point estimates.

The absolute magnitudes of the standard errors are clearly related to the population size. Figure 2 shows the plots between the magnitude of standard error with the population size at the village level in the five estimation areas. The figure clearly indicates that the two variables have a negative relationship, implying that the larger the population size of a village the smaller the standard error of the estimate. This also suggests that where the standard error of poverty estimate for a village is considered too large, the standard error can be made smaller by lumping that village with its adjacent neighbors in one estimation.

Figure 2. Standard Error and Population Size – Village Level



B. District, Subdistrict, and Village Poverty Maps

The first time availability of accurate welfare indicators at district, subdistrict, and village levels is already an achievement, but the real power of mapping is in presenting the outcomes in a geographical map, making it possible to overlay the poverty data with all kinds of spatial characteristics.

Figure 3a shows the distribution of poverty in the province of East Kalimantan by district. Figure 3b provides the same information but calculated at subdistrict level. Comparing the two figures clearly indicates that the heterogeneity of poverty within districts is quite large, making the information on the distribution of poverty in this province conveyed by the two figures differ markedly. Figure 3c provides the information at an even finer village level, which differs even more markedly from Figure 3a. Figure 4a – 4c show the same maps for the province of Jakarta, while Figure 5a – 5c for the province of East Java.

Figure 3a. Poverty Map of East Kalimantan – District Level

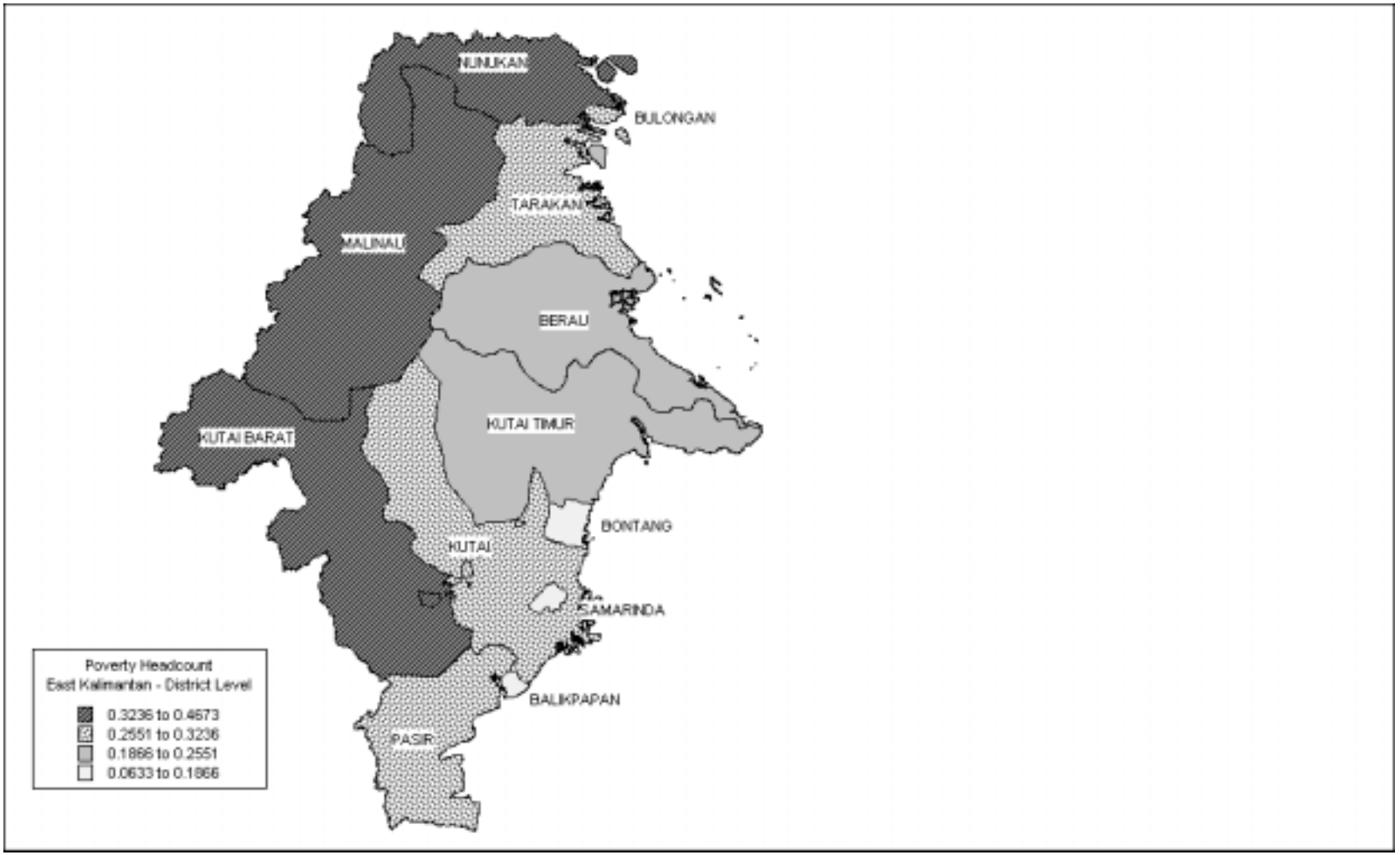


Figure 3b. Poverty Map of East Kalimantan – Subdistrict Level

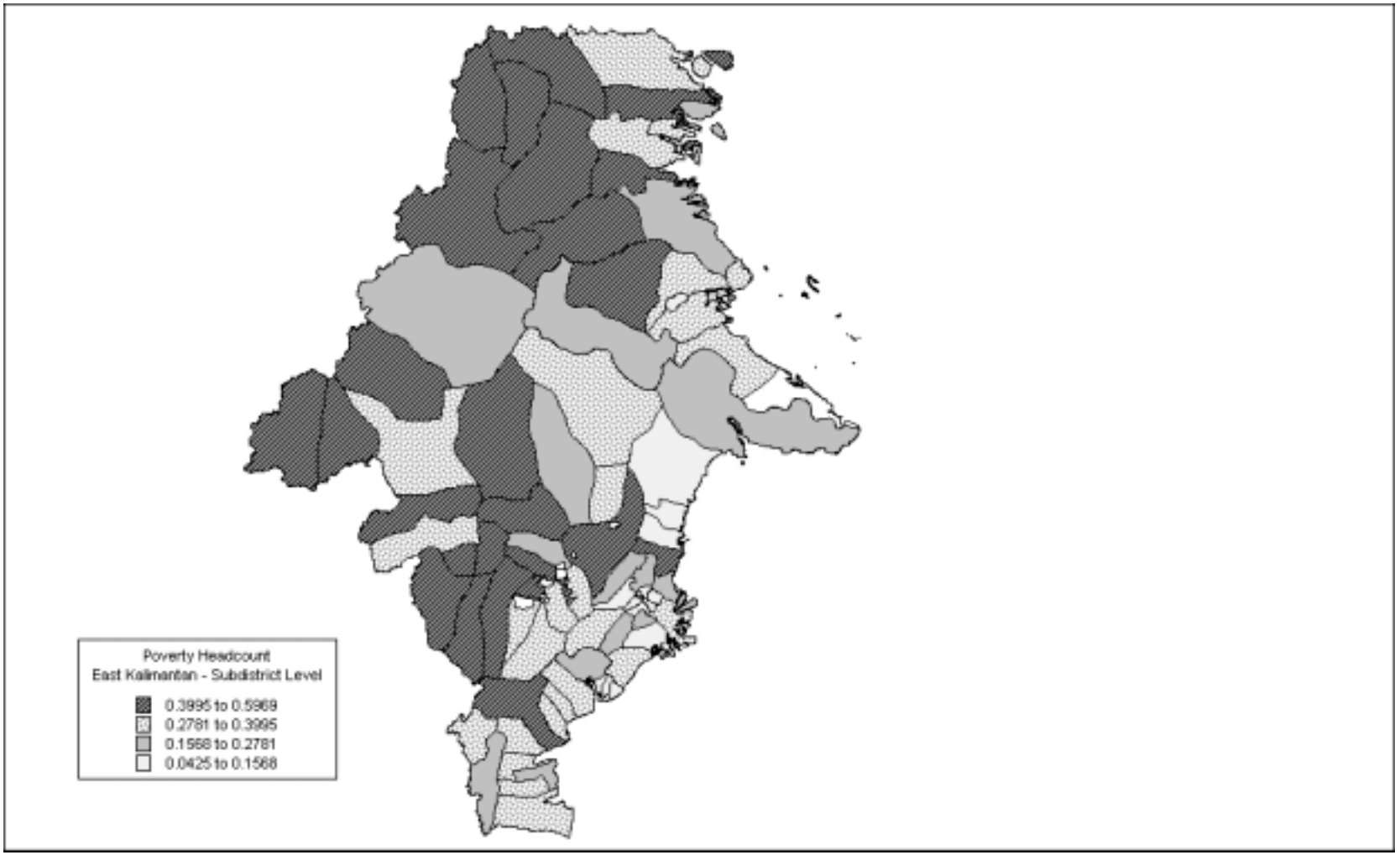


Figure 3c. Poverty Map of East Kalimantan – Village Level

