**Background:**

Diphtheria is a life-threatening disease caused by Corynebacterium diphtheriae. The pharyngeal sign is the development of a pseudomembrane over the tonsils, pharynx, and/or nasal cavity.

Worldwide, according to the WHO, national cases declined from 97,514 in 2010 to 50,223 in 2014, which decreased the worldwide immunity status. In 2014, national immunization coverage in Indonesia increased slightly from 90% in 1990 to 83% during 2010.

Cases in East Java provinces started to rise in July 2011; some 500 cases were reported. 51 culturally confirmed. In November 2011, the MTP INvestigated the outbreak in case by case interview with Ministry of Health, UNICEF, SAFTYNET, WHO, and USCDC.

**Objective:**

To identify the risk factors for the diphtheria outbreak in East Java and to institute control measures.

**Method:**

- **Study Design:** Matched case-control design. 1 case and 2 neighborhood controls per case.
- **Definition of cases:**
  - An illness characterized by symptoms or pharyngitis or tonsillitis and an abnormal membrane on the tonsil, pharynx, and/or nasal cavity caused by Corynebacterium diphtheriae from a clinical specimen and in East Java Province from Jan – Sep, 2011.
- **Case Selection:**
  - All selected cases had positive culture results for toxigenic C. diphtheriae. Thirty-eight of 83 cases were selected from 6 districts with the highest number of culture-confirmed cases because of logistical, transportation, and time constraints (shown in Table 2).
  - Three districts included Bangkalan (12 cases), Bonebolong (7 cases), and Selong (6 cases). Randomly selected (5 cases) and Sidomulyo (4 cases). Surabaya city (4 cases) was excluded because of administrative facilities to participate.

**Result:**

- **Definition of control:** A person matched for age, living in the same neighborhood without a history of diphtheria, 5 weeks before date of onset in matched case.
- **Control Selection:**
  - Starting from case households, and moving in a randomly determined direction, each household was visited until two matched cases were found.
- **Data Collection:**
  - By interviewing collectors information on participants during household interviews with parent (s) or grandparent (s) using a pretested questionnaire in Indonesian language. Information includes:
    1. Demographic characteristics (age, sex, address, occupation, education status, households, etc.).
    2. Recent travel history, and,
    3. Vaccination status with a diphtheria-containing vaccine (DTC).

**Analysis:**

- **Perform frequency counts, bivariate and multivariable conditional logistic regression analyses to calculate matched odds ratios (MOR) and 95% confidence intervals (CI).**

**Stays at home**

- Let be the I consistent in final multivariable model if the value was < 0.25 in bivariate analysis. P-values < 0.05 were considered statistically significant and used STATA** version 11 for analysis.