Supplementary Information

A Systematic Review and Meta-Analysis of Dengue Risk with Temperature Change

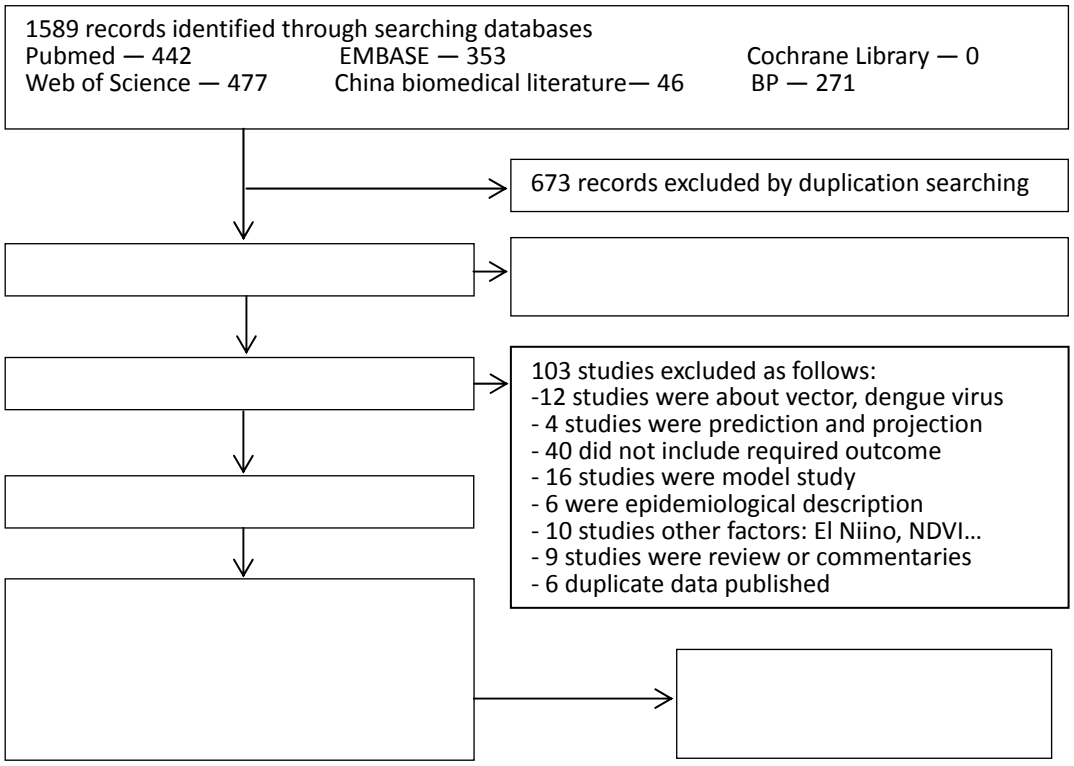

Figure S1. Flowchart of literature research and review process.

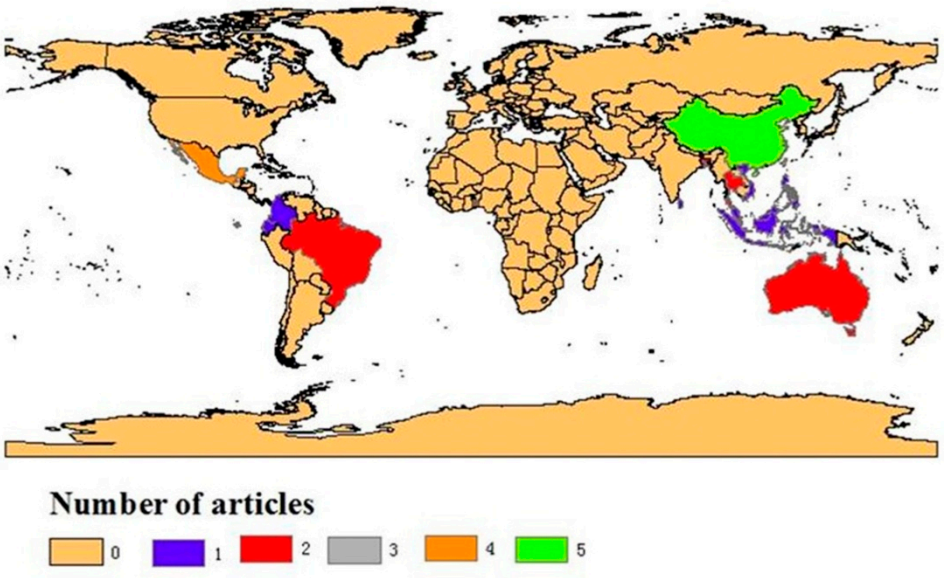

Figure S2. The location of the included articles.