Figure 4a. Poverty Map of Jakarta – District Level

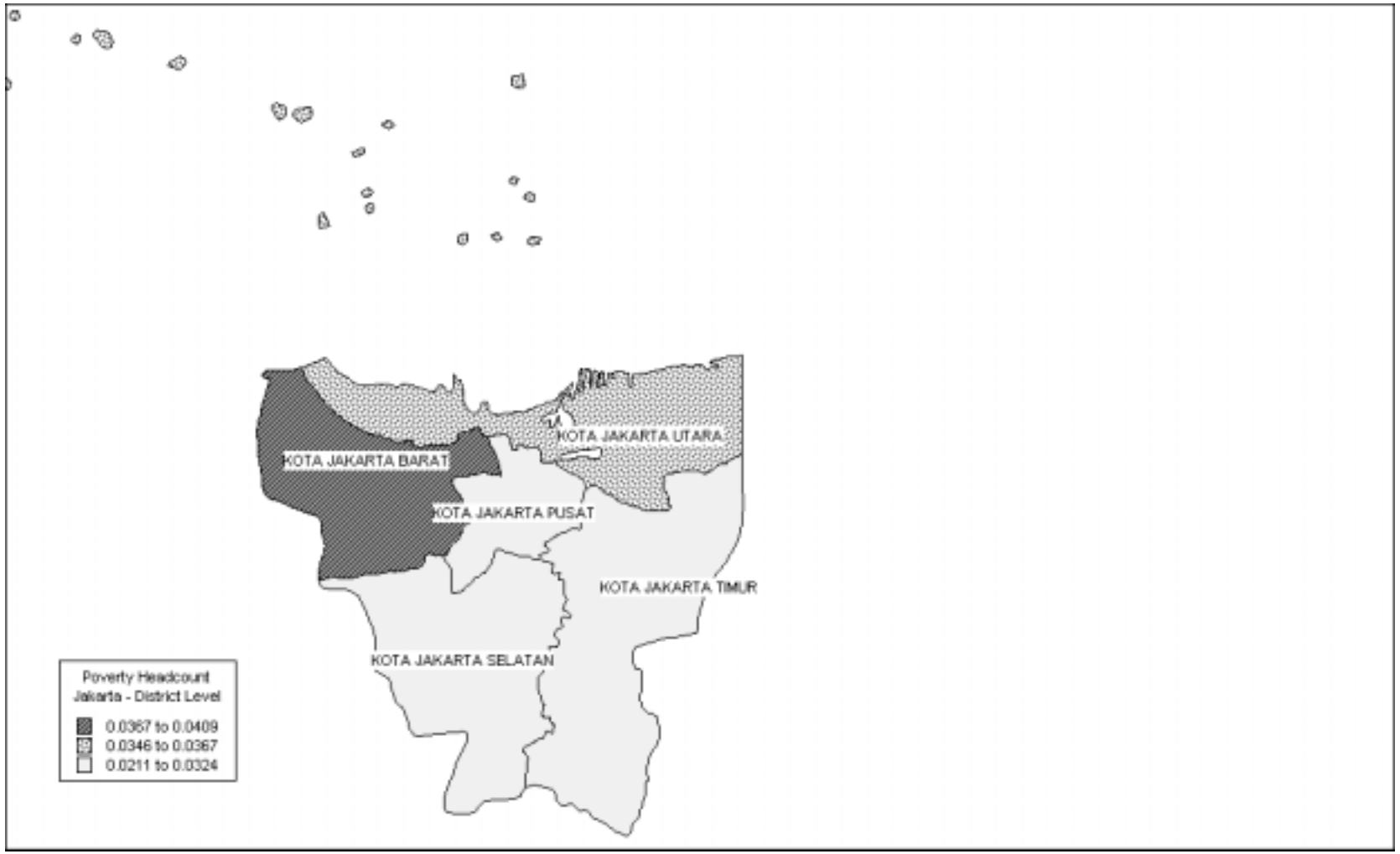


Figure 4b. Poverty Map of Jakarta – Subdistrict Level

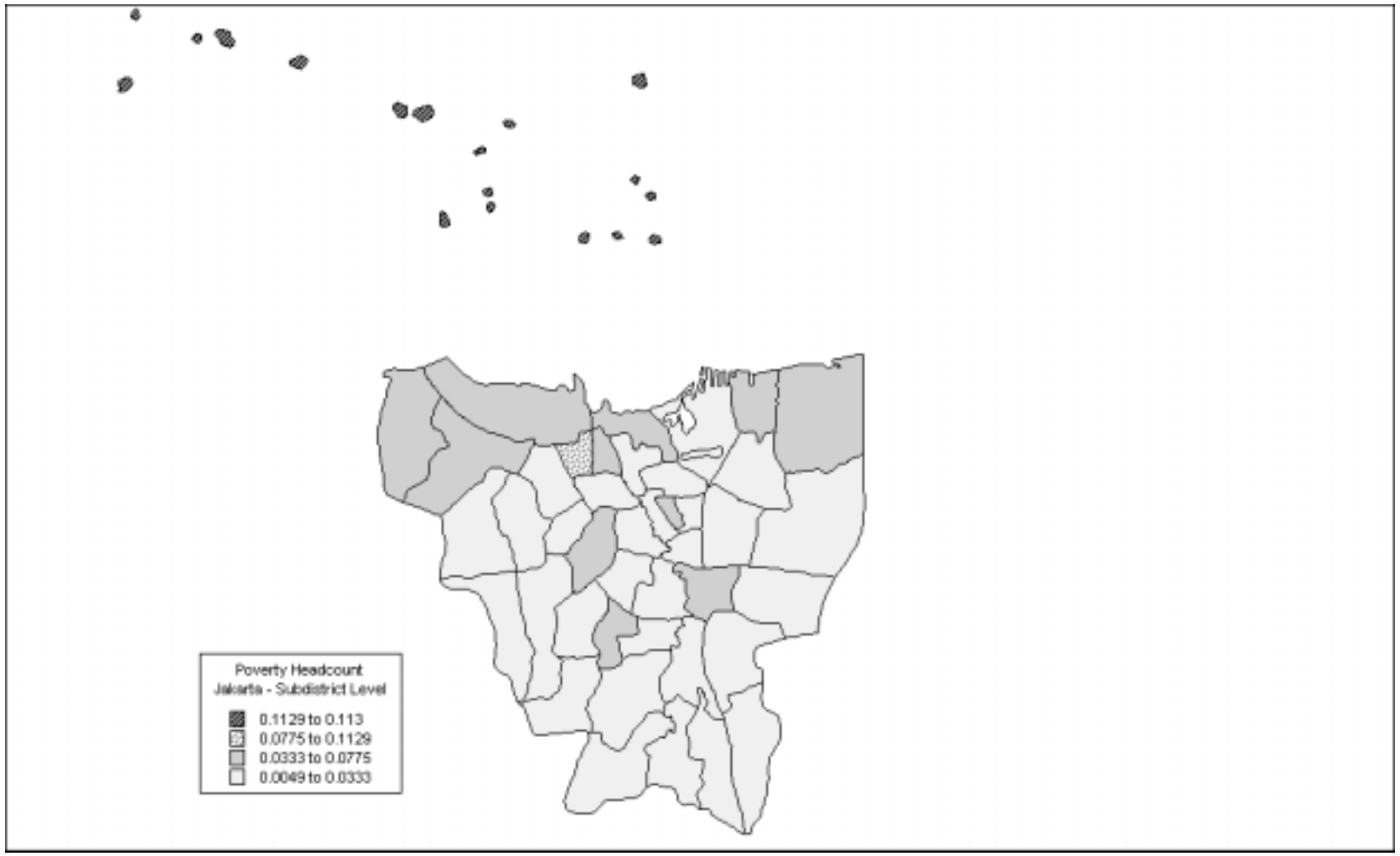


Figure 4c. Poverty Map of Jakarta – Village Level

Figure 5a. Poverty Map of East Java – District Level

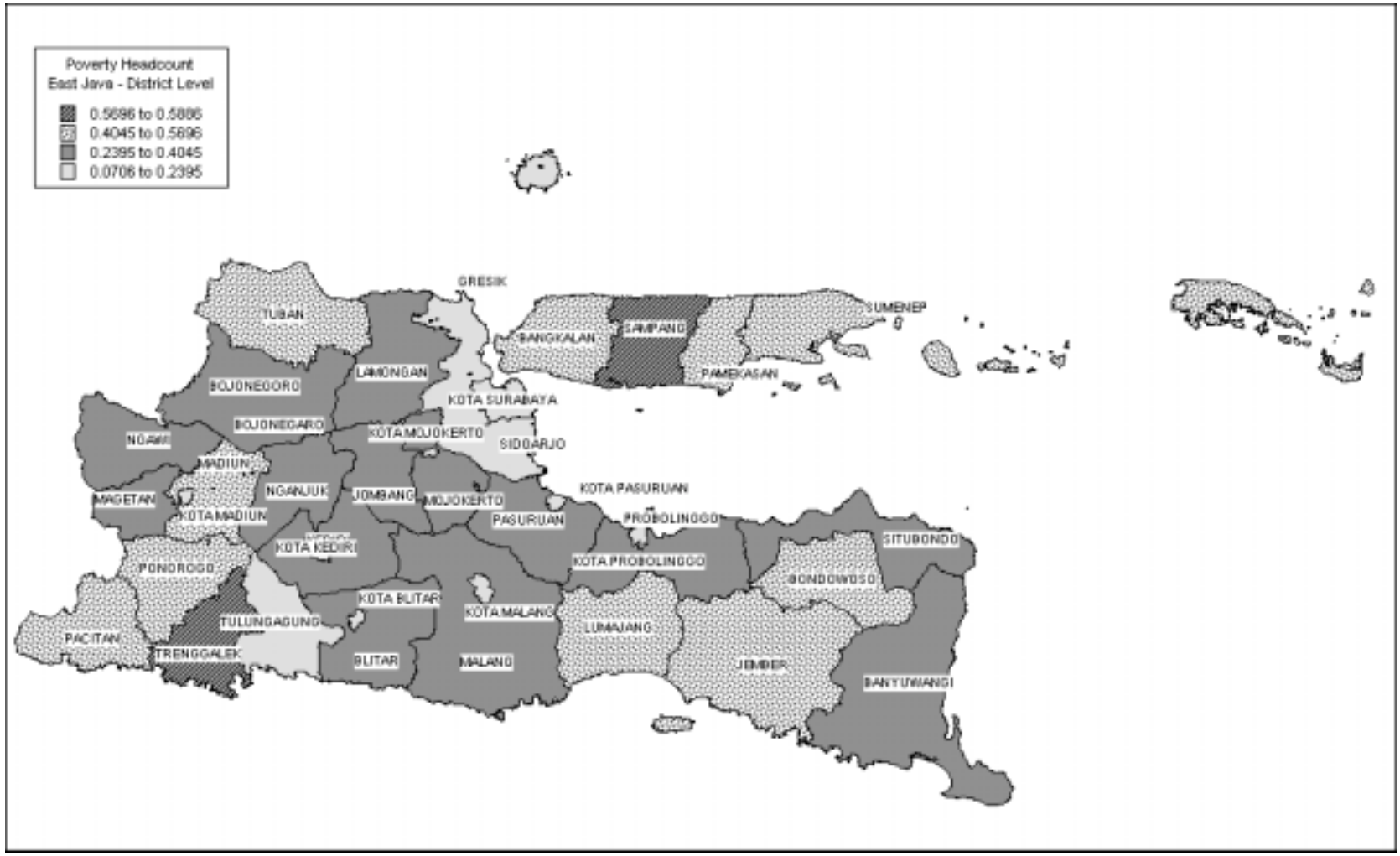


Figure 5b. Poverty Map of East Java – Subdistrict Level

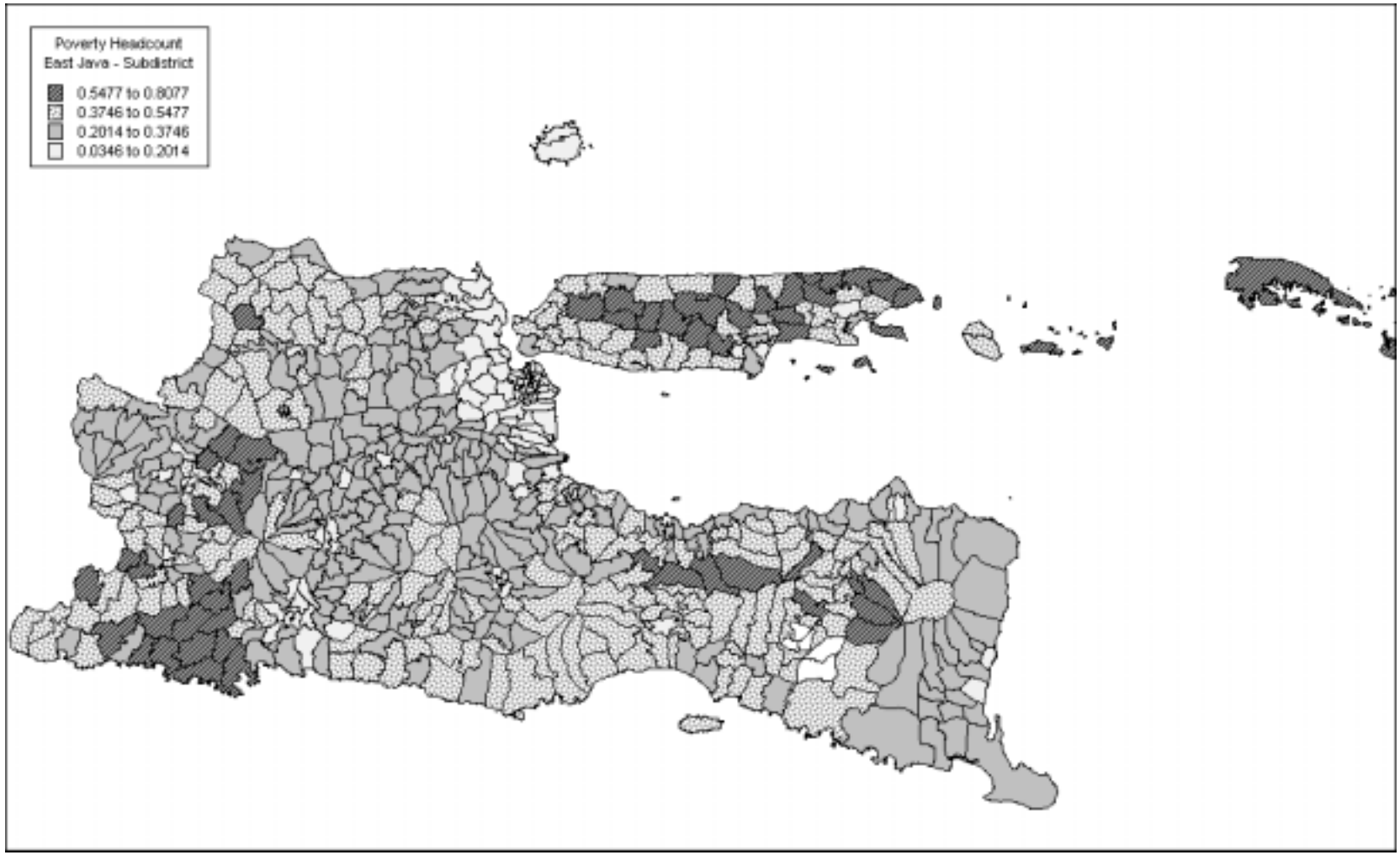
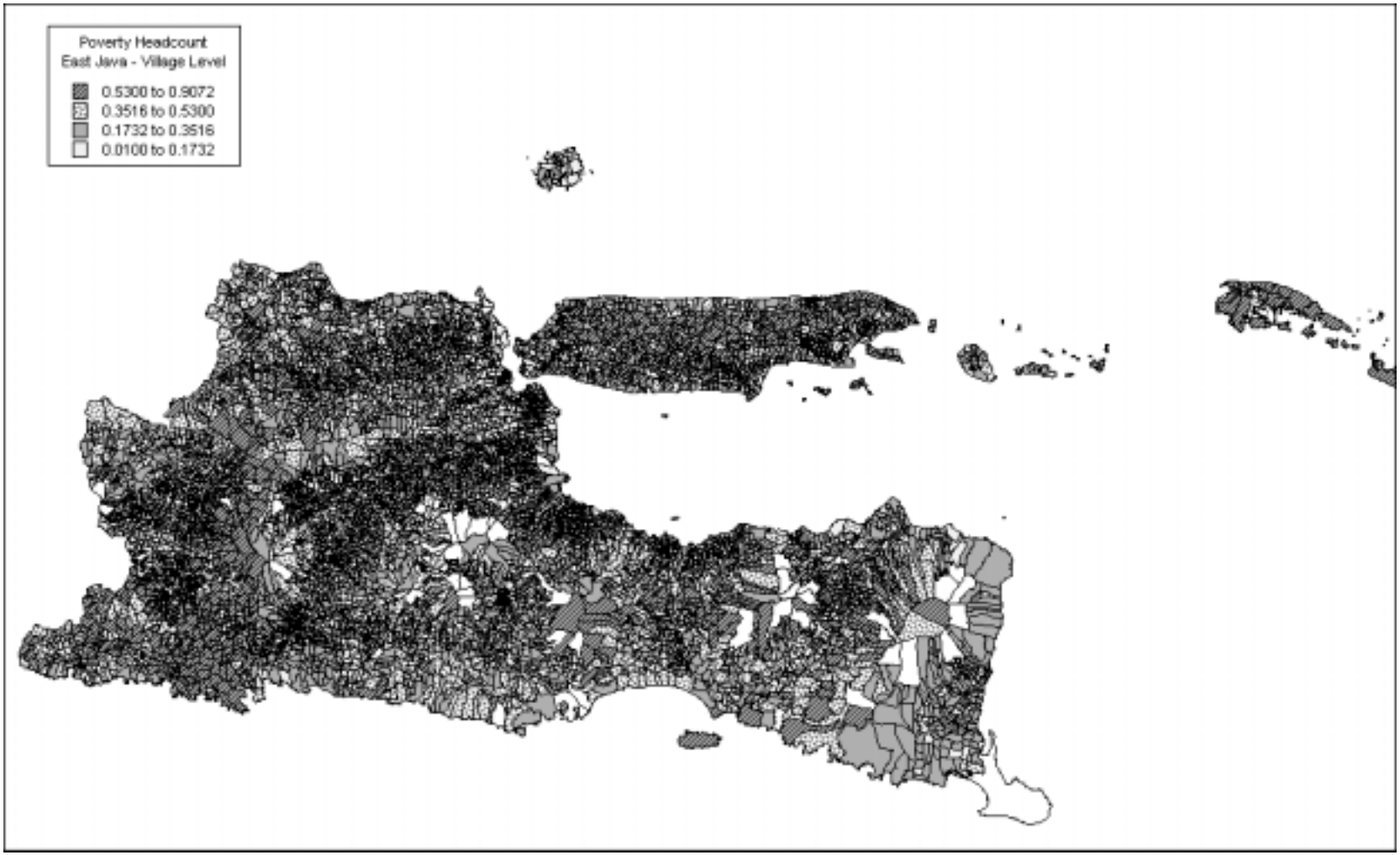
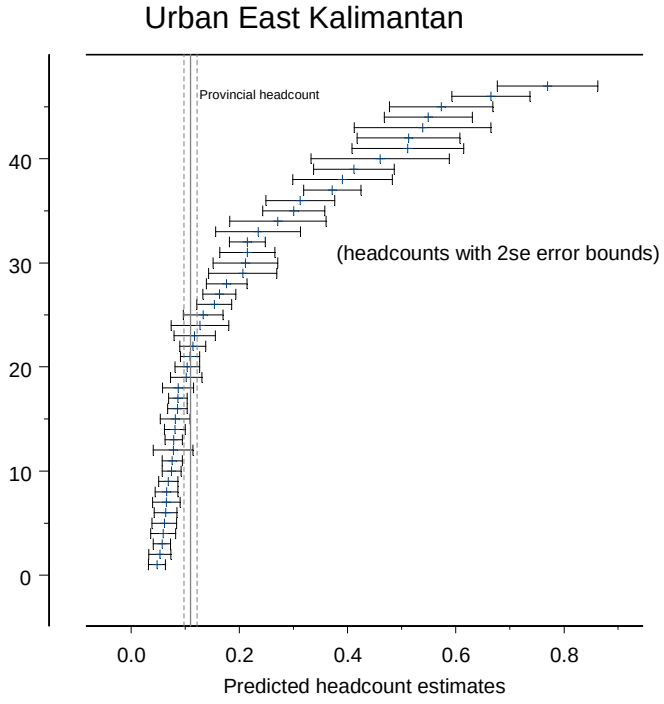


Figure 5c. Poverty Map of East Java – Village Level



When inspecting these maps it should be kept in mind that they have been created using the *expected* headcount. The *true* headcount for a location will differ from the expected headcount because of sampling and modeling error. The maps do not take errors into account. To show an example of what precision can be achieved at the subdistrict level, Figure 6 shows the district level predicted poverty headcount in urban East Kalimantan along with brackets giving a 70 percent confidence interval from one standard error below to one standard error above the point estimate. For reference, the provincial (urban) headcount has been included as a vertical line in the graph. Clearly, on the basis of this graph there is a large group of subdistricts for which one cannot tell with reasonable confidence that they have below- or above-average headcounts.

Figure 6. The Precision of District Level Poverty Estimates in Urban East Kalimantan

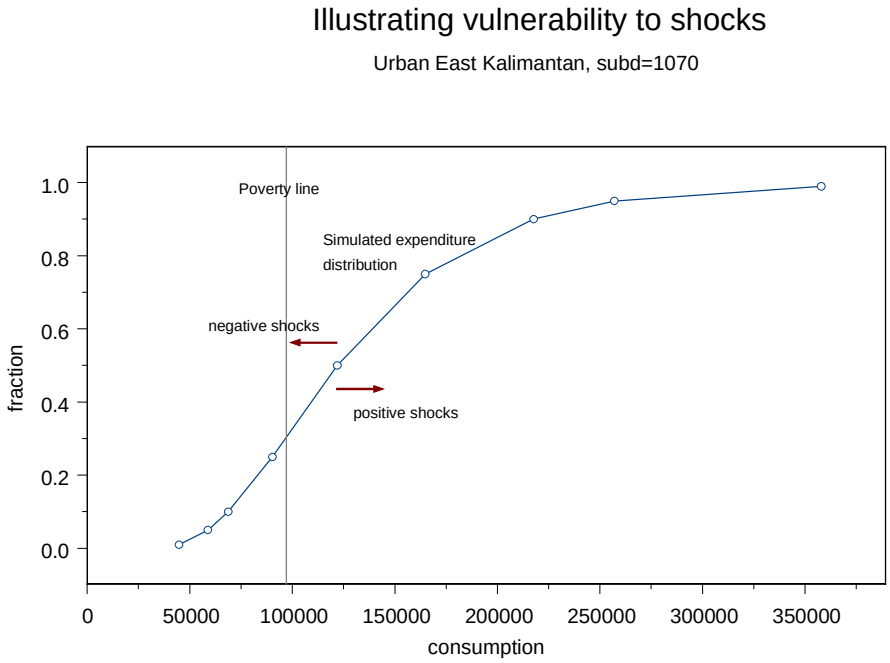


C. Examples of Further Applications

Poverty mapping can be of great value in policies targeted at the poor, but targeting is not the only possible use. For instance, the following Figure 7 could be used to illustrate the volatility of headcounts over time. The figure depicts the (estimated) distribution of per capita expenditure of a particular subdistrict, with an estimated headcount of 0.3. The graph shows that the distribution function is very steep in the neighborhood of the poverty line, implying that covariant consumption shocks (for

