

# Developing an Index-Based Insurance in Response to Human Health Consequences due to Heavy Rainfall

**Jimmy Loro**  
**Senior Advisor**

**GIZ Regulatory Framework Promotion on Pro-Poor Insurance Markets in Asia II**

**GIZ RFPI Asia**



## **Strong Correlation between Dengue and Rainfall Cases Established**

- **Rainfall, rainfall days, incidence per 100,000, relative humidity, and temperature are the climatic parameters that influence the emergence of dengue haemorrhagic fever. Rainfall and rainfall days are two important determinants for the rate of development of larvae mosquitoes; and dengue haemorrhagic fever transmission (Prompou, S. et al, 2005).**
- **The proportion of settlements in a community in Mexico with mosquito larva in their environments; and uncovered water containers; was significantly associated with those infected with dengue, with a 95% confidence interval (Koopman et al, 1991).**
- **Winakit (2006) concluded that the prevalence of dengue infection in Thailand is strongly affected by rainfall.**



## Aedes Aegypti Life Cycle

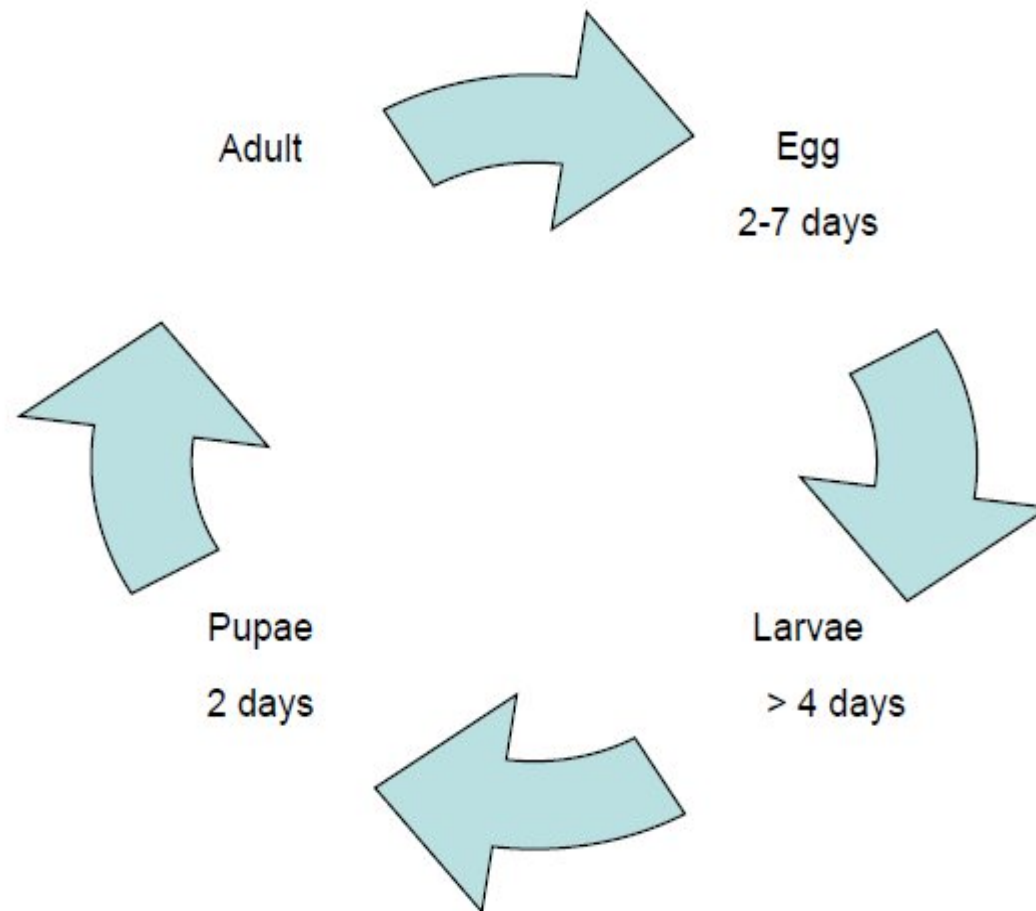


Figure 3: Life Cycle of *Aedes aegypti* Mosquito Modified from Center for Disease Control and Prevention