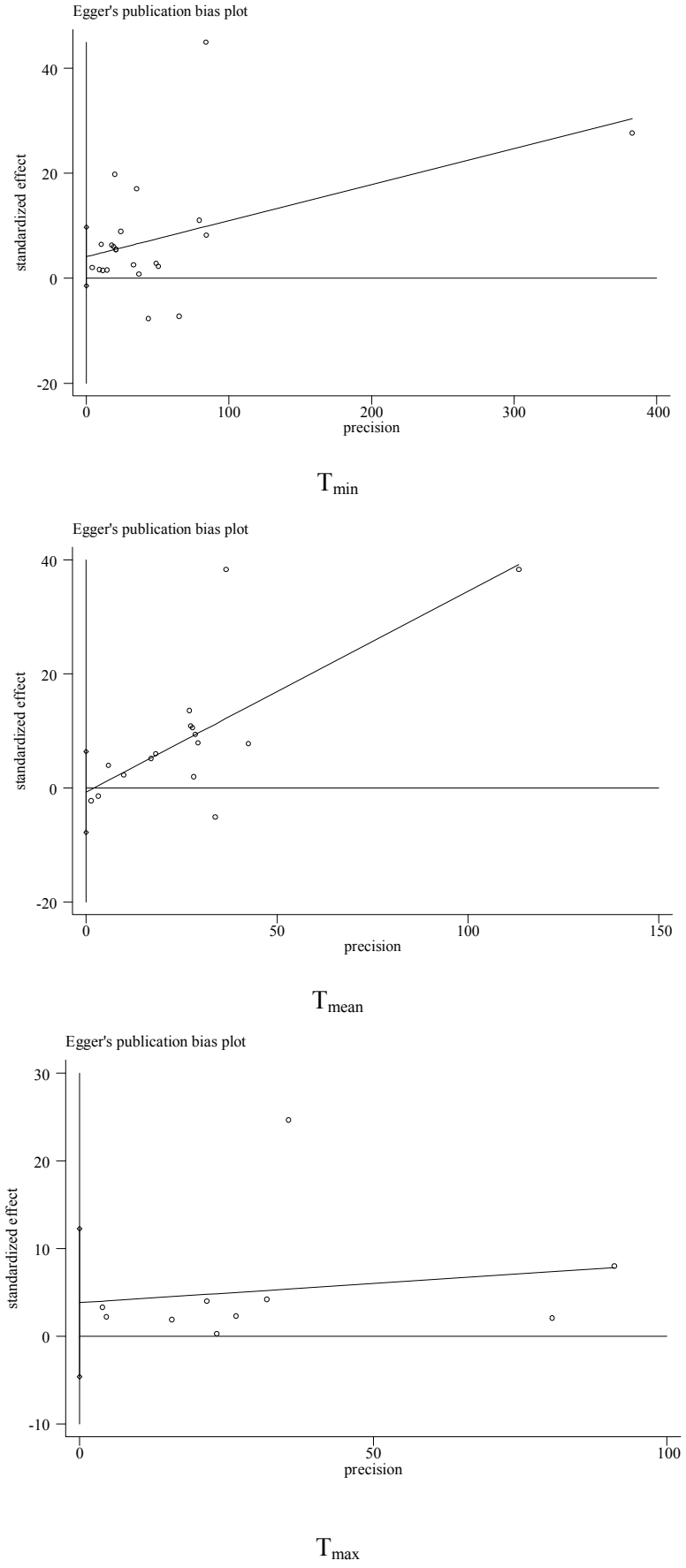

Figure S3. Egger's publication bias plot of the included articles.

Table S1. Contextual details of studies included in the meta-analysis by publication year.