example, price shocks), which will shift the distribution to the left (negative shock) or to the right (positive shock) will lead to a strong response of the headcount.

Figure 7. Cumulative Distribution Function of Consumption



An obvious application of the newly created data on economic welfare at disaggregated scale, is to correlate the data to other disaggregated statistics. For instance, a long-standing debate in development concerns the relative importance of a 'pro-growth' policy and a policy aimed at reducing inequality. The following Figures 8a and 8b show that in urban East Kalimantan there is a strong negative relationship between average per capita consumption expenditure and the poverty headcount, while the relationship between poverty and inequality is virtually non-existent.

The Gini coefficients are generally fairly low, suggesting that the scope for poverty reduction by redistributing income is limited. Note however that such graphics, suggestive as they are, cannot substitute for careful economic research into such important issues.

Figure 8a. Relationship between Poverty and Average Consumption

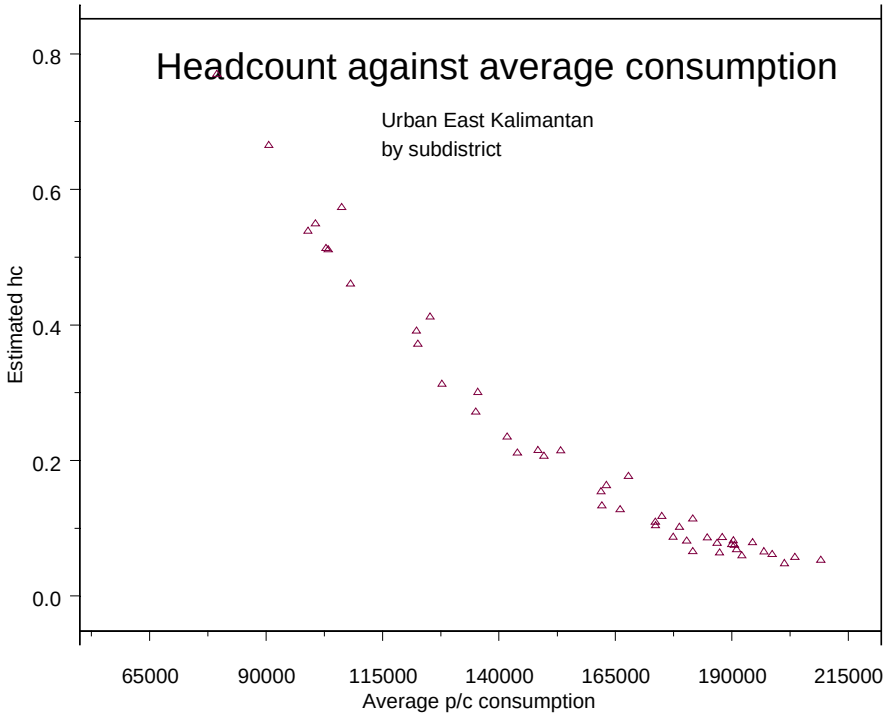
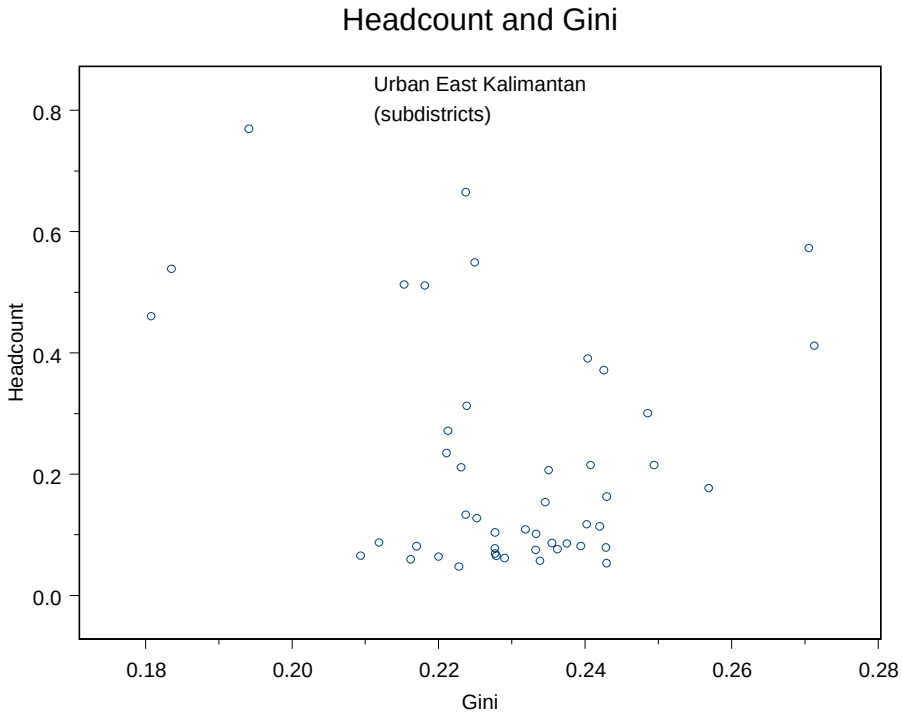


Figure 8b. Relationship between Poverty and Inequality



D. Conformity with Other Measures

The indicator most widely used in Indonesia to rank regions for targeting purposes is based on the classification of family socio-economic status created by the Family Planning Coordinating Agency (BKKBN). Under this classification system, families are grouped into four socio-economic levels: 'pre-prosperous families' ("keluarga pra-sejahtera" or KPS), 'prosperous families level I' ("keluarga sejahtera I" or KS I), level II (KS II), and level III (KS III).

