



# WEEKLY EPIDEMIOLOGICAL REPORT

A publication of the Epidemiology Unit  
Ministry of Health

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## Fogging in Dengue Control (Part II)

This is the second in a series of two articles on Fogging in Dengue Control. The first article was on advantages and limitations of fogging and the technique of fogging. This article describes favorable conditions for fogging, treatment cycles and safe use of insecticides.

Information to be given to inhabitants

- Time of fogging (for example 6.30am to 10.00 am)
- All doors and windows should be open.
- Dishes, food, fish tanks and bird cages should be covered.
- Stay away from open doors and windows during fogging or temporarily leave the house and/or the spray area until fogging is completed.
- All electric switches, heating and cooking equipment must be put off and allowed to cool before undertaking fogging.
- All animals and human beings should remain outside and stay there for at least 30 minutes after fogging. They should enter only after the household is well ventilated.
- Children or adults should not follow the fogging squad from house to house.

Timing of application

Fogging is carried out only when the correct weather conditions are present and usually only at the prescribed time. These conditions are summarized in table 1

Important points to note

- In the early morning and late evening hours, the temperature is usually cool. Cool weather is more comfortable for workers wearing protective clothing. Also, adult Aedes mosquitoes are most active during these hours.
- In the middle of the day, when the temperature is high, convection currents from the ground will prevent concentration of the fog close to the ground where adult mosquitoes are flying or resting, thus rendering the spray ineffective.
- An optimum wind speed of between 3 and 13 km/hr enables the fog to move slowly and steadily over the ground, allowing for maximum exposure of mosquitoes to the fog. Air movements of less than 3 km/hr may result in vertical mixing, while winds over 13 km/hr disperse the fog too quickly.
- In heavy rain, the fog generated loses its consistency and effectiveness. When the rain is heavy, fogging should stop and the spray head of the fogging machine should be turned down to prevent water from entering the blower.
- Fogging is permissible during light showers. Also, mosquito activity increases when the relative humidity reaches 90, especially during light showers.

Treatment cycle

The commencement and frequency of fogging generally recommended is as follows:

- At least one round of fogging should be carried out within each breeding cycle of the mosquitoes

Table 1- Conditions favourable for fogging

Source-WHO

	Most favourable conditions	Average conditions	Unfavourable conditions
Time	Early morning (0630-0830 hrs) or late evening	Early to mid-morning or late afternoon early evening	Mid-morning to mid-afternoon
Wind	Steady, between 3-13 km/hr	0-3 km/hr	Medium to strong, over 13 km/hr
Rain	No rain	Light showers	Heavy rain
Temperature	Cool	Mild	Hot

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(seven to ten days for *Aedes*). Therefore, a repeat spraying is carried out within seven to ten days after the first fogging. Also, the extrinsic incubation period of dengue virus in the mosquito is 8 to 10 days.

- When a rapid reduction in vector density is essential (such as in emergencies), fogging should ideally be carried out every 2–3 days for 10 days. Further applications should then be made once or twice a week to sustain suppression of the adult vector population. However, continuous entomological and epidemiological surveillance should be conducted to determine the appropriate application schedule and the effectiveness of the control strategies.

**Safe use of insecticides**

All pesticides are toxic to some degree. Safety precautions for their use – including care in the handling of pesticides, safe work practices for those who apply them and appropriate field application should be followed. A safety plan for insecticide application can be organized along the following lines:

- Instructions on pesticide labels should be followed carefully.
- Fogging machine operators should change clothes frequently to prevent absorption of insecticide through cloths.
- Safety gloves, goggles and masks should be used for high-exposure activities such as machine calibration.
- Changing and washing facilities should be available to fogging machine operators.
- Fogging machine operators should remove all work clothes at the end of each day's operations and should have a thorough cleaning like a shower or a bath.
- Work clothes should be washed regularly, preferably daily.
- Particular attention should be given to washing gloves as wearing contaminated gloves can be dangerous.
- Fogging machine operators should wash their hands and face before eating and should not smoke during working hours.
- Fogging machine operators should not be exposed to toxic material for periods that are longer than recommended.
- Care must be taken in disposal of used insecticide containers.
- After each day's operation, any unused liquid larvicide should be disposed of safely.
- Blood cholinesterase levels should be monitored if organophosphate insecticides are used.
- Operator supervision by a well-trained individual is essential