No.	First Author	Published	Location	Period	Altitude (m)	Climatic Zone	Data Source of Dengue	Data Source of Meteorology	Statistical Method	Studied Variable	Measure of Effect	Outcome
[1]	Wu	2009	Taiwan	1998–2006	10	Tropical	NID Notification Surveillance System	Central Weather Bureau in Taiwan	Multiple logistic regression	*Tmean*	OR	Incidence rate
[2]	Lu	2009	Guangzhou	2001–2006	15	Subtropical	Chinese Center for Disease Control and Prevention	China Meteorological Data Sharing Service System	Multivariate Poisson regression	*Tmin*	*β*	Case
[3]	Yang	2009	Cixi, China	2004.7–2010	23	Subtropical	Zhejiang Provincial Center for Disease Control and Prevention	Archives of Meteorology, China Meteorological Administration	N/A	*Tmin Tmax Tmean*	*p*	Incidence rate
[4]	Rua-Uribe	2013	Medellin, Colombia	2001–2011	1500	Tropical	Unidades Primarias Generadoras de Datos	Meteorología y Estudios Ambientales de Colombia	Autoregressive integrated moving average	*Tmin, Tmax, Tmean*	*p*	Incidence rate
[5]	Depradine	2004	Barbados	1995–2000	10	Tropical	N/A	N/A	Multiple linear regression	*Tmin Tmax Tmean*	*p*	Case
[6]	Promprou	2005	Southern Thailand	1993–2002	38	Tropical	Ministry of Public Health	Climatology Division of the Meteorological Department	Multiple linear regression	*Tmin Tmax Tmean*	*β*	Incidence rate
[7]	Chowell	2006	Colima, Mexico	2002	482	Tropical	Secretariat of Public Health	Local meteorological offices	Multiple linear regression	*Tmin Tmax Tmean*	*β*	Incidence rate
[8]	Hurtado-Daz	2006	Veracruz, Mexico	1995–2003	10	Tropical	Veracruz State Health Ministry	National Meteorological Service and Regional Gulf-Central Administration	Second-order polynomial regression	*Tmin*	*β*	Incidence rate
[9]	Arcari	2007	Indonesia	1992–2001	16	Tropical	Indonesian Ministry of Health	Bureau of Meteorology in Jakarta	Multiple linear regression	*Tmean*	*p*	Incidence rate
[10]	Brunkard	2008	Matamoros, Tamaulipas	1995–2005	1	Subtropical	Matamoros, Tamaulipas, Mexico	National Climatic Data Center	Multiple linear regression	*Tmax*	OR	Incidence rate
[11]	Su	2008	Metro Manila Philippines	1996–2005	13	Tropical	National Epidemiology Sentinel Surveillance System	Philippine Atmospheric, Geophysical, and Astronomical Services	Multiple linear regression	*Tmean*	*p*	Incidence rate

Table S1. *Cont.*

No.	First Author	Published	Location	Period	Altitude (m)	Climatic Zone	Data Source of Dengue	Data Source of Meteorology	Statistical Method	*Studied Variable*	Measure of Effect	Outcome
[12]	Hsieh	2009	Taiwan	e-weeks 23–52, 2007	10	Tropical	Taiwan Centers for Disease Control	N/A	Richards model	*Tmin Tmax Tmean*	OR	Case/ Inci-dence rate
[13]	Chen	2010	Taiwan	2001–2008	10	Tropical	Taiwan Centers for Disease Control	Taiwan Environmental Protection Agency	Multivariate Poisson regression	*Tmin*	*β*	Incidence rate
[14]	Sriprom	2010	Sakon Nakhon Province, Thailand	2005–2007	187	Tropical	Sakon Nakhon Provincial Public Health Office	Sakon Nakhon Meteorological Office	Generalized Linear Mode	*Tmin*	*β*	Incidence rate
[15]	Colon-González	2011	Warm and humid provinces of Mexico	1985–2007	580	Tropical	National System of Epidemiologic Surveillance in Mexico	Mexican National Meteorological Service	Multiple linear regression	*Tmin Tmax*	*β*	Cumulative incidence rate
[16]	Gharbi	2011	Guadeloup, French West Indies	2000–2007	59	Tropical	Institut Pasteur in Guadeloupe	The meteorological station of Raizet	Seasonal Autoregressive Integrated Moving Average	*Tmin, Tmean*	*β*	Incidence rate
[17]	Lai	2011	Kaohsiung, Taiwan	2002–2007	9	Tropical	Taiwan Centers for Disease Control	Taiwan Environmental Protection Administration and Central Weather Bureau	Duncan's Multiple Range test	*Tmin Tmax*	*p*	case
[18]	Pham	2011	Dak Lak, Vietnam	2004–2008	600	Tropical	Province's Center for Preventive Health	Dak Lak meteorological office	Multivariate Poisson regression	*Tmean*	*β*	Incidence rate
[19]	Pinto	2011	Singapore	2000–2007	23	Tropical	Ministry of Health Singapore	Climate Diagnostic Center and National Oceanographic and Atmospheric Administration	Multivariate Poisson regression	*Tmin, Tmax*	*β*	Incidence rate