A family is defined as 'pre-prosperous' if it fails to satisfy one of the following 5 conditions: (i) All household members are able to practice their religion; (ii) All household members are able to eat at least twice a day; (iii) All household members have different sets of clothing for home, work, school, and visits; (iv) A large part of the floor in the house is not made of earth; (v) The household is able to seek modern medical assistance for sick children and family planning services for birth control.

This BKKBN indicator was used extensively in the targeting for various Social Safety Net (SSN) Programs during the recent economic crisis.[12] Another large scale program, the Kecamatan Development Program (KDP), also uses this indicator along with a composite of various education, health, infrastructure, and economic indicators to rank subdistricts all over the country.

The subdistrict rank correlations of the poverty mapping results with these measures are shown in Table 3. Since the data are only for subdistricts within districts (*kabupaten*), and do not include subdistrict within cities (*kota*), the correlation tests can be implemented only for the provinces of East Java and East Kalimantan.[13]

Table 3. Rank Correlations of Subdistricts Based on Poverty Mapping Results with BKKBN and KDP Indicators

Province	Indicator	
	BKKBN	KDP
East Java	0.4610	0.4737
East Kalimantan	0.2140	0.4136

[12] See Pritchett, Sumarto, and Suryahadi (2002).

[13] This is because KDP is implemented only in *kabupatens*. The data were used for the implementation of the second stage of KDP (KDP 2) starting in 2002 and provided by the World Bank Jakarta office.

Table 3 shows that all the correlation coefficients are not high. The correlation with BKKBN indicator in East Kalimantan is particularly low at around 21 percent. The other three correlation coefficients stand between 40 and 50 percent. This indicates that there is a wide scope to improve targeting of regions by incorporating the results of poverty mapping into the targeting decision.

VI. Concluding Remarks

Poverty reduction and social development efforts will continue to be an important endeavor in Indonesia, even long into the future. Learning from past experiences in targeting difficulties, there is clearly a need to develop tools for more effective geographic targeting than those that have been used in the past. Ideally, geographic targeting would be based on a description of poverty incidence and other indicators of economic welfare at small areas or low administrative levels.

This study is a pilot and the first attempt to apply the recently developed poverty mapping method in Indonesia. The objective is to obtain estimates of poverty incidence at geographical units smaller than a province-urban/rural area, which is the lowest level of aggregation for which reliable (but still very imprecise) poverty statistics are currently available. This pilot study uses data from three provinces: East Kalimantan, Jakarta, and East Java.

The results of this pilot study have strongly shown that the poverty mapping method – developed to estimate poverty measures and other welfare indicators for small areas using data that are already available – can be successfully applied in Indonesia. Using data from the three pilot provinces, this study has successfully calculated various poverty and inequality indicators at the provincial, district, subdistrict, and village levels with reasonable – and better than SUSENAS based calculations of – standard errors.

In particular, the standard errors at the provincial, district, and subdistrict levels are reasonably acceptable. At the village level, however, there are great variations in the precision of poverty headcount estimates across villages within a province. The implication of this is that the poverty mapping results for the village level need to used with caution. For villages with high standard errors, other information is required to verify the estimates.

Finally, the proven applicability and the usefulness of the poverty mapping results appear to support the extension of the application of the method to the remaining provinces. It is desirable that Indonesia has a complete poverty map for the whole country.

Appendix

Table A1. Mean and Standard Deviation of Matched Variables, East Kalimantan - Urban

Variables	SUSENAS		Census	
	Mean	S.D.	Mean	S.D.
Household size	4.26	1.88	4.03	1.95
Household living in permanent house	0.97	0.18	0.95	0.23
Household living in owned house	0.59	0.49	0.58	0.49
Household living in rented house	0.26	0.44	0.31	0.46
Housing facilities:				
- Clean water	0.96	0.19	0.76	0.43
- Toilet	0.83	0.37	0.81	0.39
- Electricity	1.00	0.07	0.91	0.29
Household head characteristics:				
- Age (years)	41.55	12.60	39.43	11.99
- Female	0.10	0.30	0.10	0.29
- Married	0.84	0.37	0.84	0.37
Education level of household head:				
> Incomplete primary education or lower	0.12	0.33	0.08	0.27
> Completed primary education	0.25	0.43	0.27	0.44
> Lower secondary education	0.17	0.37	0.18	0.38
> Upper secondary education	0.34	0.48	0.38	0.48
> Tertiary education	0.12	0.32	0.10	0.29
Years of education of household head	9.43	3.97	9.24	4.02
Working status of household head:				
> Unemployed	0.14	0.34	0.09	0.28
> Self employed/employer	0.31	0.46	0.34	0.47
> Employee/salaried workers	0.55	0.50	0.57	0.50
> Family workers/non salaried workers	0.01	0.09	0.01	0.09
Occupation sector of household head:				
> Agriculture	0.07	0.26	0.11	0.31
> Industry	0.08	0.28	0.12	0.32
> Trade	0.20	0.40	0.14	0.35
> Services	0.65	0.48	0.63	0.48
Spouse of household head characteristics:				
- Age (years)	29.45	16.89	27.87	16.34

Table A1. *Continued*

Variables	SUSENAS		Census	
	Mean	S.D.	Mean	S.D.
Education level of spouse of household head:				
> Incomplete primary education or lower	0.15	0.36	0.07	0.26
> Completed primary education	0.22	0.42	0.28	0.45
> Lower secondary education	0.15	0.35	0.17	0.37
> Upper secondary education	0.25	0.43	0.24	0.43
> Tertiary education	0.05	0.21	0.05	0.21
Years of education of spouse of household head	6.89	4.81	6.81	4.81
Working status of spouse of household head:				
> Unemployed	0.49	0.50	0.60	0.49
> Self employed/employer	0.13	0.34	0.08	0.27
> Employee/salaried workers	0.12	0.33	0.09	0.29
> Family workers/non salaried workers	0.07	0.26	0.04	0.19
Occupation sector of spouse of household head:				
> Agriculture	0.02	0.15	0.03	0.16
> Industry	0.03	0.16	0.02	0.14
> Trade	0.15	0.35	0.07	0.25
> Services	0.62	0.49	0.69	0.46
Average years of study for adult	8.86	3.02	8.98	3.17
Proportion of adults who are employed	0.59	0.28	0.57	0.28
Proportion of 6-24 year olds who are enrolled in schools	0.50	0.45	0.42	0.45
Proportion of children 5 years old or younger	0.11	0.14	0.12	0.17
Proportion of male	0.52	0.23	0.52	0.23
Proportion of less than 15 year olds and 65 year olds or older (Dependency ratio)	0.28	0.22	0.29	0.24

Table A2. Mean and Standard Deviation of Matched Variables, East Kalimantan - Rural

Variables	SUSENAS		Census	
	Mean	S.D.	Mean	S.D.
Household size	4.29	1.71	3.91	1.85
Household living in permanent house	0.88	0.33	0.83	0.37
Household living in owned house	0.83	0.37	0.78	0.41
Household living in rented house	0.07	0.26	0.07	0.25
Housing facilities:				
- Clean water	0.65	0.48	0.52	0.50
- Toilet	0.55	0.50	0.47	0.50
- Electricity	0.74	0.44	0.63	0.48
Household head characteristics:				
- Age (years)	41.98	11.87	40.19	12.87
- Female	0.08	0.27	0.07	0.25
- Married	0.87	0.34	0.86	0.35
Education level of household head:				
> Incomplete primary education or lower	0.36	0.48	0.26	0.44
> Completed primary education	0.32	0.47	0.41	0.49
> Lower secondary education	0.12	0.33	0.14	0.34
> Upper secondary education	0.16	0.37	0.17	0.38
> Tertiary education	0.04	0.19	0.03	0.16
Years of education of household head	6.64	3.93	6.15	4.35
Working status of household head:				
> Unemployed	0.05	0.22	0.03	0.16
> Self employed/employer	0.60	0.49	0.68	0.47
> Employee/salaried workers	0.35	0.48	0.27	0.45
> Family workers/non salaried workers	0.01	0.08	0.02	0.14
Occupation sector of household head:				
> Agriculture	0.52	0.50	0.64	0.48
> Industry	0.10	0.30	0.06	0.24
> Trade	0.08	0.27	0.05	0.21
> Services	0.30	0.46	0.25	0.43
Spouse of household head characteristics:				
- Age (years)	30.54	15.49	28.60	16.51

Table A2. ***Continued***

Variables	SUSENAS		Census	
	Mean	S.D.	Mean	S.D.
Education level of spouse of household head:				
> Incomplete primary education or lower	0.35	0.48	0.24	0.43
> Completed primary education	0.32	0.47	0.39	0.49
> Lower secondary education	0.09	0.29	0.11	0.31
> Upper secondary education	0.07	0.25	0.08	0.27
> Tertiary education	0.03	0.17	0.01	0.10
Years of education of spouse of household head	4.99	3.94	4.42	4.10
Working status of spouse of household head:				
> Unemployed	0.43	0.50	0.40	0.49
> Self employed/employer	0.13	0.33	0.12	0.32
> Employee/salaried workers	0.07	0.26	0.04	0.21
> Family workers/non salaried workers	0.23	0.42	0.27	0.44
Occupation sector of spouse of household head:				
> Agriculture	0.24	0.43	0.33	0.47
> Industry	0.05	0.21	0.01	0.11
> Trade	0.08	0.27	0.04	0.19
> Services	0.49	0.50	0.45	0.50
Average years of study for adult	6.16	2.64	6.18	3.53
Proportion of adults who are employed	0.69	0.27	0.72	0.28
Proportion of 6-24 year olds who are enrolled in schools	0.48	0.44	0.36	0.43
Proportion of children 5 years old or younger	0.12	0.15	0.13	0.17
Proportion of male	0.52	0.20	0.54	0.22
Proportion of less than 15 year olds and 65 year olds or older (Dependency ratio)	0.34	0.22	0.31	0.26

Table A3. Mean and Standard Deviation of Matched Variables, Jakarta

Variables	SUSENAS		Census	
	Mean	S.D.	Mean	S.D.
Household size	4.21	1.89	3.74	1.89
Household living in permanent house	0.98	0.12	0.92	0.27
Household living in owned house	0.64	0.48	0.52	0.50
Household living in rented house	0.29	0.46	0.40	0.49
Housing facilities:				
- Clean water	1.00	0.06	0.81	0.39
- Toilet	0.78	0.42	0.79	0.41
- Electricity	1.00	0.03	0.97	0.18
Household head characteristics:				
- Age (years)	43.87	13.15	40.01	13.03
- Female	0.14	0.34	0.13	0.34
- Married	0.81	0.39	0.80	0.40
Education level of household head:				
> Incomplete primary education or lower	0.11	0.31	0.06	0.23
> Completed primary education	0.21	0.41	0.23	0.42
> Lower secondary education	0.19	0.39	0.19	0.39
> Upper secondary education	0.35	0.48	0.38	0\.49
> Tertiary education	0.14	0.35	0.13	0.34
Years of education of household head	9.79	4.02	9.82	0.39
Working status of household head:				
> Unemployed	0.17	0.38	0.10	0.30
> Self employed/employer	0.34	0.47	0.27	0.44
> Employee/salaried workers	0.49	0.50	0.62	0.49
> Family workers/non salaried workers	0.00	0.05	0.01	0.10
Occupation sector of household head:				
> Agriculture	0.00	0.06	0.02	0.12
> Industry	0.13	0.34	0.14	0.35
> Trade	0.28	0.45	0.21	0.41
> Services	0.59	0.49	0.63	0.48
Spouse of household head characteristics:				
- Age (years)	30.24	18.62	26.19	18.53

