

# Health Research Center for Crisis and Disaster University of Indonesia

**Survey Site: Jakarta, Indonesia**

**Focus of the Study :**

**Leptospirosis cases during the 2007 flood in Jakarta**

## Background of the Study

Within the period of February 1- 26, 2007, a major flood occurred in Indonesian capital city, Jakarta Province, inundating 60% of this city. In the aftermath of these floods, many cases of leptospirosis emerged and were reported.

As a widespread zoonosis diseases, leptospirosis is infecting through rodents and the occurrence of flooding will facilitate the proliferation of rodents and brings rodents into closer contact to humans shared high ground and also promotes the spread of contaminated waters.

Clinical characteristic of leptospirosis range from a mild flu-like illness (“anicteric form”) to a fulminant disease, also known as the Weil’s disease or “icteric form”, characterized by multiple organ impairment. Particularly in Jakarta area, clinical characteristics of this disease have seldom been described.

## Summary Statistics

A combination of case series and ecological study was carried out to analyze 195 leptospirosis cases reported from five major general hospitals in 5 municipalities in Jakarta province (Table 1.).

**Table.1.** Distribution of leptospirosis cases among Jakarta resident (n=196) before, during and after flood by municipality, November 2006 – May 2007.

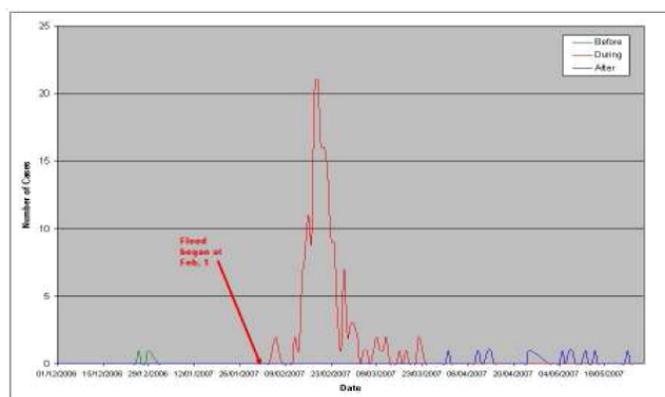
No	Municipality of Origin	Number of cases infected “before flood” (%)	Number of cases infected “during flood” (%)	Number of cases infected “after flood” (%)	Total number of cases from Jakarta (%)
1	West Jakarta	1 (0.9)	103 (93.6)	6 (5.5)	110 (100.0)
2	Central Jakarta	1 (3.2)	27 (87.1)	3 (9.7)	31 (100.0)
3	South Jakarta	0 (0.0)	9 (100.0)	0 (0.0)	9 (100.0)
4	East Jakarta	0 (0.0)	37 (97.4)	1 (2.6)	38 (100.0)
5	North Jakarta	0 (0.0)	7 (87.5)	1 (12.5)	8 (100.0)
Total		2 (1.0)	183 (93.4)	11 (5.6)	196 (100.0)

Note: “before flood”: < Feb. 3, 2007; “during flood”: Feb. 3 – March. 28, 2007; “after flood”: > March. 28, 2007

About 56% of the cases came from West Jakarta. Most of reported cases (68%) were young adults aged from 18 years to 49 years. Male cases were predominant (77%).

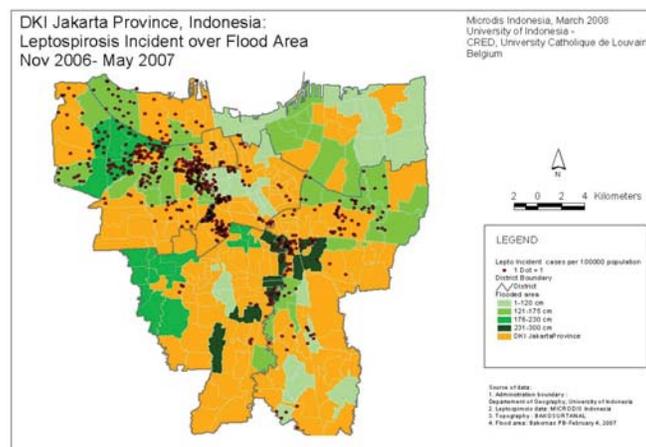
A week after very heavy rains the floods went from February 1-26, 2007. The very sharp increase of the leptospirosis cases since February 3, as reflected in the epidemic curve (Fig.1), has strongly indicated a leptospirosis outbreak during the flood. From the epidemic curve, it is seen that the reported leptospirosis cases increased sharply and reaches its highest peak abruptly and falls again in a log-linear fashion, suggesting a point source outbreak. This means that the population was probably exposed from one common source, (i.e., the massive floods), at one point in time.