Table S1. *Cont.*

No.	First Author	Published	Location	Period	Altitude (m)	Climatic Zone	Data Source of Dengue	Data Source of Meteorology	Statistical Method	*Studied Variable*	Measure of Effect	Outcome
[20]	Earnest	2012	Singapore	2001–2008	23	Tropical	Ministry of Health Singapore	Meteorological Services Division of the National Environment Agency	Multivariate Poisson regression	*Tmean*	*β*	Incidence rate
[21]	Gomes	2012	Rio de Janeiro, Brazil	2001–2009	67	Tropical	Rio de Janeiro City Health Department	Weather Forecasting Center of the National Space Research Institute	Binomial negative Poisson regression	*Tmin*	OR	Case
[22]	Hashizume	2012	Dhaka, Bangladesh	2005–2009	23	Tropical	11 principal hospitals in the Dhaka Metropolitan area	Bangladesh Meteorological Department	Generalized linear Poisson regression	*Tmin Tmax Tmean*	OR	Case
[23]	Hii	2012	Singapore	2000–2010	23	Tropical	Ministry of Health Singapore	Climatic Data Center, National Oceanic and Atmospheric Administration	Multivariate Poisson regression	*Tmean*	OR	Case
[24]	Hu	2012	Queenslan, Australia	2003–2005	130	Tropical	Queensland Health Department	Australian Bureau of Meteorology	Separate Poisson regression models	*Tmax*	OR	Case
[25]	Karim	2012	Dhaka, Bangladesh	2000–2007	23	Tropical	Diseases Control Room of Directorate General of Health Services	Bangladesh Meteorological Department at Dhaka	Multiple linear regression	*Tmean*	*β*	Case
[26]	Cheong	2013	Malaysia	2008–2010	56	Tropical	Ministry of Health Malaysia	National Climatic Data Center website	Poisson generalized additive models	*Tmin, Tmax*	OR	Case
[27]	Goto	2013	Sri Lanka	2005–2011	54	Tropical	Ministry of Health, Sri Lanka	Department of Meteorology in Sri Lanka	The ordinary least squares	*Tmean*	*β*	Incidence rate
[28]	Huang	2013	Cairns, Australia	2000–2009	8	Tropical	Queensland Health Department	Australian Bureau of Meteorology	Negative-binomial hurdle model	*Tmin*	OR	Case
[29]	Li	2013	Guangzhou, China	2007–2012	15	Subtropical	N/A	N/A	Negative binomial regression	*Tmin*	OR	Incidence rate
[30]	Lowe	2013	Southeast Brazil	2001–2009	392	Tropical	DATASUS (http://dtr2004.saude.gov.br/sinanweb/novo/)	Global Precipitation Climatology Project	Bayesian general linear mixed model	*Tmean*	*β*	Incidence rate

Table S1. *Cont.*

No.	First Author	Published	Location	Period	Altitude (m)	Climatic Zone	Data Source of Dengue	Data Source of Meteorology	Statistical Method	*Studied Variable*	Measure of Effect	Outcome
[31]	Stewart-Ibarra	2013	El Oro, Ecuador	1995–2010	6	Tropical	Ministry of Health Ecuador	National Institute of Meteorology and Hydrology	Generalized linear mixed model	*Tmin*	OR	Standardized morbidity ratios
[32]	Fan	2013	Guangdong, China	2005–2011	15	Subtropical	National Noticeable Disease Surveillance System	China Meteorological Data Sharing Service System	Time-stratified case-crossover model	*Tmin Tmax Tmean*	OR	Case
[33]	Wang	2013	Guangzhou, China	2000–2012	15	Subtropical	Chinese Center for Disease Control and Prevention	China Meteorological Data Sharing Service System	Zero-inflated Poisson Regression Model	*Tmin*	β	Case

Note: N/A = not applicable.