Table A3. *Continued*

Variables	SUSENAS		Census	
	Mean	S.D.	Mean	S.D.
Education level of spouse of household head:				
> Incomplete primary education or lower	0.14	0.35	0.06	0.24
> Completed primary education	0.28	0.45	0.30	0.46
> Lower secondary education	0.21	0.41	0.22	0.41
> Upper secondary education	0.28	0.45	0.33	0.47
> Tertiary education	0.08	0.27	0.09	0.29
Years of education of spouse of household head	6.83	4.95	6.63	5.19
Working status of spouse of household head:				
> Unemployed	0.70	0.46	0.70	0.46
> Self employed/employer	0.12	0.33	0.08	0.27
> Employee/salaried workers	0.14	0.35	0.17	0.37
> Family workers/non salaried workers	0.04	0.19	0.05	0.21
Occupation sector of spouse of household head:				
> Agriculture	-	-	0.00	0.05
> Industry	0.04	0.20	0.04	0.20
> Trade	0.16	0.37	0.08	0.27
> Services	0.80	0.40	0.87	0.33
Average years of study for adult	9.11	3.01	9.57	3.04
Proportion of adults who are employed	0.57	0.27	0.63	0.29
Proportion of 6-24 year olds who are enrolled in schools	0.44	0.45	0.36	0.44
Proportion of children 5 years old or younger	0.09	0.14	0.09	0.15
Proportion of male	0.50	0.23	0.52	0.26
Proportion of less than 15 year olds and 65 year olds or older (Dependency ratio)	0.25	0.22	0.23	0.24

Table A4. Mean and Standard Deviation of Matched Variables, East Java - Urban

Variables	SUSENAS		Census	
	Mean	S.D.	Mean	S.D.
Household size	3.86	1.79	3.72	1.70
Household living in permanent house	0.88	0.33	0.89	0.32
Household living in owned house	0.76	0.43	0.77	0.42
Household living in rented house	0.17	0.38	0.15	0.36
Housing facilities:				
- Clean water	1.00	0.02	0.78	0.42
- Toilet	0.57	0.50	0.66	0.47
- Electricity	0.99	0.11	0.86	0.34
Household head characteristics:				
- Age (years)	45.31	14.24	44.17	14.45
- Female	0.16	0.37	0.15	0.36
- Married	0.79	0.41	0.81	0.39
Education level of household head:				
> Incomplete primary education or lower	0.25	0.43	0.18	0.39
> Completed primary education	0.29	0.46	0.35	0.48
> Lower secondary education	0.16	0.37	0.15	0.36
> Upper secondary education	0.23	0.42	0.24	0.43
> Tertiary education	0.06	0.24	0.07	0.25
Years of education of household head	7.70	4.41	7.46	4.56
Working status of household head:				
> Unemployed	0.16	0.37	0.12	0.33
> Self employed/employer	0.37	0.48	0.40	0.49
> Employee/salaried workers	0.46	0.50	0.46	0.50
> Family workers/non salaried workers	0.01	0.11	0.01	0.10
Occupation sector of household head:				
> Agriculture	0.11	0.31	0.21	0.41
> Industry	0.15	0.36	0.11	0.31
> Trade	0.18	0.39	0.16	0.36
> Services	0.56	0.50	0.53	0.50
Spouse of household head characteristics:				
- Age (years)	30.11	19.46	28.97	19.32

Table A4. *Continued*

Variables	SUSENAS		Census	
	Mean	S.D.	Mean	S.D.
Education level of spouse of household head:				
> Incomplete primary education or lower	0.29	0.45	0.17	0.37
> Completed primary education	0.33	0.47	0.41	0.49
> Lower secondary education	0.16	0.36	0.17	0.37
> Upper secondary education	0.18	0.38	0.20	0.40
> Tertiary education	0.05	0.21	0.05	0.22
Years of education of spouse of household head	5.35	4.67	5.47	4.81
Working status of spouse of household head:				
> Unemployed	0.51	0.50	0.50	0.50
> Self employed/employer	0.22	0.41	0.22	0.37
> Employee/salaried workers	0.18	0.38	0.18	0.38
> Family workers/non salaried workers	0.09	0.28	0.10	0.30
Occupation sector of spouse of household head:				
> Agriculture	0.05	0.22	0.11	0.32
> Industry	0.10	0.30	0.07	0.25
> Trade	0.22	0.42	0.13	0.34
> Services	0.62	0.48	0.69	0.46
Average years of study for adult	7.48	3.44	7.59	3.69
Proportion of adults who are employed	0.62	0.30	0.63	0.31
Proportion of 6-24 year olds who are enrolled in schools	0.46	0.45	0.41	0.46
Proportion of children 5 years old or younger	0.08	0.13	0.09	0.14
Proportion of male	0.48	0.23	0.49	0.23
Proportion of less than 15 year olds and 65 year olds or older (Dependency ratio)	0.28	0.24	0.28	0.25

Table A5. Mean and Standard Deviation of Matched Variables, East Java - Rural

Variables	SUSENAS		Census	
	Mean	S.D.	Mean	S.D.
Household size	3.71	1.59	3.60	1.56
Household living in permanent house	0.57	0.50	0.63	0.48
Household living in owned house	0.96	0.19	0.95	0.22
Household living in rented house	0.01	0.10	0.01	0.10
Housing facilities:				
- Clean water	0.99	0.12	0.61	0.49
- Toilet	0.41	0.49	0.39	0.49
- Electricity	0.89	0.31	0.69	0.46
Household head characteristics:				
- Age (years)	48.31	14.39	46.06	14.31
- Female	0.15	0.36	0.14	0.35
- Married	0.83	0.37	0.85	0.36
Education level of household head:				
> Incomplete primary education or lower	0.55	0.50	0.43	0.50
> Completed primary education	0.31	0.46	0.43	0.49
> Lower secondary education	0.07	0.25	0.07	0.26
> Upper secondary education	0.06	0.25	0.06	0.23
> Tertiary education	0.01	0.12	0.01	0.11
Years of education of household head	4.47	3.72	4.09	3.95
Working status of household head:				
> Unemployed	0.10	0.30	0.06	0.23
> Self employed/employer	0.60	0.49	0.68	0.47
> Employee/salaried workers	0.29	0.46	0.25	0.43
> Family workers/non salaried workers	0.01	0.09	0.01	0.12
Occupation sector of household head:				
> Agriculture	0.56	0.50	0.68	0.47
> Industry	0.06	0.25	0.03	0.18
> Trade	0.11	0.31	0.08	0.27
> Services	0.27	0.44	0.21	0.41
Spouse of household head characteristics:				
- Age (years)	32.60	19.70	31.10	19.05

Table A5. *Continued*

Variables	SUSENAS		Census	
	Mean	S.D.	Mean	S.D.
Education level of spouse of household head:				
> Incomplete primary education or lower	0.55	0.50	0.39	0.49
> Completed primary education	0.32	0.47	0.48	0.50
> Lower secondary education	0.08	0.26	0.08	0.27
> Upper secondary education	0.04	0.20	0.04	0.20
> Tertiary education	0.01	0.09	0.01	0.09
Years of education of spouse of household head	3.42	3.54	3.41	3.72
Working status of spouse of household head:				
> Unemployed	0.39	0.49	0.47	0.50
> Self employed/employer	0.18	0.39	0.17	0.38
> Employee/salaried workers	0.15	0.36	0.13	0.34
> Family workers/non salaried workers	0.27	0.45	0.23	0.38
Occupation sector of spouse of household head:				
> Agriculture	0.36	0.48	0.30	0.46
> Industry	0.07	0.25	0.03	0.17
> Trade	0.14	0.34	0.08	0.27
> Services	0.44	0.50	0.59	0.49
Average years of study for adult	4.71	2.90	4.56	3.27
Proportion of adults who are employed	0.71	0.29	0.70	0.29
Proportion of 6-24 year olds who are enrolled in schools	0.41	0.45	0.38	0.45
Proportion of children 5 years old or younger	0.08	0.13	0.09	0.14
Proportion of male	0.48	0.21	0.48	0.21
Proportion of less than 15 year olds and 65 year olds or older (Dependency ratio)	0.33	0.25	0.31	0.25

Table B1. OLS Results for East Kalimantan – Urban
(For explanation, see text Chapter IV)

Dependent Variable: Log per capita expenditure.		
Variable	Parameter Estimate	Standard Error
Constant	12.396 **	0.1486
Household level:		
Household size	-0.62918 **	0.09552
Household size squared	0.09792 **	0.02021
Household size cubed	-0.00524 **	0.00129
Housing facility: toilet	0.15686 **	0.04571
Occupation sector of household head: Trade	0.12639 **	0.04512
Working status of household head: self employed/employer	-0.13086 *	0.06123
Working status of household head: employee	-0.09275	0.05644
Years of schooling of household head	0.03074 **	0.00523
Years of schooling of spouse of household head	0.00863	0.00445
Proportion of children 5 years old or younger	-0.32013 *	0.14552
Proportion of adults who are employed	0.23389 **	0.06736
Proportion of 6-24 year olds who are enrolled in schools	0.05734	0.04418
Proportion of less than 15 year olds and 65 year olds or older (Dependency ratio)	-0.11377	0.09552
Village level infrastructure:		
Presence of clinics	0.35397 **	0.06021
Presence of bank	0.12831 **	0.03639
Village means/non-infrastructure:		
Mean number of live births of women who have been married	0.01086	0.00766
Root MSE	0.32656	
Adjusted R^2	0.5268	
F-test	31.54 **	

Table B1. *Continued*

1st Stage Diagnostic Information	
Number of observations in survey	440
Number of clusters	26
Sum of weights across all survey observations	265,782
Maximum households per cluster	32
Minimum households per cluster	10
Max observed left hand side value in survey	13.706738472
Min observed left hand side value in survey	10.787813187
Maximum total residual from OLS model	1.1579629559
Minimum total residual from OLS model	-0.78851085
Maximum household component of residual	0.9895228673
Minimum household component of residual	-0.758217768
Maximum cluster component of residual	0.2111920808
Minimum cluster component of residual	-0.232690124
Total sigma from OLS model	0.3265599409
Sigma-eta	0.0802765886
Ratio of SigmaEta**2/MSE	0.0604299172
Variance of sigma-eta-squared	0.0000135306

Heteroscedasticity Regression

Dependent variable: see report.

