Supplementary information

Table S1

Serotype	N (%)
DENV1	39 (14)
DENV2	100 (37)
DENV3	72 (26)
DENV4	6 (2)
Serotype unknown	55 (20)
Total	272 (100)

Table S1. Serotype distribution. Serotype distribution (by PCR) of detected symptomatic cases.

Table S2

Parameter	Estimate (95% CI)
Mean permanent rise in log2-titers (ω_m)	1.33 (1.18-1.48)
Variance permanent rise in log2-titers (ω_v)	1.85 (1.42-2.47)
Mean temporary rise in log2-titers (γ_m)	5.39 (5.14-5.64)
Variance temporary rise in log2-titers (γ_v)	4.54 (3.72-5.64)
Mean decay in log2-titers per day (δ_m)	0.017 (0.015-0.019)
Variance decay in log2-titers (δ_v)	0.00020 (0.00015-0.00028)
Difference in rise for infecting vs. non infecting serotype (primary infection only) (η)	1.16 (1.15-1.18)
Measurement error (σ - standard deviation of log2-titers)	0.49 (0.49-0.50)
DENV2 bias (χ_2) (log2-titers)	-0.85 (-0.88 - -0.81)
DENV3 bias (χ_3) (log2-titers)	-0.19 (-0.22- -0.16)
DENV4 bias (χ_4) (log2-titers)	0.06 (0.04-0.09)
Daily force of infection in 1998 per serotype ($\bar{\lambda}$)	0.00018 (0.00016-0.00019)
1997 FOI vs 1998 (β_2)	1.11 (0.97-1.27)
1999 FOI vs 1998 (β_2)	0.88 (0.76-1.00)
2000 FOI vs 1998 (β_3)	0.29 (0.23-0.35)
2001 FOI vs 1998 (β_4)	1.01 (0.88-1.17)
2002 FOI vs 1998 (β_5)	0.43 (0.34-0.53)
Seasonality parameter 1 (δ)	0.32 (0.24-0.39)
Seasonality parameter 2 (ζ)	4.0 (3.7-4.2)

Table S2. Parameter estimates from model fit to all study subjects (N=3,451). Model parameter estimates from model fit to all study subjects (N=3,451)

Table S3

	Any symptoms	Hospitalization	DHF
Intercept	-0.65 (-0.95- -0.37)	-2.09 (-2.68- -1.63)	-2.66 (-3.26- -2.09)
1998	Ref	Ref	Ref
1999	0.02 (-0.40-0.42)	0.02 (-1.08-0.84)	-0.01 (-0.96 – 0.76)
2000	0.04 (-0.58-0.66)	0.03 (-1.32-0.88)	0.03 (-15.71-1.10)
2001	0.04 (-0.36-0.36)	-0.05 (-0.73-0.67)	-0.05 (-0.81-0.85)
2002	0.03 (-0.53-0.57)	-0.02 (-1.20-0.89)	-0.04 (-1.39-1.04)

Table S3. **Log-odds of symptoms, hospitalization and DHF for those infected during the surveillance windows (N=781) as a function of year of infection.** Exponentiated coefficients from logistic regression models with 95% confidence intervals in parentheses.

Table S4

	Any symptoms		Hospitalization		DHF	
	Simple	Multivariable	Simple	Multivariable	Simple	Multivariable
Intercept	-0.62	-0.67	-2.59	-3.17	-3.11	-4.65
	(-0.80- -0.47)	(-1.00- -0.31)	(-2.95- -2.30)	(-4.11- -2.48)	(-3.56- -2.76)	(-7.21- -3.38)
Age 8-9	-0.03	-0.02	0.43	0.48	0.21	0.33
	(-0.36 – 0.31)	(-0.36- 0.31)	(-0.15-1.00)	(-0.10-1.08)	(-0.58-0.94)	(-0.52-1.10)
Age >9	Ref	Ref	Ref	Ref	Ref	Ref
Titer	-	0.43	-	4.03	-	7.39
		(-0.70-1.63)		(1.67-7.43)		(3.11-14.99)
Titer^2	-	-0.69	-	-7.22	-	-10.53
		(-2.30- 0.73)		(-13.40- -2.56)		(-19.11- -3.81)

Table S4. **Regression for log-odds of symptoms, hospitalization and DHF as a function of with age and titer**. Exponentiated coefficients from logistic regression models with 95% confidence intervals in parentheses.

Table S5

Parameter	True value	Estimated (95% confidence intervals)
Mean permanent rise in titers (ω_m)	1.4	1.3 (1.1-1.5)
Variance permanent rise in titers (ω_v)	2.0	1.5 (1.0-2.3)
Mean temporary rise in titers (γ_m)	5.5	5.2 (5.0-5.5)
Variance temporary rise in titers (γ_v)	2.0	1.4 (1.0-2.0)
Mean decay in titers (δ_m)	0.02	0.02 (0.02-0.03)
Variance decay in titers (δ_v)	0.0002	0.0005 (0.0002-0.0009)
Difference in rise for infecting vs. non infecting serotype (primary infection only) (η)	1.20	1.18 (1.16-1.20)
Measurement error	0.50	0.49 (0.49-0.50)
DENV2 bias (χ_2)	-0.8	-0.8 (-0.7- -0.9)
DENV3 bias (χ_3)	-0.2	-0.2 (-0.1-0.3)
DENV4 bias (χ_4)	0.05	0.04 (-0.02-0.11)
Daily force of infection in 1998 ($\bar{\lambda}$)	0.0009	0.0011 (0.0009-0.0014)
Year 2 FOI vs Y1 (β_2)	1.0	0.9 (0.7-1.1)
Year 3 FOI vs Y1 (β_3)	0.2	0.2 (0.1-0.2)
Year 4 FOI vs Y1 (β_4)	1.0	1.0 (0.8-1.3)
Year 5 FOI vs Y1 (β_5)	0.4	0.2 (0.1-0.5)
Seasonality parameter 1 (δ)	0.4	0.4 (0.3-0.5)
Seasonality parameter 2 (ζ)	4.0	3.8 (3.5-4.1)
Number of subclinical infections	370	360 (350-370)