**Monitoring of insecticide susceptibility**

- Insecticides have been used widely for dengue vector control since their development. As a result, insecticide-resistant populations of *Aedes aegypti* have been detected in a number of countries. Operationally, significant levels of resistance to organophosphates, pyrethroids, carbamates and organochlorines have been documented in other countries.
- Insecticide resistance must be considered as a potentially serious threat to effective dengue vector control. Routine monitoring of insecticide susceptibility should be integral to any programme.
- In countries like Sri Lanka with a history of extensive DDT use in the past, resistance may be widespread. Also, DDT resistance may predispose to pyrethroid resistance, since both insecticides have the same target site (the voltage gated sodium channel) and both have been associated with mutations in the *kdr* gene in *Aedes aegypti*. Consequently, in countries such as Thailand where pyrethroids – including deltamethrin, cypermethrin and permethrin are increasingly being used in favour of organophosphates for space spraying, pyrethroid resistance is likely to occur sooner in mosquito populations that already have this mutation.
- This phenomenon reinforces the importance of carrying out routine susceptibility testing at regular intervals during any control programme.

Note: Fogging has been listed as the last option in chemical control methods due to some of its limitations as mentioned above. In view of the limitations, fogging is not a preferred option for vector control and needs to be discouraged as a routine method.

**Sources**

Dengue : guidelines for diagnosis, treatment, prevention and control, available from [whqlibdoc.who.int/publications/2009/9789241547871\\_eng.Pdf](http://whqlibdoc.who.int/publications/2009/9789241547871_eng.Pdf)

Guidelines for insecticide fogging for outbreak control, available from [stg2.kar.nic.in/healthnew/PDF/Guideline\\_Fogging.pdf](http://stg2.kar.nic.in/healthnew/PDF/Guideline_Fogging.pdf)

Compiled by Dr. Madhava Gunasekera of the Epidemiology Unit

**Table 3 : Water Quality Surveillance**  
Number of microbiological water samples - December / 2011

District	MOH areas	No: Expected *	No: Received
Colombo	12	72	33
Gampaha	15	90	5
Kalutara	12	72	NR
NHIS	2	12	NR
Kandy	23	138	NR
Matale	12	72	3
Nuwara Eliya	13	78	7
Galle	19	114	NR
Matara	17	102	NR
Hambantota	12	72	13
Jaffna	11	66	NR
Kilinochchi	4	24	0
Manner	5	30	24
Vavuniya	4	24	34
Mullatvu	4	24	NR
Batticaloa	14	84	NR
Ampara	7	42	NR
Trincomalee	11	66	48
Kurunegala	23	138	24
Puttalam	9	84	NR
Anuradhapura	19	114	18
Polonnaruwa	7	42	171
Badulla	15	90	47
Moneragala	11	66	74
Rathnapura	18	108	8
Kegalle	11	66	16
Kalmunai	13	78	NR

\* No of samples expected (6 / MOH area / Month)  
NR = Return not received

**Table 1: Vaccine-preventable Diseases & AFP**

14th – 20th January 2012 (03rd Week)

Disease	No. of Cases by Province									Number of cases during current week in 2012	Number of cases during same week in 2011	Total number of cases to date in 2012	Total number of cases to date in 2011	Difference between the number of cases to date in 2012 & 2011
	W	C	S	N	E	NW	NC	U	Sab					
Acute Flaccid Paralysis	00	01	00	00	01	00	00	00	00	02	00	08	01	+ 700.0 %
Diphtheria	00	00	00	00	00	00	00	00	00	-	-	-	-	-
Measles	00	00	00	00	00	00	00	00	01	01	01	01	03	- 66.7 %
Tetanus	00	00	01	00	00	00	00	00	00	01	00	01	02	- 50.0 %
Whooping Cough	01	00	01	00	00	00	00	00	00	02	01	05	03	+ 66.7 %
Tuberculosis	110	06	02	02	15	00	06	01	15	157	294	726	534	+ 69.7%

**Table 2: Newly Introduced Notifiable Disease**

14th – 20th January 2012 (03rd Week)

Disease	No. of Cases by Province									Number of cases during current week in 2012	Number of cases during same week in 2011	Total number of cases to date in 2012	Total number of cases to date in 2011	Difference between the number of cases to date in 2012 & 2011
	W	C	S	N	E	NW	NC	U	Sab					
Chickenpox	08	04	14	01	09	05	02	02	12	57	65	205	224	- 08.5 %
Meningitis	03 CB=1 GM=1	00	01 GL=1	00	00	02 KR=1 PU=1	00	00	00	06	27	41	58	- 29.3 %
Mumps	15	04	01	01	14	08	06	01	07	57	36	240	117	+ 105.1 %
Leishmaniasis	00	01 ML=1	02 MT=2	00	00	04 KN=3 PU=1	20 AP=10 PO=10	00	00	27	03	44	25	+ 76.0 %