Variable Label	Parameter Estimate	Standard Error
Constant	-3.69673 **	0.19558
(Occupation sector of HH head=trade) * (Mean number of live births of women who have been married)	-0.19105	0.09998
(Occupation sector of HH head = trade) * (Years of education of household head)	0.11773 **	0.04428
(Years of education of household head) * (Mean number of live births of women who have been married)	0.02480 **	0.00776
(Housing facility: toilet) * (Proportion of 6-24 year olds enrolled in schools)	1.60020 **	0.52869

Table B1. ***Continued***

Variable Label	Parameter Estimate	Standard Error
(Household size) * (Proportion of 6-24 year olds who are enrolled in schools)	-0.85401 **	0.21213
(Occupation sector of head = trade) * (Working status of household head = employee/salaried workers)	-1.05809	0.58562
(Years of education of spouse of household head) * (Mean number of live births of women who have been married)	-0.02039 *	0.00906
(Household size ^ 2) * (Proportion of 6-24 year olds enrolled in schools)	0.08311 **	0.02493
Root MSE	2.30565	
Adjusted R^2	0.0750	
F-test	4.37 **	

Note:

** significant at 1 percent level

* significant at 5 percent level

Table B2. OLS Results for East Kalimantan – Rural
(For explanation, see text Chapter IV)

Dependent Variable: Log per capita expenditure.			
Variable	Parameter Estimate		Standard Error
Constant	12.18071	**	0.14528
Household level:			
Household size	-0.31852	**	0.03784
Household size squared	0.02030	**	0.00366
Occupation sector of household head: Trade	0.11395	*	0.05555
Occupation sector of household head: Services	0.06346		0.03752
Household head characteristics: married	0.08527		0.04737
Education level of household head: upper secondary	0.09298	*	0.04301
Education level of household head: tertiary	0.34335	**	0.07976
Household living in permanent house	0.18026	**	0.04518
Household living in owned house	0.03034		0.04378
Housing facility: toilet	0.04115		0.03200
Housing facility: electricity	0.16314	**	0.03557
Proportion of adults who are employed	0.13363	*	0.05862
Proportion of 6-24 year olds who are enrolled in schools	0.14463	**	0.03936
Proportion of less than 15 year olds and 65 years or older	-0.41973	**	0.07510
Proportion of male	0.15709	*	0.07143
Village level infrastructure:			
Distance of village from subdistrict capital	0.00291	**	0.00082
Proportion of agriculture household	-0.20128	**	0.06110
Population density	0.01219	**	0.00423
Energy for cooking: kerosene/gas	0.07546		0.04548
Presence of public health center in village	0.13401	*	0.05422
Village means/non-infrastructure:			
Proportion of permanent houses in village	-0.16789	*	0.06819

Table B2. *Continued*

Root MSE	0.32957
Adjusted R^2	0.5278
F-test	30.80 **
1st Stage Diagnostic Information	
Number of observations in survey	561
Number of clusters	34
Sum of weights across all survey observations	264,263
Maximum households per cluster	32
Minimum households per cluster	14
Max observed left hand side value in survey	13.209498405
Min observed left hand side value in survey	10.561680794
Maximum total residual from OLS model	1.3265882613
Minimum total residual from OLS model	-1.030168735
Maximum household component of residual	1.1611067134
Minimum household component of residual	-0.906374023
Maximum cluster component of residual	0.4374508661
Minimum cluster component of residual	-0.336961862
Total sigma from OLS model	0.3295661755
Sigma-eta	0.1552102131
Ratio of SigmaEta**2/MSE	0.2217968256
Variance of sigma-eta-squared	0.0000553922

Heteroscedasticity Regression

Dependent variable: see report.

Variable Label	Parameter Estimate	Standard Error
Constant	-4.84198 **	0.19355
(Education level of household head = upper secondary) * (Proportion of 6-24 year olds who are enrolled in schools)	-9.72501 *	3.95900
(Household head characteristics = married)* (Education level of household head = tertiary)	3.18591 *	1.37819
(Household facility = electricity) * (Dependency ratio ^ 2)	-3.21966 **	0.95738

Table B2. *Continued*

Variable Label	Parameter Estimate	Standard Error
(Education level of household head = upper secondary) * (Proportion of 6-24 year olds who are enrolled in schools)	9.14908 *	3.95437
(Owned house) * (Household facility = electricity)	0.70805 **	0.23690
(Occupation sector of household head = services) * (Rented house)	-1.28811	0.69913
(Occupation sector of household head = trade) * (Dependency ratio ^ 2)	3.93098	2.13506
(Education level of household head = upper secondary) * (Population density)	0.10228	0.07403
(Housing facilities = toilet) * (Presence of public health center in village)	0.66462 *	0.29106
(Housing facilities = toilet) * (Dependency ratio ^ 2)	4.95624 *	2.25854
(Household size) * (Rented house)	0.24390	0.14429
(Occupation sector of household head = trade) * (Household head characteristics = married)	1.85100 *	0.71795
(Occupation sector of household head = trade) * (Housing facilities = electricity)	-2.35954 **	0.73938
(Housing facility = toilet) * (Dependency ratio)	-2.92977 *	1.44595
(Proportion of male) * (Proportion of 6-24 year olds who are enrolled in schools ^2)	1.48770 **	0.44674
(Household size) * (Education level of household head = tertiary)	-0.72089 *	0.28077
(Education level of household head = upper secondary) * (Proportion of adults who are employed)	-0.91042	0.59163
(Housing facility = electricity) * (Education level of household head = upper secondary)	1.02132	0.52653

Table B2. ***Continued***

Root MSE	2.21143
Adjusted R^2	0.0702
F-test	3.35 **

Note:

** significant at 1 percent level

* significant at 5 percent level

Table B3. OLS Results for Jakarta
(For explanation, see text Chapter IV)

Dependent Variable: Log per capita expenditure.			
Variable	Parameter Estimate		Standard Error
Constant	13.66112	**	0.21547
Household level:			
Household size	-0.31521	**	0.03177
Household size squared	0.03203	**	0.00580
Household size cubed	-0.00124	**	0.00032
Age of household head	0.00692	**	0.00072
Household living in owned house	0.07891	**	0.02968
Household living in rented house	-0.07207	*	0.03086
Housing facility: toilet	0.21295	**	0.02032
Female head of household	-0.08232	*	0.03200
Single head of household	0.10743	**	0.03231
Education level of household head: completed primary education	0.08287	**	0.02806
Education level of household head: lower secondary education	0.12421	**	0.03150
Education level of household head: upper secondary education	0.18859	**	0.03451
Education level of household head: tertiary education	0.36958	**	0.04298
Education level of spouse of household head: upper secondary education	0.06735	**	0.02144
Education level of spouse of household head: tertiary education	0.25319	**	0.03646
Occupation sector of household head: Trade	0.06091	**	0.01613
Average years of schooling of adult	0.03857	**	0.00441
Proportion of children 5 years old or younger	-0.23759	**	0.06686
Proportion of adults who are employed	0.21785	**	0.02944
Proportion of less than 15 year olds and 65 year olds or older	-0.10665	*	0.04533

Table B3. ***Continued***

Variable	Parameter estimate	Standard Error
Village level infrastructure:		
Presence of tertiary education school	0.07925 **	0.01657
Presence of house for the handicapped	0.14807 **	0.03074
Presence of hospital in village	0.07972 **	0.01470
Village means/non-infrastructure:		
Population density	-0.00020 **	0.00005
Village mean of proportion of males	-3.06947 **	0.38369
Village mean of tertiary educated people (aged > 20 years)	0.47178 **	0.09991
Root MSE	0.38096	
Adjusted R^2	0.5429	
F-test	136.14 **	
1st Stage Diagnostic Information		
Number of observations in survey	2,959	
Number of clusters	140	
Sum of weights across all survey observations	2,208,256	
Maximum households per cluster	47	
Minimum households per cluster	13	
Max observed left hand side value in survey	15.142329216	
Min observed left hand side value in survey	11.036549568	
Maximum total residual from OLS model	1.8888788164	
Minimum total residual from OLS model	-1.340939709	
Maximum household component of residual	1.5629351087	
Minimum household component of residual	-1.116646653	
Maximum cluster component of residual	0.9383526449	
Minimum cluster component of residual	-0.594724273	
Total sigma from OLS model	0.3809567452	
Sigma-eta	0.2201030164	
Ratio of SigmaEta**2/MSE	0.3338110075	
Variance of sigma-eta-squared	0.0000458914	

Table B3. *Continued*

Heteroscedasticity Regression		
Dependent variable: see report.		
Variable	Parameter Estimate	Standard Error
Constant	-4.19952 **	0.18805
(Occupation sector of HH head = trade) * (Proportion of adults who are employed ^ 2)	-2.45888 *	0.95872
Variable	Parameter Estimate	Standard Error
(Proportion of children <= 5 years) ^ 3	4.14304	2.23667
(Education level of spouse of HH head = upper secondary) * Hospital	0.68564 **	0.18702
(Education level of spouse of HH head = tertiary) * (Proportion of adults who are employed ^ 3)	8.42829 *	4.03983
(Dependency Ratio ^ 2)	-9.94796 **	2.48405
(Dependency Ratio ^ 3)	10.44737 **	2.31618
Household Size * Age of household head	-0.00273 **	0.00094888
(Education level of HH head = upper secondary) * (Proportion of adults who are employed ^ 3)	-9.80496 **	3.43170
(Education level of HH head = tertiary) * Female head	3.13535	2.37019
(Education level of HH head = tertiary) * Village mean of proportion of males	4.65105	2.44136
Toilet * Village mean of proportion of males	-2.28872 **	0.55855
Household size * (Education of head = tertiary)	0.09977 **	0.03539
(Education of head = upper secondary) * (Village mean of proportion of tertiary educated people)	2.23725 **	0.81689
(Proportion of children <= 5 years) * (Presence of tertiary school in village)	-1.63279 **	0.58322

Table B3. *Continued*

Variable	Parameter Estimate	Standard Error
Age of head * Toilet	0.03061 **	0.00671
Household size * Owned house	0.09729 *	0.03804
(Education level of HH head = upper secondary) * (Proportion of adults who are employed ^ 2)	16.39895 **	5.10598
Owned house * (Proportion of children <= 5 years)	1.60464 *	0.65668
(Education level of spouse of HH head = upper secondary) * Owned house	-0.44875 **	0.16144
Age of household head * Mean years of study of adult	-0.00141 **	0.00046145
(Occupation sector of HH head = trade) * (Proportion of adults who are employed)	3.02581 *	1.17625
(Education level of spouse of HH head = upper secondary) * Rented house	-0.51753 *	0.22452
Household size * Dependency ratio	0.27973 *	0.12501
(Education level of HH head = upper secondary) * (Proportion of adults who are employed)	-6.72210 **	1.80738
(Education level of spouse of HH head = tertiary) * Toilet	-1.60744	1.16716
Mean years of study of adults * Dependency ratio	0.24325 **	0.05777
(Occupation sector of HH head = trade) * (Education level of HH head = upper secondary)	0.41394 *	0.20580
(Occupation sector of HH head = trade) * Rented house	-0.79403 *	0.36340
Rented house * Presence of tertiary school in village	0.62979 **	0.17162
(Proportion of children <= 5 years) * (Proportion of adults who are employed)	-2.97146 **	0.89633
(Occupation sector of HH head = trade) * Owned house	-1.05632 **	0.34978

Table B3. ***Continued***

(Education level of spouse of HH head = tertiary) * (Proportion of adults who are employed ^ 2)	-8.93018	4.57147
Owned house * Dependency ratio	-1.50485 **	0.48499
Root MSE	2.34115	
Adjusted R^2	0.0374	
F-test	4.48 **	

Note:

** significant at 1 percent level

* significant at 5 percent level

Table B4. OLS Results for East Java – Urban
(For explanation, see text Chapter IV)

Dependent Variable: Log per capita expenditure.			
Variable	Parameter Estimate		Standard Error
Constant	12.30789	**	0.11880
Household level:			
Household size	-0.38841	**	0.03223
Household size squared	0.04195	**	0.00662
Household size cubed	-0.00125	**	0.00041308
Household living in permanent house	0.18720	**	0.02316
Household living in owned house	-0.09226	**	0.02755
Household living in rented house	-0.12375	**	0.03074
Housing facility: toilet	0.12467	**	0.01936
Housing facility: electricity	0.16159	*	0.06680
Education level of household head: completed primary education	0.05774	**	0.02114
Education level of household head: lower secondary education	0.05568	*	0.02705
Education level of household head: upper secondary education	0.17779	**	0.03113
Education level of household head: tertiary education	0.34968	**	0.04574
Education level of spouse of household head: upper secondary education	0.05348	*	0.02419
Education level of spouse of household head: tertiary education	0.14696	**	0.04493
Occupation sector of household head: Trade	0.14606	**	0.02186
Occupation sector of household head: Services	0.07946	**	0.01744
Occupation sector of spouse of household head: Trade	0.05081	*	0.01990
Average years of schooling of adult	0.03152	**	0.00378
Proportion of children 5 years old or younger	-0.22012	**	0.06458
Proportion of adults who are employed	0.05106		0.02612

Table B4. *Continued*

Variable	Parameter Estimate	Standard Error
Proportion of 6-24 year olds who are enrolled in schools	0.06931 **	0.01851
Proportion of less than 15 year olds or 65 year olds or older	-0.17245 **	0.03813
Village level infrastructure:		
Industrial index * toilet facility	0.07661 **	0.01958
Common sector of income of village people: services	0.05654 **	0.01576
Presence of tertiary education in village	0.12197 **	0.01937
Presence of market in village	0.07726 **	0.01662
Proportion of agriculture household	-0.21100 **	0.03277
Village means/non-infrastructure:		
Village mean of household size	-0.06042 *	0.02626
Village mean of proportion of 6 – 24 year olds who are enrolled in school	-0.61153 **	0.11075
Village mean of proportion of children 5 years or younger	1.32257 *	0.64184
Root MSE	0.37983	
Adjusted R^2	0.5164	
F-test	111.07 **	

1st Stage Diagnostic Information	
Number of observations in survey	3,094
Number of clusters	181
Sum of weights across all survey observations	3,174,147
Maximum households per cluster	32
Minimum households per cluster	11
Max observed left hand side value in survey	14.261955261
Min observed left hand side value in survey	10.459640503
Maximum total residual from OLS model	2.4251350726
Minimum total residual from OLS model	-0.997549968
Maximum household component of residual	2.3402287628
Minimum household component of residual	-1.095993227
Maximum cluster component of residual	0.7677288977
Minimum cluster component of residual	-0.476817353

Table B4. *Continued*

Heteroscedasticity Regression	
Total sigma from OLS model	0.379825218
Sigma-eta	0.1940121383
Ratio of SigmaEta**2/MSE	0.2609096925
Variance of sigma-eta-squared	0.0000229342

Dependent variable: see report.

