# A SPATIAL AUTOREGRESSIVE MODEL OF DIARRHEA PREVALENCE IN JAVA ISLAND DISTRICTS

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## ABSTRACT

Diarrhea diseases remain ones of the most challenging public health problems in developing countries. Information on contribution of diarrheal risk factors become an important input for development and evaluation the policies and activities for combating diarrhea. In this paper we estimate the contribution of diarrhea risk factors by means of a spatial autoregression (SAR) model to account for spatial dependence among diarrhea occurrences in Java Island districts. We find that SAR improves the standard regression (SR) diarrhea model. It provides a better model fit and lower standard error estimates than SR does. It also corrects parameter estimates bias due to ignoring diarrhea contagiousness. From the estimates we infer that diarrhea prevalence rate in neighboring districts is the most dominant risk factor i.e. 1% increase of average diarrhea prevalence in neighboring districts will increase 0.36% diarrhea prevalence in a district. The other important risk factors are house wife literacy, safe water supply (non-pipe and pipe water), and private toilet. 1% increase in each risk factor rate, respectively, will decrease 0.098%, 0.023%, 0.020% and 0.010% diarrhea prevalence. Nevertheless, we suspect that the spatial effect to be overestimated, while the other factors to be under estimated. Further improvement is required for reducing omitted variable bias caused by diarrhea risk factors which are not in the model.

**Key words**: Spatial autoregressive model, regression, diarrhea

## 1. INTRODUCTION

Diarrhea diseases remain ones of the most challenging public health problems in developing countries. Four billion cases of diarrhea occur annually, causing 1.8 million deaths (WHO, 2007). The problem requires effective and efficient policies in the health sector and activities of other sectors that directly manage or influence the determinants of accidences of diarrhea. In this case, information on contribution of diarrheal risk factors become an important input for development and evaluation the policies and activities.

Many researchers had estimated contribution of diarrheal risk factors (e.g. Borooah, 2004; Ozkan, 2007; Rego, 2007). Nevertheless, most of them ignored diarrhea nature as contagious diseases. They ignored the dependence among diarrhea occurrences which may lead to inefficient and biased contribution estimates (Anselin, 1988). In this paper, using a data set obtained from a national-wide socio-economic survey in Java Island - Indonesia, we intend to estimate contribution of diarrhea risk factors relating to domestic water supply and sanitation facilities at the district level by means of a spatial autoregressive (SAR) model to account for the dependence of diarrhea occurrence among districts.

The paper is organized as the following. In section 2, we present the conceptual model and data. Section 3 discusses the results. Section 4 concludes.

## 2. CONCEPTUAL MODEL AND DATA

Diarrheal diseases are commonly defined by an increase in the frequency and fluidity of bowel movements relative to the usual pattern of each individual. There are at