**Key to Table 1 & 2**

Provinces: W C S N E NC NW U Sab  
 DPDHS Divisions: CB GM KL KD ML NE GL HB ! MT JF " #  
 KN \$ \$ MN VA % BD & MO BT & \$ AM ' TR ( \$ KM KR PU )  
 AP ' PO )

Data Sources:  
 Weekly Return of Communicable Diseases: + ( \$, -  
 Special Surveillance: '\$ . \$\$ )  
 / # # \$ 01230121004 15 1004

**Dengue Prevention and Control Health Messages**

**You have a duty and a responsibility in preventing dengue fever. Make sure that your environment is free from water collections where the dengue mosquito could breed.**

**Table 4: Selected notifiable diseases reported by Medical Officers of Health**  
14<sup>th</sup> - 20<sup>th</sup> January 2012 (03<sup>rd</sup> Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Returns Received
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
Colombo	232	730	2	8	0	0	6	19	3	3	1	5	0	0	2	2	0	0	77
Gampaha	124	560	3	10	0	0	1	4	0	0	1	9	0	1	6	21	0	0	67
Kalutara	33	130	1	10	0	0	0	5	0	0	1	9	0	0	1	4	0	0	85
Kandy	41	165	1	10	0	0	0	2	4	4	3	9	1	8	0	1	0	0	87
Matale	9	28	2	12	0	1	1	3	1	1	2	6	0	1	0	1	0	0	92
Nuwara	5	18	2	7	0	0	2	2	0	0	0	3	1	5	1	2	0	0	77
Galle	17	73	2	9	0	0	2	4	0	1	4	9	0	0	0	0	0	0	84
Hambantota	13	41	0	4	0	0	0	0	0	1	3	8	3	10	0	1	4	4	92
Matara	52	140	0	6	0	0	0	4	0	0	3	10	2	8	3	13	0	0	100
Jaffna	32	66	5	19	0	1	15	52	0	5	0	2	29	92	0	1	0	0	100
Kilinochchi	0	8	0	3	0	0	1	3	0	0	0	0	3	10	0	0	0	2	75
Mannar	5	32	0	3	0	1	2	4	0	0	1	3	1	3	0	0	0	0	80
Vavuniya	10	17	1	1	6	10	2	3	0	2	4	7	0	0	1	1	0	0	100
Mullaitivu	0	2	0	2	0	1	0	1	0	0	0	2	1	1	0	0	0	0	100
Batticaloa	62	159	1	10	0	0	0	4	0	1	0	2	0	0	2	2	0	0	71
Ampara	3	7	4	8	0	0	0	0	0	0	1	5	0	0	0	0	0	0	71
Trincomalee	7	22	3	16	1	1	1	3	0	0	2	3	0	0	0	0	0	0	75
Kurunegala	27	100	0	9	2	3	1	6	4	4	5	12	2	9	5	9	0	0	83
Puttalam	28	77	0	11	0	0	0	1	0	0	2	4	1	2	0	0	0	0	75
Anuradhapu	6	28	3	8	0	0	0	1	0	1	2	17	2	3	2	4	0	0	79
Polonnaruw	10	17	3	4	0	0	0	0	0	0	2	6	1	1	0	1	1	1	86
Badulla	6	28	1	5	1	1	2	5	0	0	0	0	2	3	3	5	0	0	88
Monaragala	5	14	0	5	0	1	1	4	0	0	0	10	1	2	0	2	0	1	91
Ratnapura	12	53	5	16	0	3	0	1	0	2	5	18	0	0	4	4	0	0	39
Kegalle	34	103	1	2	0	0	1	4	0	5	2	6	0	1	21	42	0	0	91
Kalmune	6	21	0	14	0	0	0	1	0	0	0	0	0	0	0	0	0	1	62
<b>SRI LANKA</b>	<b>779</b>	<b>2639</b>	<b>40</b>	<b>212</b>	<b>10</b>	<b>23</b>	<b>38</b>	<b>136</b>	<b>12</b>	<b>30</b>	<b>44</b>	<b>165</b>	<b>50</b>	<b>160</b>	<b>51</b>	<b>116</b>	<b>05</b>	<b>09</b>	<b>81</b>

Source: Weekly Returns of Communicable Diseases WRCD).

\*Dengue Fever / DHF # + . 2+ ! \$ .

\*\*Timely # \$ # 10 " 1031 ( # 51= # # \$ , 199

A > \$ , B > \$ #

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**ON STATE SERVICE**

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