Variable	Parameter Estimate	Standard Error
Constant	-6.00822 **	0.30678
(Education level of household head = tertiary) * (Education level of spouse of household head = tertiary)	-1.98107	1.17249
Owned house * (Industrial index * toilet facility)	-0.40024 **	0.14466
(Average years of study for adults) * (Presence of tertiary education in village)	-0.05697 *	0.02579
(Education level of spouse of household head = tertiary) * (Occupation sector of household head = trade)	1.28577 *	0.65589
Owned house * (Village mean of proportion of children of 5 years or younger)	-17.10848 **	3.91019
Rented house * (Village mean of proportion of children of 5 years or younger)	-13.31108 **	5.02875
(Dependency ratio ^ 2)	1.57060 *	0.62903
(Education level of spouse of household head = tertiary) * (Industrial index * toilet facility)	0.91815 *	0.45734
(Owned house) * (Proportion of children 5 years old or younger)	1.81318 **	0.69994
(Average years of study for adult)* (Proportion of 6-24 year olds who are enrolled in schools)	0.07280 *	0.02969
(Education level of spouse of household head = upper secondary) * (Proportion of agriculture household)	-1.26881 *	0.54994

Table B4. *Continued*

Variable	Parameter Estimate	Standard Error
(Housing facility = electricity) * (Village mean of proportion of children 5 years or younger)	26.25682 **	6.63363
(Proportion of 6-24 year olds who are enrolled in schools) * (Village mean of proportion of 6-24 year olds who are enrolled in schools).	-1.38845 *	0.57597
(Rented house) * (Occupation sector of spouse of household head = trade)	-0.84595 **	0.29864
(Dependency ratio) * (Proportion of agriculture household)	-1.77741 **	0.63505
(Housing facility = electricity) * (Presence of market in village)	-0.89209 **	0.29834
Owned house * (Education level of household head = tertiary)	-1.17489 **	0.40792
(Education level of household head = tertiary) * (Occupation sector of household head = services)	1.07266 **	0.38388
(Education level of household head = lower secondary) * (Village mean of proportion of 6-24 year olds who are enrolled in schools)	3.92238 **	1.09117
(Education level of household head = tertiary) * (Occupation sector of spouse of household head = trade)	-1.50648 **	0.57467
(Household size) * (Occupation sector of household head = services)	-0.12771 **	0.04103
(Housing facility = electricity) * (Dependency ratio)	-2.24325 **	0.77628
(Education level of household head = upper secondary) * (Proportion of children 5 years old or younger)	1.89545 *	0.85824
(Permanent house) * (Village mean of proportion of children 5 years old or younger)	-12.44037 **	4.38632

Table B4. *Continued*

Variable	Parameter Estimate	Standard Error
(Owned house) * (Presence of tertiary education in village)	0.70263 **	0.24055
(Education level of household head = upper secondary)* (Education level of spouse of household head = tertiary)	-2.32648 *	1.12896
(Education level of household head = tertiary) * (Presence of market in village)	-0.81679 *	0.40653
(Owned house) * (Proportion of agriculture household)	0.67486 *	0.28204
(Housing facility = toilet) * (Occupation sector of household head = trade)	0.87372 **	0.21186
(Household size) * (Presence of market in village)	0.11091 **	0.03627
(Education level of spouse of household head = upper secondary) * (Occupation sector of household head = trade)	-0.74680 *	0.34366
(Housing facility = toilet) * (Education level of spouse of household head = upper secondary)	-0.48841	0.27376
(Education level of household head = upper secondary) * (Education level of spouse of household head = tertiary)	-5.24654 **	1.94223
(Permanent house) * (Owned house)	1.34002 **	0.35690
(Permanent house) * (Rented house)	1.06630 *	0.45532
(Occupation sector of household head = services) * (Industrial index * housing facility = toilet)	0.45620 **	0.16856
(Education level of household head = upper secondary) * (Average years of study for adults)	-0.11231 **	0.03990
(Education level of household head = lower secondary) * (Village mean of proportion of children 5 years or younger)	-16.34155 **	5.13383
(Rented house) * (Presence of tertiary education in village)	0.76800 *	0.32841

Table B4. *Continued*

Variable	Parameter Estimate	Standard Error
(Education level of household head = tertiary education) * (Village mean of proportion of 6 - 24 year olds who are enrolled in schools)	3.30583 **	1.08600
(Occupation sector of household head = trade) * (Presence of market in village)	0.39202 *	0.19396
(Education level of household head = upper secondary) * Dependency ratio	-1.61418 **	0.61104
(Housing facility: electricity) * (Village mean of proportion of 6-24 year olds who are enrolled in school)	-1.67777 *	0.82513
(Permanent house) * (Occupation sector of household head = services)	-0.47481 *	0.23226
(Education level of spouse of household head = upper secondary) * (Occupation sector of household head = trade)	0.99539 **	0.33713
(Education level of household head = tertiary) * (Proportion of 6 – 24 year olds who are enrolled in school)	-0.76972	0.40985
(Education level of household head = tertiary) * (Average of years of education for adults)	0.15694	0.08209
(Education level of household head = upper secondary) * (Average of years of education for adults)	0.08367 **	0.02531
(Occupation sector of household head = services) * (Village mean of proportion of under 5 years old or younger)	10.61531 **	2.74230
(Owned house) * (Occupation sector of household head = trade)	-0.74355 **	0.21123
Dependency ratio * (Village mean of proportion of 6 – 24 year olds who are enrolled in school)	4.07848 *	2.00573

Table B4. ***Continued***

(Proportion of under 5 years old or younger) * (Village mean of proportion of 6 – 24 year olds who are enrolled in school)	-3.81615 *	1.61171
Permanent house * Market	0.47447	0.28821
(Education level of household head = tertiary) * (Village mean of proportion of 6 – 24 year olds who are enrolled in school)	3.05026 *	1.20757
Root MSE	2.22831	
Adjusted R^2	0.0473	
F-test	3.84 **	

Note:

** significant at 1 percent level

* significant at 5 percent level

Table B5. OLS Results for East Java – Rural
(For explanation, see text Chapter IV)

Dependent Variable: Log per capita expenditure.			
Variable	Parameter Estimate		Standard Error
Constant:	11.97188	**	0.07294
Household level:			
Household size	-0.30607	**	0.02462
Household size squared	0.03222	**	0.00445
Household size cubed	-0.00114	**	0.00023078
Household living in permanent house	0.09418	**	0.01791
Household living in owned house	0.08578	**	0.02931
Housing facility: toilet	0.08845	**	0.01123
Housing facility: electricity	0.05078	**	0.01814
Household head characteristics: female	-0.04221	*	0.01830
Years of schooling of spouse of household head	-0.00516	*	0.00242
Education level of household head: upper secondary	0.12834	**	0.02628
Education level of household head: tertiary education	0.18744	**	0.05157
Education level of spouse of household head: upper secondary	0.10413	**	0.03534
Education level of spouse of household head: tertiary education	0.26430	**	0.07514
Occupation sector of household head: Trade	0.04897	*	0.02424
Occupation sector of household head: Services	0.09233	**	0.01556
Occupation sector of spouse of household head: Trade	0.08662	**	0.01837
Occupation sector of spouse of household head: Services	0.03873	**	0.01238
Working status of household head: self employed/employer	0.14701	**	0.02236
Working status of household head: employee	0.10233	**	0.02202

Table B5. ***Continued***

Variable	Parameter Estimate		Standard Error
Average years of schooling of adult	0.03636	**	0.00308
Proportion of children 5 years old or younger	-0.19692	**	0.04551
Proportion of 6-24 year olds who are enrolled in schools	0.06317	**	0.01334
Proportion of less than 15 year olds or 65 year olds or older	-0.10379	**	0.02345
Industrial index * household size	-0.16266	**	0.04062
Industrial index * (household size ^ 2)	0.03454	**	0.01041
Industrial index * (household size ^ 3)	-0.00237	**	0.00078449
Industrial index * permanent house	0.05452		0.03003
Industrial index * (Housing facility =electricity)	0.14890	**	0.04913
Mountain * household size	-0.08192	**	0.01031
Mountain * (household size ^ 2)	0.00884	**	0.00169
Mountain * permanent house	0.09968	**	0.02259
Mountain * (Sector occupation of household head = trade)	0.08147	*	0.03401
Coastal village	0.08140	**	0.02025
Village mean of permanent house	-0.05796	*	0.02394
Village mean of years of study of household head	-0.04447	**	0.01662
Village mean of years of study of adult	0.05099	**	0.01750
Village mean of tertiary educated people (aged > 20 years)	3.12595	**	0.55729
Proportion of agriculture household	-0.14872	**	0.03096
Presence of lower secondary school in village	-0.03449	**	0.01095
Presence of public motorized transportation in village	0.03712	*	0.01643
Village mean of dependency ratio	-0.82483	**	0.14946
Village mean of education level of household head = upper secondary education	0.05482	**	0.01427

Table B5. ***Continued***

District dummy for District 3	-0.18846 **	0.04069
District dummy for District 4	0.24984 **	0.03387
District dummy for District 10	0.12962 **	0.02705
District dummy for District 18	0.15896 **	0.02968
District dummy for District 19	-0.32661 **	0.03439
District dummy for District 25	0.21318 **	0.03525
District dummy for District 29	-0.22634 **	0.03165
Root MSE	0.33114	
Adjusted R^2	0.4321	
F-test	69.59 **	

1st Stage Diagnostic Information	
Number of observations in survey	4419
Number of clusters	280
Sum of weights across all survey observations	5039475
Maximum households per cluster	32
Minimum households per cluster	11
Max observed left hand side value in survey	14.016383171
Min observed left hand side value in survey	10.187086105
Maximum total residual from OLS model	2.0861312566
Minimum total residual from OLS model	-1.184569068
Maximum household component of residual	2.1143365852
Minimum household component of residual	-1.151620273
Maximum cluster component of residual	0.4465563246
Minimum cluster component of residual	-0.56328487
Total sigma from OLS model	0.3311352542
Sigma-eta	0.1635432794
Ratio of SigmaEta**2/MSE	0.2439240171
Variance of sigma-eta-squared	7.5751029E-6

Table B5. ***Continued***

Variable	Parameter Estimate	Standard Error
Heteroscedasticity Regression		
Dependent variable: see report.		
Variable Label	Parameter Estimate	Standard Error
Constant	-5.87934 **	0.08278
(Proportion of children <= 5 years) ^ 2	-8.89581 *	3.46425
(Proportion of children <= 5 years) ^ 3	16.19228 *	6.77412
Permanent house * (Education level of spouse of HH head = tertiary)	-1.68255	1.25708
(Education level of spouse of HH head = secondary) * (Industrial Index * Household size)	7.46563 **	2.24444
Household size * Dummy District 25	0.25115 *	0.10145
Permanent house * (Education level of HH head = upper secondary)	0.84886 **	0.20084
(Housing facility: electricity) * Mean years of study for adults	-0.12313 **	0.02180
(Working status of HH head = self employed/employer) * Dummy District 4	1.24688 **	0.28993
(Education level of HH head = upper secondary) * Dummy District 25	-1.61665 *	0.77596
(Education level of spouse of HH head = upper secondary) * (Mountain * Permanent house)	1.36568 *	0.55792
Proportion of children 6 – 24 years who are enrolled in school * (Industrial index * electricity)	-0.79053 *	0.34479
Permanent house * (Education level of spouse of HH head = upper secondary)	-1.55759 **	0.48888
(Housing facility: electricity) * (Occupation sector of spouse of HH head = trade)	0.82221 **	0.20677
(Education level of spouse of HH head = upper secondary) * District Dummy 25	2.22796 *	0.95787