Table S2. Quality assessment of selected studies.

Author	Year	Generalizability	Description of Temperature	Dengue Cases or Incidence	Source of Dengue Data	Reporting Bias	Limitation	Multiple Lag	Adjusted for Time Trend	Adjusted for Seasonality	Fund Supporting
Wu *et al.* [1]	2009	1	1	1	1	1	1	1	1	1	0
Lu *et al.* [2]	2009	1	1	1	1	1	0	1	0	0	1
Yang *et al.* [3]	2009	0	1	1	1	1	1	N/A	N/A	N/A	1
Rua-Uribe *et al*. [4]	2013	1	1	1	1	1	0	1	0	0	0
Depradine *et al.* [5]	2004	1	0	1	1	1	0	1	1	0	0
Promprou *et al.* [6]	2005	1	1	1	1	1	0	0	0	0	1
Chowell *et al.* [7]	2006	1	1	1	1	1	1	1	1	1	0
Hurtado-Daiz *et al.* [8]	2006	1	1	1	1	1	1	1	1	1	0
Arcari *et al.* [9]	2007	1	1	1	1	1	1	1	0	1	0
Brunkard *et al.* [10]	2008	1	1	1	1	1	1	1	0	0	0
Su [11]	2008	1	0	1	1	1	0	0	0	0	0
Hsieh *et al.* [12]	2009	1	1	1	1	1	0	1	1	0	1

Table S2. *Cont.*

Author	Year	Generalizability	Description of Temperature	Dengue Cases or Incidence	Source of Dengue Data	Reporting Bias	Limitation	Multiple Lag	Adjusted for Time Trend	Adjusted for Seasonality	Fund Supporting
Chen *et al.* [13]	2010	1	1	1	1	1	1	1	0	0	0
Sriprom *et al.* [14]	2010	1	1	1	1	1	0	0	0	0	0
Colon- González *et al.* [15]	2011	1	1	1	1	1	1	1	1	1	1
Gharbi *et al.* [16]	2011	1	1	1	1	1	1	1	1	1	0
Lai [17]	2011	1	1	1	1	1	0	1	0	0	0
Pham *et al.* [18]	2011	1	1	1	1	1	1	0	0	0	0
Pinto *et al.* [19]	2011	1	1	1	1	1	1	1	0	0	0
Earnest *et al.* [20]	2012	1	1	1	1	1	1	1	1	1	1
Gomes *et al.* [21]	2012	1	1	1	1	1	1	1	0	1	0
Hashizume *et al.* [22]	2012	1	1	1	1	1	1	1	1	1	1
Hii *et al.* [23]	2012	1	1	1	1	1	1	1	0	0	1
Hu *et al.* [24]	2012	1	1	1	1	1	1	0	0	0	1
Karim *et al.* [25]	2012	1	1	1	1	1	0	0	1	1	0
Cheong *et al.* [26]	2013	1	1	1	1	1	0	1	1	1	0
Goto *et al.* [27]	2013	1	1	1	1	1	1	1	0	0	1
Huang *et al.* [28]	2013	1	1	1	1	1	1	1	0	1	1
Li *et al.* [29]	2013	1	1	1	0	1	1	1	0	0	1
Lowe *et al.* [30]	2013	1	1	1	1	1	1	1	1	1	1
Stewart-Ibarra *et al.* [31]	2013	1	1	1	1	1	0	1	0	0	1
Fan *et al.* [32]	2013	1	1	1	1	1	1	1	1	1	1
Wang *et al.* [33]	2013	1	1	1	1	1	1	1	0	0	1

Notes: N/A = not applicable; 1 = yes; 0 = no.

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