**Fig.1.a.** Epidemic curve of the leptospirosis cases due to the flood in February 2007



Our data (Fig.2.) showed that most of leptospirosis cases were more concentrated in flooded areas, especially in northwest part of the province. Concerning the flood itself, most of flooded areas located in northern part of the city, which has lower land altitude as compared to southern part.

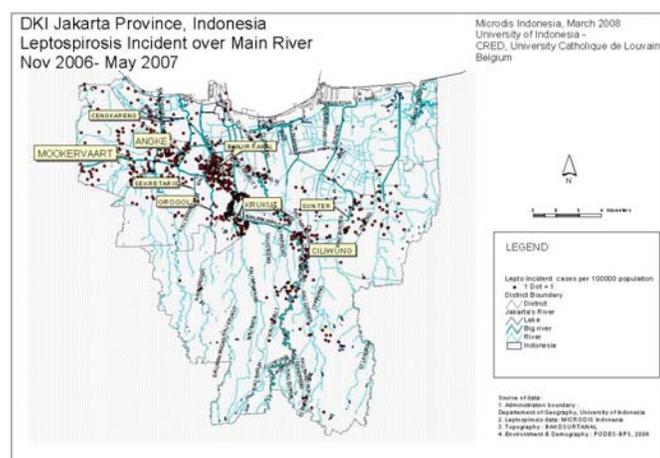
**Figure 2**



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Interestingly, the clusters of leptospirosis could be observed in certain areas alongside some parts of the main city drains, canals and rivers; mostly clustered around some parts of Grogol river, Banjir Kanal canal and Ciliwung river, the biggest river of the city (Fig. 3). Another map (not shown) also indicated that most of the cases were distributed in areas within the radius 500 m from the point of disposal. Our findings suggest that certain environmental factors, like flows of rivers, drains/canals and possibly waste disposal sites and slum environment, may induce the spread of the leptospirosis, after February flood, especially in surrounding main city rivers and drains/canals in Jakarta.

Figure 3



Mean age was 39.2 [36.7-41.1] years, with no significant age difference between men and women ( $p=0.21$ ). The most frequently reported symptoms were fever (86.5%), nausea (77.9%), vomiting (62.5%) and diarrhea (41.35%).

The frequency of symptoms was not significantly different across sex and age groups. As showed below, our patients presented high leucocytosis, thrombocytopenia, elevated creatinin levels and elevated bilirubin levels. Acute renal failure (ARF) was observed in 68.7% of our Patients. Nearly 70% of the patients had thrombocytopenia. 19 percent of the patients with ARF had completely normal bilirubin levels (<1 mg/dl), showing that leptospirosis may lead to renal impairment without hyperbilirubinemia. More than half of these had concomitant thrombocytopenia. Our study reveals that the severity of leptospirosis is unrelated to the presence of hyperbilirubinemia, and shows a high prevalence of ARF and thrombocytopenia in severe leptospirosis.

Table 2: Laboratory Analysis

Name of variable (unit)	total n	% or mean(+CI95%)
White Blood Cells (WBC) count ( $\times 10^3/\text{mm}^3$ )	194	12.5 (11.7-13.3)
Platelet count ( $\times 10^3/\text{mm}^3$ )	195	91.2 (80.6-103.2)
Creatinin (mg/dl)	186	2.5 (2.2-2.8)
Bilirubin (mg/dl)	121	2.2 (1.7-2.8)
sGPT (IU/l)	176	48.9 (43.5-55.1)
sGOT (IU/l)	175	44.5 (38.7-51.2)
Hemoglobin Males	149	12.9 (12.6-13.1)
Hemoglobin Females	45	11.4 (10.9-12.0)
Anemia Males (Hematocrit male <40%)	150	72%
Anemia Females (Hematocrit female <37%)	45	80%
Leucocytosis (WBC >11 000/ $\text{mm}^3$ )	195	61.50%
Thrombocytopenia (Platelets <150 000/ $\text{mm}^3$ )	195	68.70%
Hyperbilirubinemia (bilirubin >1,0 mg/dl)	195	78.50%
ARF (creatinin >1.5mg/dl)	195	68.70%
sGOT >19,0 IU/l	195	88.20%
sGPT >23,0 IU/l	195	77.90%

Disease length was not statistically different ( $p=0.22$ ) between deaths and survivors, indicating that death occurred late in the disease course. Overall case fatality rate was 6.25%. The total disease length considered as the sum of the duration of disease prior to arrival and the duration of hospitalization. The overall median (range) duration was 11 (3-53) days. Median disease duration in survivors was 11(3-53) days, while it was 9 (3-28) days in non-survivors, which was not statistically different ( $p=0.22$ ), suggesting that death did not come early in the disease course.

Leptospirosis was suspected in only 31.7% of our confirmed cases, at entry. Since dengue is a common disease in Indonesia, and may have some similar clinical presentations, Dengue Fever (DF) or Dengue Hemorrhagic Fever (DHF) has been diagnosed in 27.1% of the leptospirosis patients at the time of admission.