Table B5. *Continued*

Variable	Parameter Estimate	Standard Error
(Education level of spouse of HH head = upper secondary) * Industrial Index * (Household size ^ 2)	-3.64196 **	1.14908
Permanent house * (Occupation sector of spouse of HH head = trade)	-0.87381 **	0.24551
Mean years of study for adults * Industrial Index * (Household size ^ 2)	-0.01263 **	0.00402
Mean years of study for adults * Village mean of permanent house	0.15885 **	0.02913
(Proportion of children <= 5 years)* Industrial Index * (Household size ^ 3)	-0.08405 **	0.03033
(Occupation sector of HH head = Services) * (Proportion of children <= 5 years)	2.05215 **	0.57486
(Proportion of children 6 – 24 years who are enrolled in school) * (Industrial Index * Permanent house)	1.04838 **	0.38999
(Education level of spouse of HH head = upper secondary) * District Dummy 29	2.05885	1.22356
(Education level of spouse of HH head = upper secondary) * District Dummy 19	1.90615	1.02733
(Housing facility: electricity) * (Education level of spouse of HH head = tertiary)	2.08807	1.20912
(Proportion of children <= 5 years) * Industrial Index * (Household size ^ 2)	0.64607 **	0.21166
(Working status of head = self employed/employer) * (Proportion of children <= 5 years)	1.44796 **	0.49573
(Education level of spouse of HH head = upper secondary) * District Dummy 18	2.70055 *	1.24613
(Occupation sector of HH head = Services) * District Dummy 18	-0.79526 *	0.37139
(Education level of HH head = upper secondary) * District Dummy 19	-2.70456 **	0.84013
Permanent house * (Housing facility: electricity)	0.65462 **	0.09127

Table B5. ***Continued***

(Proportion of children <= 5 years) * Industrial Index * (Housing facility: electricity)	-5.24141 **	1.52963
(Housing facility: electricity ^ 2) * Industrial Index	1.05296 **	0.23006
Mean years of study for adults * Industrial Index * (Household size ^ 3)	0.00165 **	0.00053295
(Permanent house ^ 2) * Industrial Index	-0.82046 **	0.25633
Toilet * (Housing facility: electricity)	0.38337 **	0.09037
Household size * (Village mean of permanent house)	-0.11490 **	0.03313
Toilet * Industrial Index * (Housing facility = electricity)	-0.67205 **	0.19652
(Education level of spouse of HH head = upper secondary) * Industrial Index * (Household Size ^ 3)	0.46007 **	0.14653
Owned house * District Dummy 25	-1.28840 *	0.52234
Root MSE	2.34069	
Adjusted R^2	0.0487	
F-test	6.80 **	

Note:

** significant at 1 percent level

* significant at 5 percent level

Table C1. GLS Results for East Kalimantan – Urban
(For explanation, see text Chapter IV)

Coefficients and standard errors from GLS model. Dependent variable: log per capita consumption		
Variable	Parameter Estimate	Standard Error
Constant	12.2232	0.1394
Household size	-0.5011	0.0866
Household size squared	0.0781	0.0189
Household size cubed	-0.0043	0.0013
Housing facility: toilet	0.1331	0.0342
Occupation sector of household head: Trade	0.1068	0.0380
Working status of household head: self employed/employer	-0.1579	0.0544
Working status of household head: employee	-0.1018	0.0496
Years of schooling of household head	0.0303	0.0045
Years of schooling of spouse of household head	0.0056	0.0038
Proportion of children 5 years old or younger	-0.4633	0.1106
Proportion of adults who are employed	0.2574	0.0574
Proportion of 6-24 year olds who are enrolled in schools	0.0394	0.0384
Proportion of less than 15 year olds or 65 year olds or older	-0.1054	0.0794
Presence of clinics in village	0.3884	0.0711
Presence of bank in village	0.1102	0.0462
Mean of number life birth children	0.0058	0.0071

Table C2. GLS Results for East Kalimantan – Rural
(For explanation, see text Chapter IV)

Coefficients and standard errors from GLS model. Dependent variable: log per capita consumption		
Variable	Parameter Estimate	Standard Error
Constant	12.2750	0.1943
Household size	-0.3146	0.0234
Household size squared	0.0197	0.0022
Occupation sector of household head: Trade	0.0712	0.0415
Occupation sector of household head: Services	0.0353	0.0285
Married head of household	0.0285	0.0325
Education level of household head: upper secondary	0.0650	0.0307
Education level of household head: tertiary	0.3069	0.0613
Household living in permanent house	0.1618	0.0322
Household living in owned house	0.0573	0.0314
Housing facility: toilet	0.1441	0.0272
Housing facility: Electricity	0.1383	0.0296
Proportion of adults who are employed	0.0335	0.0428
Proportion of 6-24 year olds who are enrolled in schools	0.1562	0.0297
Proportion of less than 15 year olds or 65 years or older	-0.3519	0.0502
Proportion of male	0.1900	0.0464
Distance of village to subdistrict capital	0.0038	0.0016
Proportion of agriculture household	-0.2655	0.1261
Population density	0.0123	0.0084
Energy for cooking: kerosene/gas	0.0015	0.0857
Presence of public health center in village	0.1470	0.1067
Proportion of permanent house in village	-0.1719	0.1348

Table C3. GLS Results for Jakarta
(For explanation, see text Chapter IV)

Coefficients and standard errors from GLS model. Dependent variable: log per capita consumption		
Variable	Parameter Estimate	Standard Error
Constant	13.7226	0.5303
Household size	-0.3044	0.0254
Household size squared	0.0295	0.0047
Household size cubed	-0.0011	0.0003
Age of household head	0.0048	0.0005
Household living in owned house	0.0743	0.0239
Household living in rented house	-0.0608	0.0247
Housing facility: toilet	0.1966	0.0151
Female head of household	-0.0145	0.0239
Single head of household	0.0358	0.0238
Education level of household head: completed primary education	0.0741	0.0208
Education level of household head: lower secondary education	0.1149	0.0234
Education level of household head: upper secondary education	0.1474	0.0255
Education level of household head: tertiary education	0.2894	0.0329
Education level of spouse of household head: upper secondary education	0.0576	0.0148
Education level of spouse of household head: tertiary education	0.1821	0.0267
Occupation sector of household head: Trade	0.0492	0.0116
Average years of schooling for adults	0.0409	0.0034
Proportion of children 5 years old or younger	-0.3222	0.0479
Proportion of adults who are employed	0.1817	0.0219
Proportion of less than 15 year olds or 65 year olds or older	-0.0815	0.0363

Table C3. *Continued*

Variable	Parameter Estimate	Standard Error
Population density	-0.0002	0.0001
Presence of tertiary education school in village	0.0774	0.0456
Presence of house for handicapped in village	0.1607	0.0780
Presence of hospital in village	0.0926	0.0413
Village mean of proportion of males	-2.9312	1.0057
Village mean of tertiary educated people (aged > 20 years)	0.5149	0.2731

Table C4. GLS Results for East Java – Urban
(For explanation, see text Chapter IV)

Coefficients and standard errors from GLS model. Dependent variable: log per capita consumption		
Variable	Parameter Estimate	Standard Error
Constant	12.2968	0.1927
Household size	-0.3488	0.0270
Household size squared	0.0369	0.0059
Household size cubed	-0.0012	0.0004
Household living in permanent house	0.1645	0.0159
Household living in owned house	0.0181	0.0227
Household living in rented house	-0.0546	0.0249
Housing facility: toilet	0.1451	0.0174
Housing facility: Electricity	0.1533	0.0363
Education level of household head: completed primary education	0.0626	0.0148
Education level of household head: lower secondary education	0.0900	0.0199
Education level of household head: upper secondary education	0.1717	0.0232
Education level of household head: tertiary education	0.3348	0.0340
Education level of spouse of household head: upper secondary education	0.0458	0.0185
Education level of spouse of household head: tertiary education	0.1281	0.0343
Occupation sector of household head: Trade	0.1284	0.0155
Occupation sector of household head: Services	0.0603	0.0128
Occupation sector of spouse of household head: Trade	0.0509	0.0141
Average years of schooling for adults	0.0315	0.0028
Proportion of children 5 years old or younger	-0.1755	0.0467

Table C4. *Continued*

Variable	Parameter Estimate	Standard Error
Proportion of adults who are employed	0.0413	0.0200
Proportion of 6-24 year olds who are enrolled in schools	0.0544	0.0135
Proportion of less than 15 year olds or 65 year olds or older	-0.1460	0.0296
Industrial index * toilet facility	0.0528	0.0216
Common sector of income of village people: services	0.0769	0.0353
Presence of tertiary education school in village	0.1344	0.0429
Presence of market in village	0.0762	0.0363
Proportion of agriculture household	-0.1989	0.0675
Village mean of household size	-0.0818	0.0554
Village mean of proportion of children aged 6 – 24 year olds who are enrolled in school	-0.6670	0.2326
Village mean of proportion of children 5 years or younger	1.1552	1.3920

Table C5. GLS Results for East Java – Rural
(For explanation, see text Chapter IV)

Coefficients and standard errors from GLS model. Dependent variable: log per capita consumption		
Variable	Parameter Estimate	Standard Error
Constant	12.0235	0.1153
Household size	-0.3128	0.0216
Household size squared	0.0327	0.0042
Household size cubed	-0.0011	0.0003
Household living in permanent house	0.1185	0.0142
Household living in owned house	0.0774	0.0218
Housing facility: toilet	0.0856	0.0094
Housing facility: Electricity	0.0768	0.0171
Household head characteristics: female	-0.0606	0.0133
Years of schooling of spouse of household head	-0.0024	0.0018
Education level of household head: upper secondary	0.1192	0.0218
Education level of household head: tertiary education	0.1789	0.0401
Education level of spouse of household head: upper secondary	0.0663	0.0271
Education level of spouse of household head: tertiary education	0.3242	0.0651
Occupation sector of household head: Trade	0.0509	0.0179
Occupation sector of household head: Services	0.0725	0.0118
Occupation sector of spouse of household head: Trade	0.0728	0.0146
Occupation sector of spouse of household head: Services	0.0197	0.0091
Working status of household head: self employed/employer	0.0943	0.0166
Working status of household head: employee	0.0493	0.0164
Average years of schooling for adults	0.0325	0.0024

Table C5. *Continued*

Variable	Parameter Estimate	Standard Error
Proportion of children 5 years old or younger	-0.1308	0.0329
Proportion of 6-24 year olds who are enrolled in schools	0.0695	0.0098
Proportion of less than 15 years old or 65 years or older	-0.1413	0.0175
Industrial index * household size	-0.0841	0.0408
Industrial index * (household size ^ 2)	0.0174	0.0097
Industrial index * (household size ^ 3)	-0.0012	0.0007
Industrial index * permanent house	0.0379	0.0231
Industrial index * (Housing facility: electricity)	0.0250	0.0509
Mountain * household size	-0.0610	0.0120
Mountain * (household size ^ 2)	0.0063	0.0016
Mountain * permanent house	0.0340	0.0181
Mountain * (Sector occupation of household head = trade)	0.0437	0.0262
Coastal village	0.0727	0.0419
Village mean of permanent house	-0.0462	0.0462
Village mean of years of study of household head	-0.0602	0.0341
Village mean of years of study of adult	0.0691	0.0353
Village mean of tertiary educated people (aged > 20 years)	3.4340	1.1511
Proportion of agriculture household	-0.1408	0.0633
Presence of lower secondary school in village	-0.0348	0.0227
Presence of public motorized transportation in village	0.0427	0.0337
Village mean of dependency ratio	-0.8875	0.3027
Village mean of education level of household head = upper secondary education	0.0490	0.0294

Table C5. *Continued*

District dummy for District 3	-0.2038	0.0778
District dummy for District 4	0.1936	0.0716
District dummy for District 10	0.1466	0.0560
District dummy for District 18	0.1413	0.0610
District dummy for District 19	-0.3685	0.0722
District dummy for District 25	0.2150	0.0716
District dummy for District 29	-0.2607	0.0635

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