

Yan Ding

Dr. sc. hum.

Economic Evaluation of the Infectious Disease Reporting System and Integrated Surveillance System in rural China

Fach/Einrichtung: Public Health

Doktorvater: Prof. Dr. med. Rainer Sauerborn

In China, a nation-wide internet-based infectious disease surveillance system exists and is called the China Information System for Disease Control and Prevention (CISDCP). CISDCP is based on confirmed case reports. An automated system for outbreak detection and rapid response is based on data from CISDCP. Laboratory tests for confirmation are for most cases not available at village clinics or even township and county hospitals. In addition, village doctors lack formal medical training and do not have the necessary experience and knowledge to identify infectious diseases. However, poor areas, especially villages, are particularly vulnerable to threats posed by infectious diseases, due to poor hygiene, inadequate sanitation in public places including village clinics and schools, insufficient access to safe drinking water and close human-animal contacts. Therefore, a sensitive and convenient early warning surveillance system for infectious disease is urgently needed in rural China.

A syndromic surveillance system (SSS) may collect non-specific syndromes in the early stages of a disease outbreak. This makes an SSS an apparently advantageous tool for promoting the early detection of epidemics and reducing the necessity of disease confirmation. An Integrated Surveillance System in rural China (ISSC project), which integrates functions of an SSS into CISDCP has been established and implemented since 2012. The data sources of the SSS include data on visits of outpatients presenting with at least one of ten selected syndromes, on sales of medicine from pharmacies and on absenteeism from primary schools

A public health surveillance system should be evaluated to determine how well its stated purposes and objectives are met. Existing evaluation studies of public health surveillance

systems typically judge quality against a series of attributes such as timeliness, simplicity, flexibility, acceptability etc. Studies on the costs of these systems are, however, rare, not mentioning cost effectiveness studies. This study explored the cost and effectiveness of an SSS in four counties in China, and also the driving factors of its cost.

This study is based on both secondary and primary data and was conducted from the perspective of managers of the surveillance. For secondary data, I reviewed publications and presentations of all partners of this project to provide a description of the SSS. I also collected daily timesheets of researchers from the two Chinese institutes who facilitated the implementation of SSS in the study sites to quantify time from researchers' side. Through an authorized access to the ISSC platform, an online database for data collection, transfer, processing and analysis of this SSS, I obtained data on records reported to the SSS from all involved surveillance units. In addition, I obtained forms for signal verification and epidemiological investigation reports in order to quantify resources devoted to signal verification and investigate the effectiveness of the SSS.

The main findings drawn from the study can be summarized as follows:

- 1) Time is a major resource for the development of an SSS and training. Huge time differences existed between Counties A and B in Hubei Province on the one hand and Counties C and D in Jiangxi Province on the other.
- 2) Time costs for data collection and reporting, for daily management of data reporting and overhead costs allocated to the SSS were the main components of the operational costs. If grouped by the categories of surveillance units, it became evident for each county that village clinics incurred most of total costs of the SSS.
- 3) Daily reporting times varied within and across groups but the median times for reporting in different groups were around 20 to 30 minutes with no big differences across groups. Together with the differences in annual salaries and daily total working hours, however, the opportunity costs of time for reporting data were observed to be extremely different within and across groups.
- 4) During time horizon covered by this study, the SSS had not yet fully developed its automatic signal detection. Costs for signal verification were negligible in this study.
- 5) An SSS which requires manual data reporting may generate more than small costs.

- 6) The numbers of reported records and rates of reported records to outpatient volumes varied within and across groups of reporting units (hospital levels, school levels and pharmacies). A systematic difference concerning the rates of reported records per total outpatient records was detected between Counties A plus B and Counties C plus D.
- 7) In terms of cost per record, the incremental cost effectiveness ratio from pharmacies was the lowest and that from primary schools was the highest, with those from village clinics, township and county hospitals in between.

Given the difficulty of measuring the impact of the SSS, this study offers some information for managers of the SSS. Since the purpose of an SSS is the early warning of epidemics, the average cost per records alone without additional information on signals for early warning, does not appear suitable to judge which data source would offer an adequate potential of information. Future research should be planned to draw conclusions on a possible relationship between costs and the early warning ability of the SSS.