Proceedings 64th ISI World Statistics Congress - Ottawa, Canada ISBN: 9789073592421

CPS Paper

Small Area Estimation of Poverty Using Remote Sensing Data (Case: Expenditure Per Capita Estimation of Very Poor Household in West Java, Indonesia)

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Submission ID: 645

Reference Number: 645

Presentation File

abstracts/ottawa-2023_ca3836ef5000fd509ab002bf356175c1.pdf

Brief Description

This session will present the implementation of remote sensing data as auxiliary variables in a small area model to estimate poverty, especially expenditure per capita estimation of very poor household in West Java, Indonesia.

Abstract

Solving the problem of poverty, which is one of the main concerns of governments around the world, begins with providing accurate data to describe the population in poverty itself. The use of small area estimation to estimate poverty in a small area is increasingly needed in order to get better poverty monitoring and policy making.

The success of small area model estimation depends on auxiliary variables used, to make appropriate estimates and smaller variances. Numerous studies show that remote sensing with various advantages, such as: objective measurement, low cost, frequent updates, and comprehensive area coverage, can be used as covariate in small area models. However, studies using several remote sensing variables to estimate poverty are still limited, especially for very poor households whose expenditure per capita/month is less than 0.8 poverty line. This research aims to implement remote sensing data as auxiliary variables in a small area model to estimate expenditure per capita of very poor households in West Java, Indonesia.

The method used in this research is Small Area Estimation using Fay Herriot Model. Here we show the comparison between small area models using administrative data as a common auxiliary variable and remote sensing data (nighttime light, land surface temperature, air pollution, and spectral indices.

We found nighttime light data, that shows social and economic activity in an area, as a good auxiliary variable for expenditure per capita estimation of very poor households. Direct estimates, small area estimates of model using administrative data, and small area estimates of model using remote sensing data have similar patterns. Both small area models produced estimation for unsampled area and more accurate estimation than direct estimates for sampled area. Although the relative standard error is still slightly higher than the model using administrative data, remote sensing data is preferable because of the lower cost and more comprehensive coverage.

Overall, we show that there is a potential of using remote sensing data as an auxiliary variable in the small area estimation model for poverty estimation. This small area estimates can be used as a basis for seeing poverty in detail, so the government can take policies in order to minimize very poor household and poverty in general. For further research, we can explore other remote sensing data that shows poverty conditions in details.