Table S5. Simulated results. Results from simulated epidemics from 1000 randomly selected individuals from the cohort.

Table S6

Parameter	True value	Estimated (95% confidence intervals)
Mean permanent rise in titers (ω_m)	1.4	1.4 (1.2-1.6)
Variance permanent rise in titers (ω_v)	2.0	1.3 (0.9-2.0)
Mean temporary rise in titers (γ_m)	5.5 for symptomatic 4.5 for subclinical	5.2 (4.9-5.5)
Variance temporary rise in titers (γ_v)	2.0	2.0 (1.4-2.8)
Mean decay in titers (δ_m)	0.02	0.024 (0.019-0.032)
Variance decay in titers (δ_v)	0.0002	0.0005 (0.0002-0.0011)
Difference in rise for infecting vs. non infecting serotype (primary infection only) (η)	1.20	1.17 (1.16-1.20)
Measurement error	0.50	0.50 (0.49-0.50)
DENV2 bias (χ_2)	-0.8	-0.76 (-0.69- -0.83)
DENV3 bias (χ_3)	-0.2	-0.22 (-0.0.15- -0.28)
DENV4 bias (χ_4)	0.05	0.08 (0.01 – 0.15)
Daily force of infection in 1998 ($\bar{\lambda}$)	0.0009	0.001 (0.0009-0.0013)
Year 2 FOI vs Y1 (β_2)	1.0	0.9 (0.8-1.2)
Year 3 FOI vs Y1 (β_3)	0.2	0.2 (0.1-0.3)
Year 4 FOI vs Y1 (β_4)	1.0	1.2 (0.9-1.6)
Year 5 FOI vs Y1 (β_5)	0.4	(0.4 (0.2-0.7)
Seasonality parameter 1 (δ)	0.4	0.4 (0.2-0.5)
Seasonality parameter 2 (ζ)	4.0	3.8 (3.4-4.2)
Number of subclinical infections	340	320 (310-330)

Table S6. Simulated results in scenario with different rises for symptomatic and non-symptomatic infections. Results from simulated epidemics from 1000 randomly selected individuals from the cohort where different antibody rises were induced for symptomatic vs non-symptomatic infections.

Table S7

Parameter	Base model (95% CI)	Extra school-specific parameters (95%CI)
Mean permanent rise in log2-titers (ω_m)	1.33 (1.18-1.48)	1.33 (1.19-1.48)
Variance permanent rise in log2-titers (ω_v)	1.85 (1.42-2.47)	1.90 (1.46-2.54)
Mean temporary rise in log2-titers (γ_m)	5.39 (5.14-5.64)	5.42 (5.19-5.65)
Variance temporary rise in log2-titers (γ_v)	4.54 (3.72-5.64)	4.07 (3.35-5.12)
Mean decay in log2-titers per day (δ_m)	0.017 (0.015-0.019)	0.016 (0.015-0.018)
Variance decay in log2-titers (δ_v)	0.00020 (0.00015-0.00028)	0.00020 (0.00015-0.00028)
Difference in rise for infecting vs. non infecting serotype (primary infection only) (η)	1.16 (1.15-1.18)	1.16 (1.15-1.17)
Measurement error (σ - standard deviation of log2-titers)	0.49 (0.49-0.50)	0.49 (0.49-0.50)
DENV2 bias (χ_2) (log2-titers)	-0.85 (-0.88 - -0.81)	-0.85 (-0.87 - -0.83)
DENV3 bias (χ_3) (log2-titers)	-0.19 (-0.22- -0.16)	-0.19 (-0.22- -0.18)
DENV4 bias (χ_4) (log2-titers)	0.06 (0.04-0.09)	0.06 (0.04-0.07)
Seasonality parameter 1 (δ)	0.32 (0.24-0.39)	0.32 (0.25-0.39)
Seasonality parameter 2 (ζ)	4.0 (3.7-4.2)	4.0 (3.8-4.3)
Number of augmented infections	1,149 (1,135-1,163)	1,151 (1,137-1,165)

Table S7. Parameter estimates when incorporating school-specific force of infection parameters across all study subjects (N=3,451). Parameter estimates when a separate force of parameter estimate was included for each of the 12 schools.

Table S8

	Seronegative at baseline		Seropositive at baseline	
	Pre vaccination	Post vaccination	Pre vaccination	Post vaccination
DENV1	5	26	278	912
DENV2	5	69	306	1050
DENV3	5	71	261	907
DENV4	5	73	73	353
Mean	**5**	**60**	**228**	**806**

Table S8. Results extracted from Dengvaxia vaccine study. PRNT titers pre and post vaccination from participants in the Dengvaxia phase III trial as extracted from Table S8 in Villar et al., (2015).