## Monthly Mean Rainfall and Dengue Cases, One Month After

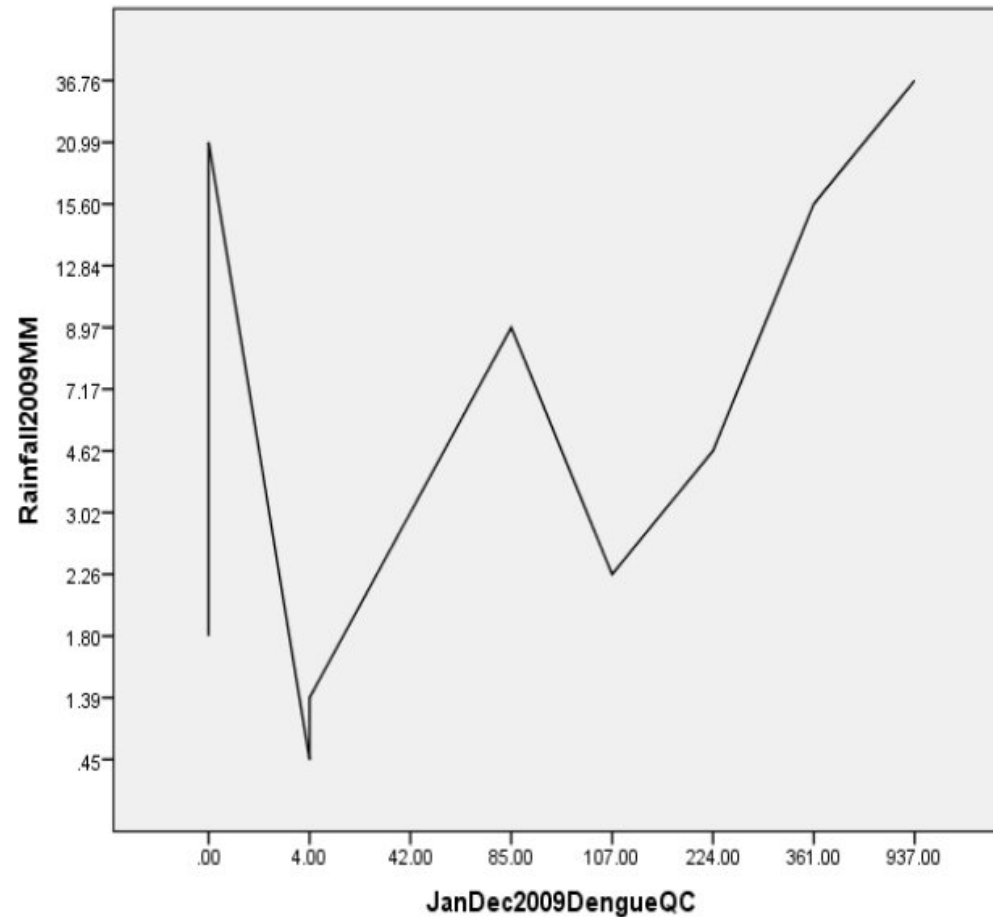


Figure 4: Relationship of Quezon City Mean Monthly Rainfall Levels mm (Y) Adapted from PAGASA, and Dengue Cases (X) Adapted from DoH; 2009

## Implications of the Study Results

**The results agreed with Hii et al (2013) who found that higher risks of dengue infection in Singapore occurred at a lag of 3-4 months following mean temperature and cumulative rainfall supportive of increasing dengue transmission.**



## Simulation Health/Environment Index Insurance 2000-2014 Quezon City, Philippines

Table 9: MMR in 2000-2014, and Triggered events for an Environmental Index-Based Insurance

| Month | Mean Monthly Rainfall (mm), Quezon City |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|       | 2000                                    | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  |
| Jan   | 2.79                                    | 1.94  | 0.22  | 1.21  | 2.79  | 2.47  | 1.68  | 2.26  | 0.21  | 5.4   | 7.09  | 1.55  | 3.75  | 4.98  | 0.41  |
| Feb   | 20.59                                   | 0.41  | 0.19  | 0.05  | 0.19  | 0.41  | 1.82  | 0.07  | 1.68  | 1.39  | 0.16  | 5.01  | 1.33  | 1.52  | 0     |
| Mar   | 0.24                                    | 0.43  | 1.26  | 0.26  | 1.26  | 0.43  | 0.24  | 0.86  | 0.82  | 0.45  | 0     | 0.01  | 4.43  | 3.18  | 0.03  |
| Apr   | 2.53                                    | 0.52  | 0     | 0.31  | 0     | 0.52  | 2.53  | 0.68  | 1.25  | 3.02  | 0.08  | 1.06  | 6.31  | 4.26  | 0.7   |
| May   | 0                                       | 1.19  | 2.95  | 0.74  | 2.95  | 1.19  | 0     | 0.86  | 1.17  | 4.62  | 0.67  | 0.12  | 0.07  | 1.59  | 0.75  |
| June  | 4.93                                    | 4.45  | 6.66  | 12.19 | 6.66  | 4.45  | 4.93  | 5.75  | 7.86  | 8.97  | 2.2   | 10.1  | 10.58 | 5.48  | 3.46  |
| July  | 11.45                                   | 17.72 | 7.15  | 7.72  | 7.15  | 17.72 | 11.45 | 3.31  | 8.28  | 15.6  | 11.47 | 24.16 | 10.44 | 18.76 | 8.2   |
| Aug   | 18.81                                   | 7.14  | 11.15 | 9.31  | 11.15 | 7.14  | 18.81 | 6.64  | 7.27  | 20.99 | 13.43 | 17.68 | 28.59 | 7.16  | 14.42 |
| Sep   | 9.84                                    | 10.72 | 19.89 | 13.12 | 19.89 | 10.72 | 9.84  | 18.02 | 11.59 | 12.84 | 19.94 | 20.46 | 44.75 | 30.66 | 13.29 |
| Oct   | 22.25                                   | 13.52 | 8.61  | 14.59 | 8.61  | 13.52 | 22.25 | 15.25 | 12.63 | 36.76 | 12.89 | 14.87 | 24.54 | 22.81 | 24.53 |
| Nov   | 6.85                                    | 15.74 | 2.77  | 5.99  | 2.77  | 15.74 | 6.85  | 7.1   | 5.48  | 7.17  | 11.73 | 9.18  | 10.94 | 11.51 | 11.09 |
| Dec   | 2.96                                    | 2.55  | 6.85  | 3.97  | 6.85  | 2.55  | 2.96  | 9.49  | 6.24  | 1.8   | 8.51  | 9.01  | 0.89  | 2.93  | 3.17  |

Legend: highlighted cells represented insurance pay-out events.

**Thank you for  
your attention!**

**Jimmy R. Loro, MENRM  
Senior Advisor  
GIZ Regulatory Framework  
Promotion of Pro-Poor Insurance  
Markets in Asia  
[www.inclusiveinsuranceasia.com](http://www.inclusiveinsuranceasia.com)  
M:+639988410734  
T:+6323531044  
E:jimmy.loro@giz.de;  
jimmy.loro@gmail.com**