

Research Data Archive, Center for Disease Control, The Executive Yuan, R.O.C.
Readme file

Project Title: Estimation of Burden of Dengue Infection and Its Applications

Project Number: DOH97 -DC-2006

Executing Institute: Centers for Disease Control, R.O.C.(Taiwan)

Principal Investigator(P.I.): Jen-Hsiang Chuang

P.I. Position Title: Associate researcher & Director

P.I. Institute: National Health Command Center

Abstract:

Dengue fever has become a major international health issue in recent years. In Taiwan, outbreaks of indigenous dengue fever usually occur at the beginning of summer in recent years. Especially in 2002, the outbreak in southern Taiwan caused 5,388 cases of dengue fever, among which 242 cases were dengue hemorrhagic fever and 21 cases were deaths. The aims of this study were to estimate the disease burden of dengue in Taiwan, to analyze the cost-effectiveness of fever screening stations at the international airports, and to explore how to protect personal privacy when data linkage is undertaken between two governmental organizations.

To measure the disease burden, we used the personal identifiers (PIDs) to link the claim data from the Bureau of National Health Insurance (BNHI) and the notified dengue cases from the Centers for Disease Control (CDC) from 2000 to 2007. The linked claim data were analyzed to estimate the duration of the illness for calculating DALYs (Disability-adjusted Life Years) losts caused by dengue. To estimate the cost-effectiveness of implementing fever screening stations at the international airports, we estimated the impacts of the detected, imported dengue cases on the potential reduction of the number of the indigenous dengue cases for calculating the incremental cost-effectiveness ratio (ICER) of the fever screening. As for the privacy issues, we explored the techniques for sharing information under the premise of protecting privacy.

During the eight years of the study period, a total of 9,939 cases of dengue fever and dengue haemorrhagic fever occurred (95% of cases were dengue fever), among which 167 cases were discarded due to the inaccuracy or incompleteness of the PIDs. After implementing data linkage, we found 9,286 cases (93%) utilizing their health insurance services between one month prior the date of the onset of the illness and one month after the date of the notification. Among those, 5,977 (64%) cases were hospitalized. The durations of the illness for dengue fever and dengue hemorrhagic fever survivors were 8.35 and 10.80 days, respectively. We used 0.2 and 0.5 as the disability weights for dengue fever and dengue hemorrhagic fever respectively for calculation of DALYs. The burden of dengue fever were 48.96 DALYs (2.13 DALYs per million people) annually. After implementing fever screening, 419 indigenous dengue fever cases and 8.41 DALYs losts were estimated to be prevented per year, which is 48% of annually indigenous dengue fever case and 58% of DALYs losts in the past 4 years respectively. It costed 11,080 New Taiwan Dollars (NTD) to prevent one indigenous dengue case at fever screening station, based on 3% of discount rate. Furthermore, it costed NTD \$558,952 to prevent one DALY lost caused by dengue, which was similar to Taiwan's Gross Domestic Product (GDP) per person in 2007 (\$551,458). Finally, with respect to the study on privacy protection, encryption of the PIDs was implemented for linking data between two institutions. In addition, simulation calculation was implemented to estimate the duration for data processing,

which was around 0.38 second per record, by having the assistance of a neutralized third party without the disclosure of the raw data from BNHI, and CDC was allowed to acquire the required data.

In conclusions, the study has successfully linked the data to estimate the disease burden of dengue fever in Taiwan. In addition, fever screening for detection of imported dengue is cost-effective. Finally, we have empirically simulated privacy protection technologies for the data linkage.

Keyword: Dengue fever 、 cost of illness 、 confidentiality 、 cost effectiveness